CROP PROTECTION

2022

The Blue Book

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In co-operation with the agro-chemical industry

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KNOW THE MARKET IMPACTS OF YOUR CROP PROTECTION PRODUCT CHOICES

On-farm practices make a difference in protecting Canada's reputation as a trusted supplier of high-quality canola, cereals and pulses. Follow the **Keep it Clean 5 Simple Tips** to ensure your crop is market ready.

keepitclean.ca/5-simple-tips

Keep it Clean!
Resources to Grow Market-Ready Crops

CANADIAN AGRICULTURAL PARTNERSHIP
canolacouncil OF CANADA
Pulse Canada
Cereals Canada
Conseil de l'orge du Canada
Barley Council of Canada
Prairie Oat Growers Association
Canada

Address and telephone numbers

Chemical companies

ADAMA Agricultural Solutions Canada Ltd.
300 - 191 Lombard Avenue
Winnipeg, MB R3B 0X1
1-855-264-6262

Adjuvants Plus Inc.
1755 Division Road North
Kingsville, ON N9Y 2Y8
1-877-512-4659

Advantage Crop Protection Inc.
601, 402 - 21st Street East
Saskatoon, SK
1-888-931-2530
www.advantagecropprotection.ag

AgraCity Crop and Nutrition Ltd. (New Agco)
320 22 Street East
Saskatoon, SK S7K 0H1
1-844-269-3276

BASF Canada
100 Milverton Drive, 5th floor
Mississauga, ON L5R 4H1
416-675-3611 or 1-877-371-2273
www.agproducts.basf.com

Bayer CropScience Inc.
200, 160 Quarry Park Blvd., SE
Calgary, AB T2P 3G3
1-888-283-6847
www.bayercropscience.ca

Belchim Crop Protection Canada
104 Cooper Drive Unit 3
Guelph, ON N1G 4X5
519-826-7878 or 1-866-613-3336
www.engageagro.com

Chemtura Co.
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www.corteva.ca

FMC of Canada
6755 Mississauga Road, Suite 204
Mississauga, ON L5N 7Y2
client support: 1-833-362-7722
www.fmccrop.ca

Gowan Company
P.O. Box 5569
Yuma, AZ 85366-5569
1-800-833-5720
www.gowanco.com

Interprovincial Co-operative Limited
945 Marion Street
Winnipeg, MB R2J 0K7
204-233-3461
www.ipco.ca

Loveland Products Canada Inc.
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Dorchester, ON N0L 1G5
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www.monsanto.ca

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519-821-3110
24-hour emergency: 613-787-5620
www.noracconcepts.com

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24 Hour Emergency: 1-800-424-9300
www.nufarm.ca

Peacock Industries Inc.
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Hague, SK S0K 1X0
306-225-4691
www.grasshoppercontrol.com

Sharda Canada
1-844-810-5720
admin.ca@shardaintl.com
www.shardacanada.ca

Syngenta Crop Protection Canada Inc.
300, 6700 MacLeod Trail South
Calgary, AB T2H 0L3
1-877-964-3682
24-hour emergency: 1-800-327-8633
www.syngenta.ca

UAP Canada Inc.
789 Donnybrook Drive
Dorchester, ON N0L 1G5
1-800-561-5444
24-hour emergency: 1-800-561-8273
www.uap.ca

Note: UAP is a distributor for all Sharda products and any questions regarding these products can be directed to the UAP Info line.

Univar Solutions
99 Lowson Crescent
Winnipeg, MB R3P 0T3
1-855-888-8648
www.univarsolutions.com

UPL Ltd.
998, 105 - 150 Crowfoot Crescent NW
Calgary, AB T3G 3T2
1-866-761-9397
Fax:1-866-231-8957

Pest Management Regulatory Agency

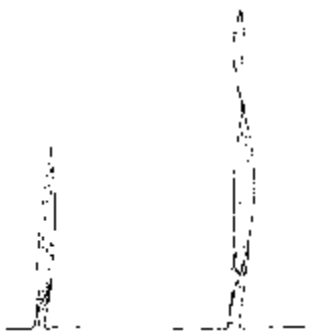
The Pest Management Regulatory Agency (PMRA) of Health Canada is responsible for providing safe access to pest management tools, such as pesticides and sustainable pest management strategies, while minimizing risks. The agency registers all pest control products that may be used in Canada. If there are questions or inquiries regarding pesticides, product labels or safety precautions, contact PMRA at the following telephone numbers:

Edmonton: 780-495-5042
National toll free number: 1-800-267-6315 – Pest Management Information Service

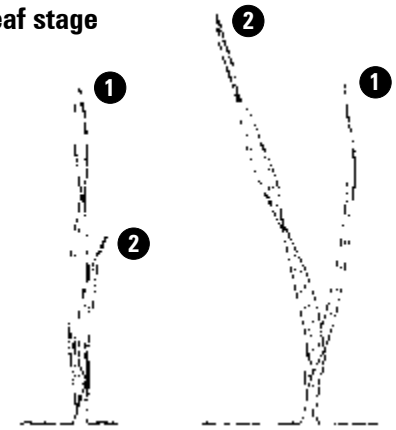
Visit the website: *www.hc-sc.gc.ca/cps-spc/pest/index-eng.php*
Online versions of the current labels are available via the following link:
www.canada.ca/en/health-canada/services/consumer-product-safetypesticides-pest-management/registrants-applicants/tools/pesticide-label-search.html

Leaf stages – cereals and grasses

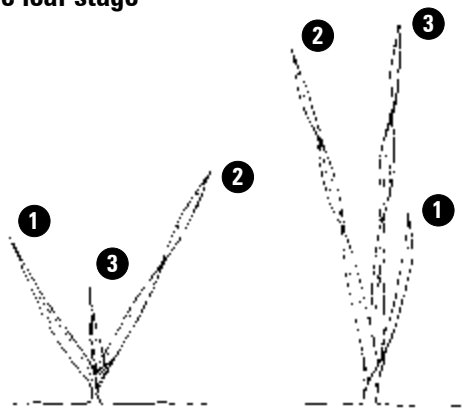
One leaf stage



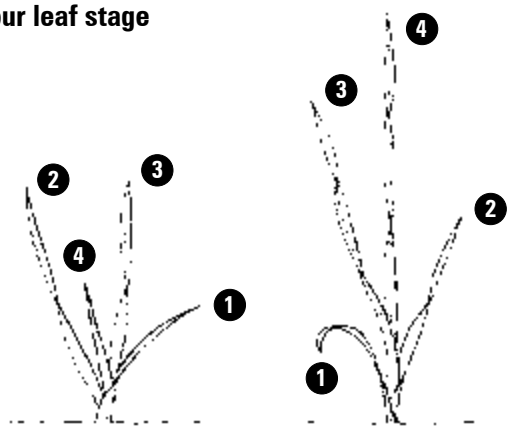
Two leaf stage



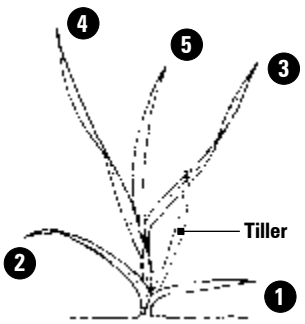
Three leaf stage



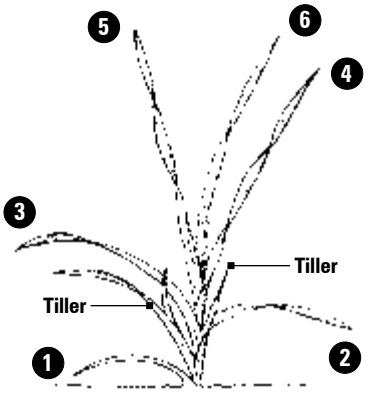
Four leaf stage



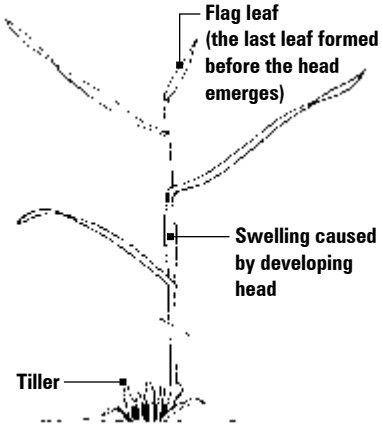
Five leaf stage
With one tiller



Six leaf stage
With two tillers



Cereal - early boot stage



Source: Alberta Agriculture and Forestry

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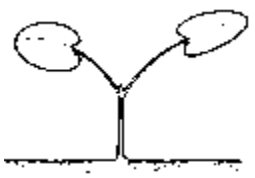
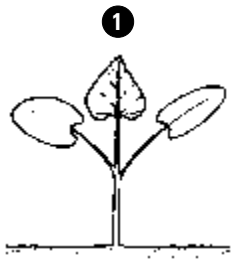
Leaf stages – broadleaf weeds

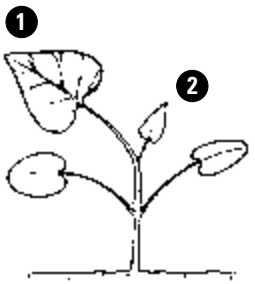
Alternate leaves



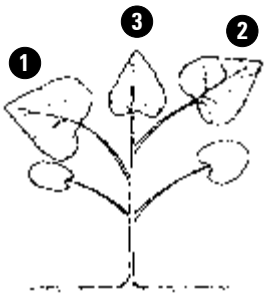
Cotyledon stage



One leaf stage



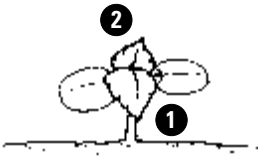
Two leaf stage



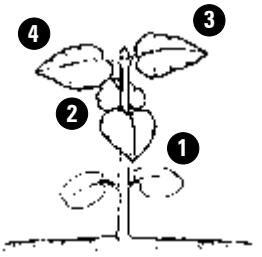
Three leaf stage

Opposite leaves

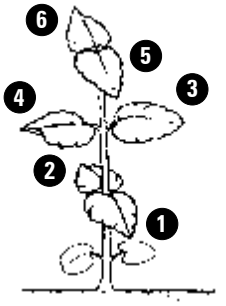
Cotyledon stage



Two leaf stage

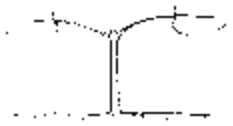


Four leaf stage

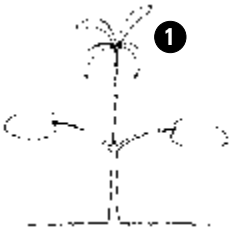


Six leaf stage

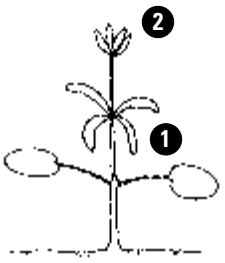
Whorled leaves



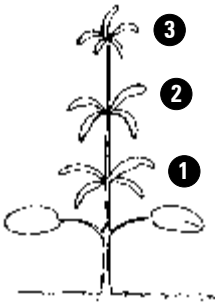
Cotyledon stage



One whorl stage



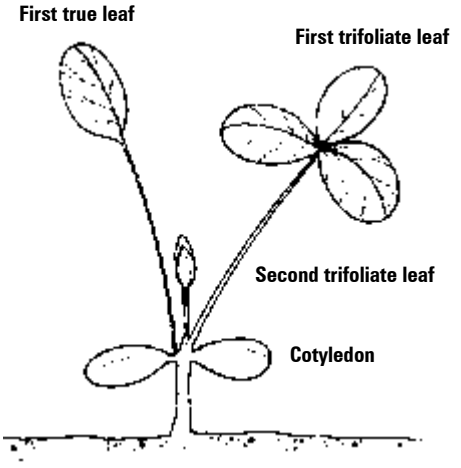
Two whorl stage



Three whorl stage

Leaf stages – legume crops

Alfalfa and clovers



Second trifoliate leaf stage

Source: Alberta Agriculture and Forestry

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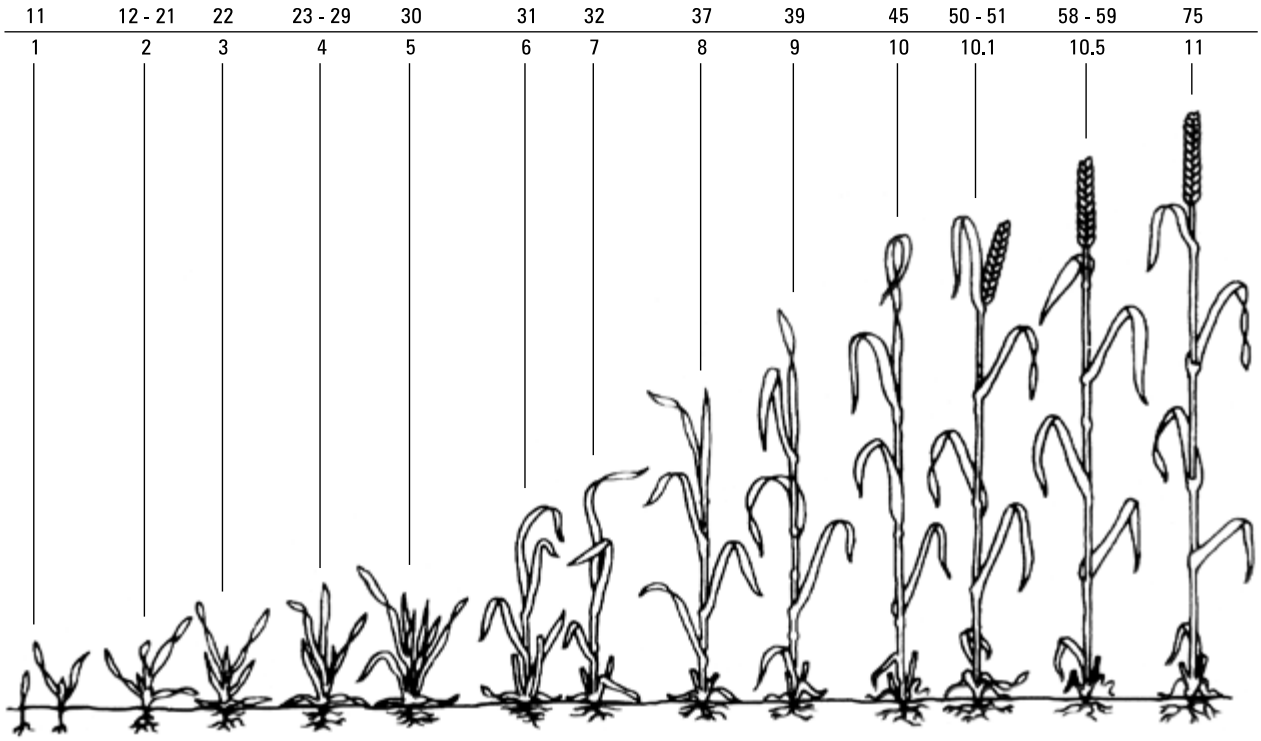
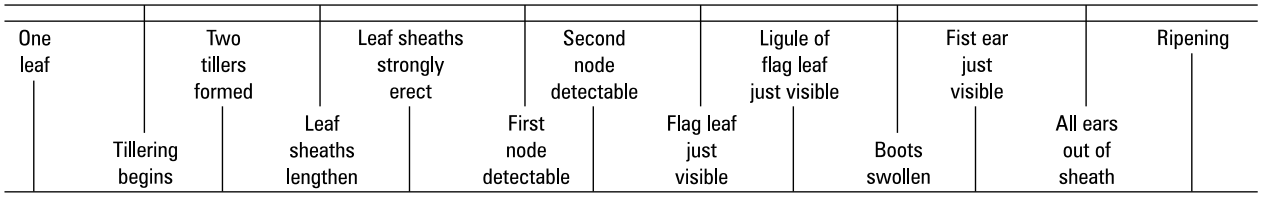
Cereal growth stages

Zadoks decimal growth stages



Feekes large growth stages



Source: Alberta Agriculture and Forestry

The Feekes and Zadoks scales define the growth stages of a relatively uniform cereal crop. Completion of these growth stages by the cereal crop will be influenced greatly by soil temperature, moisture, air temperature and day length. For example, stages 2 to 5 in the Feekes scale may take 5 to 6 weeks, whereas stages 6 to 10 may be completed in 2 to 3 weeks under prairie conditions.

To establish the growth stage of a cereal crop using either of these scales, it is necessary to collect a random sample of plants to determine the level of growth attained by the majority of the plants.

Under good growing conditions, examination of up to 10 randomly selected plants may be appropriate. Under conditions of uneven germination and low soil moisture, growth stage assessment may require larger samples.

Application of an agrochemical must be timed precisely to maximize the desired effect on the target crop. All agrochemical applications (fungicides, growth regulators, herbicides or supplemental nutrients) must be based on physiological growth stage of the crop. Applications based on calendar days are less accurate and will be less successful.

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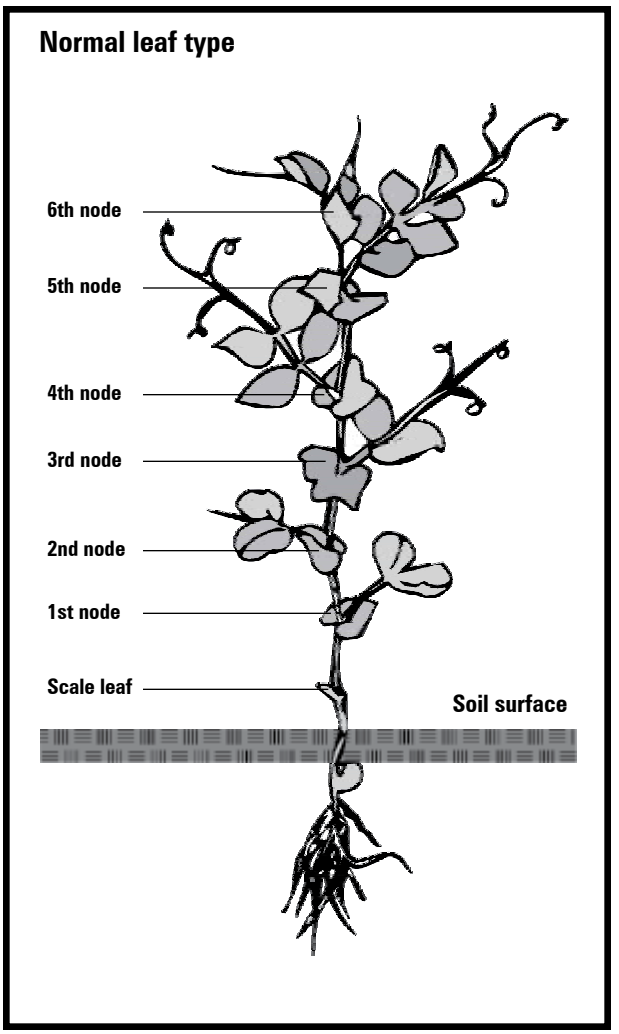
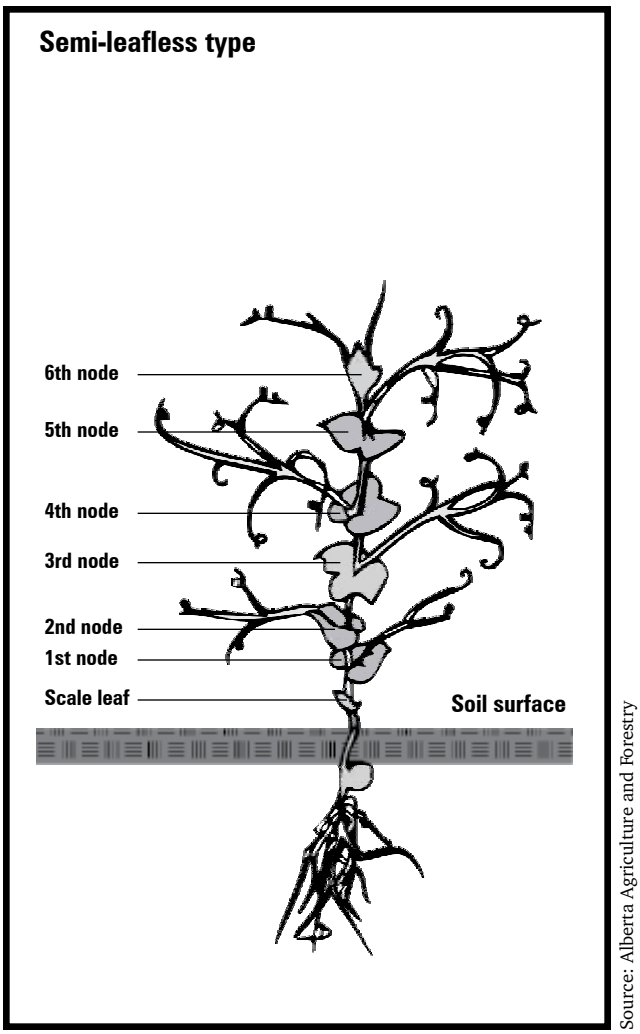
Pea node leaf stages





Source: Alberta Agriculture and Forestry

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Bean leaf stages

Unifoliate

1st trifoliate

3rd trifoliate

4th trifoliate

Source: BASF Canada

Acknowledgement: Technical expertise from Dr. Al Slinkard.

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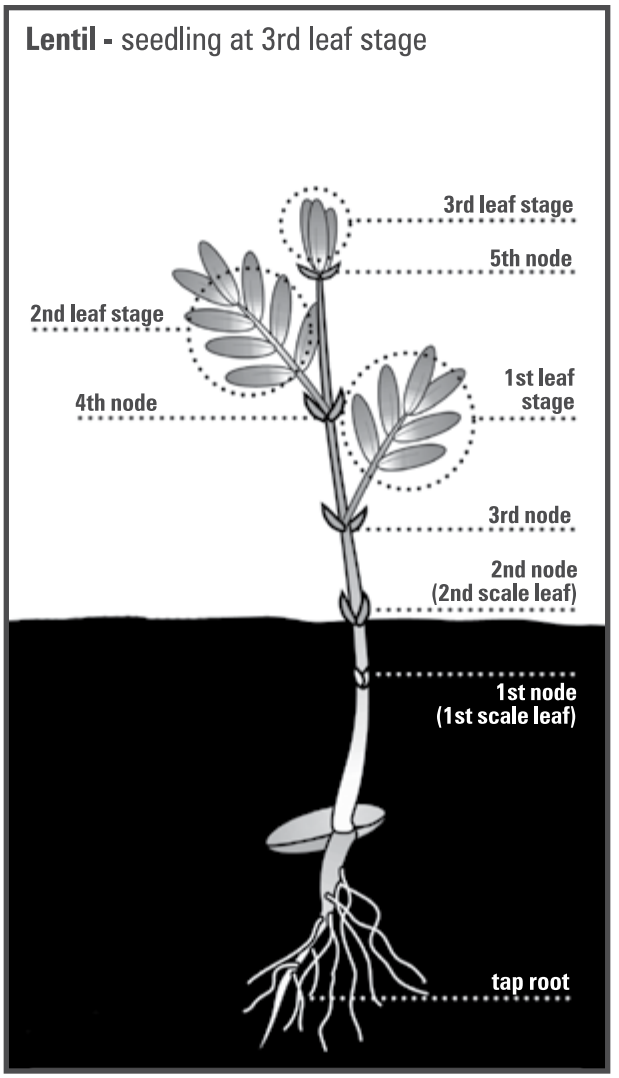
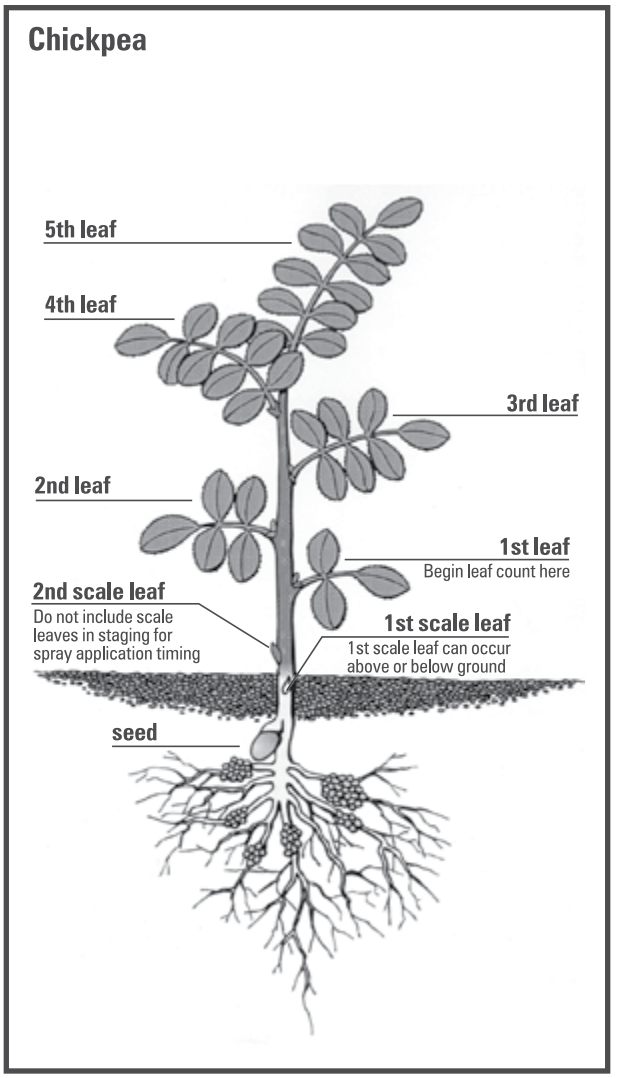
Lentil and chickpea leaf stages



Lentil drawing courtesy of Saskatchewan Pulse Growers.



Source: BASF Canada

Acknowledgement: Technical expertise from Dr. Al Slinkard.

How to use this resource

This publication assists in the selection and application of pesticides. The pesticides are grouped into four main sections:

- herbicides
- insecticides
- seed treatments
- foliar fungicides

Each section is indexed separately and contains selector charts located after the registration information.

Use the pesticide selector charts and the detailed pesticide descriptions to choose the most appropriate chemicals. To select a suitable pesticide, follow these steps.

- Identify the pest(s).
- Refer to the chart for weeds, insect pests or diseases and record the pesticide(s) available.
- Refer to the appropriate pesticide(s) in the text and select the product best suited to your operation.
- Apply the pesticide strictly according to instructions given on the label attached to the product container.

Chemical pest control summary

Know your problem(s)

- Identify the pest(s).
- Estimate infestation level or probable economic loss to determine if treatment is required.
- Know the crop variety. Some products are restricted to, or excluded from, use on specific crop types or varieties.
- If necessary, note soil type or texture of the area to be treated.

If chemical control is necessary, choose a pesticide based on the following criteria

- Registered products for the given crop (tank mixes may have separate recommendations).
- Pests controlled by the product.
- Crop and pest stage of growth or development.
- Recommended application time (e.g., spring, summer, fall; time of day).
- Cropping and/or harvest restrictions of product(s) considered.

Read product label directions for

- Recommended rate(s) for the particular pest, infestation level, crop and field conditions.
- Method of application.
- Any application restrictions during adverse or extreme weather conditions.
- Any other restrictions, cautions or special instructions.

Clean, prepare, maintain application equipment

- Lubricate and repair equipment to get the best possible performance.
- Clean spray tank of residues to prevent crop damage or problems with equipment.
- Clean, calibrate and, if necessary, replace spray nozzles.
- Check pump and pressure system.

Safely prepare pesticides for application

- Use protective clothing and recommended safety equipment; the exposure hazard is greatest during mixing.
- Follow the mixing instructions.
- Use the specified amount and quality of water.
- Use recommended rates (tank mix rates may be different from each pesticide used alone).
- If specified, add adjuvants.
- Record the following: rates used, mix order, pesticides and adjuvants. Also record water quality for future reference.

Apply pesticides using

- Recommended safety precautions and equipment.
- Proper application equipment.
- Recommended rates of pesticides, adjuvants and water.
- Proper time (e.g., growth stage, time of day, season).
- Recommended techniques (e.g., ground speed, pressure, incorporation).
- Record weather conditions at time of application, techniques used, growth stage of crop and pests for future reference.

Sprayer operations

Getting the sprayer ready

- Preliminary maintenance, adjustments and settings must be made according to the operator's manual.
- The entire sprayer system should be cleaned and rinsed.
- Ensure all nozzles are the same size and spray angle by checking the code number on the nozzle tip.
- Partially fill sprayer tank with clean water.
- Check the pump for adequate output. If the desired spraying pressure can be achieved with the agitator and boom valves open, the pump output is okay.
- Check accuracy of main sprayer gauge by installing a new gauge at a tip location on each boom section. Operate entire spray boom at normal pressure. Compare pressure at nozzle to main sprayer gauge. Note pressure difference and adjust sprayer pressure accordingly. Pressure drop is common and is more severe at higher flow rates.
- Inspect spray patterns and replace tips that have streaky patterns. Flat fan nozzle alignment should be slightly offset, so the patterns do not interfere with each other.

Standard benchmarks

*All gallon (gal) measurements cited below are US.

Application volume: 40 litres per acre (L/acre) = 100 litres per hectare (L/ha) = 10.6 gal per acre (gpa)

Spraying pressure: 2.75 bar = 40 pounds per square inch (psi)

Metric equivalents

1 acre	=	0.405 hectare
2.471 acre	=	1 hectare
6.9 kPa	=	1 psi
1.6 km/h	=	1 mph
2.54 cm	=	1 in
1 L/acre	=	2.47 L/ha

Nozzle calibration

There are several reasons why a nozzle may not produce its advertised nominal flow rate. These include plugging of the nozzle, nozzle screen or another component of the nozzle body, obstructed boom section or main screen, nozzle wear and physical damage. Confirming the actual flow rate of the nozzles is an important part of good spray practice.

1. Ensure sprayer is clean and contains sufficient water for calibration.
2. Install accurate pressure gauge on boom. A threaded nozzle cap will fit a standard gauge thread. The nozzle cap can then be installed in place of a nozzle.
3. Operate all boom sections and set boom pressure to 40 psi.
4. Collect spray from each nozzle for a consistent length of time. Depending on the capacity of the vessel, this may be, for example, 30 seconds.
5. Measure and record volume from each nozzle.
6. Calculate average flow rate per minute and compare to nominal flow for that size nozzle (see nozzle chart in this publication).
7. If overall average flow rate is significantly greater than the nominal flow for that nozzle, the set is worn and should be replaced.
8. If flow deviation is associated with a boom section, confirm spray pressure at that section and correct any flow obstructions.
9. If average flow rate is within specifications, identify individual nozzles whose output deviates by more than 5% from the average. Correct by cleaning or replacing.

Nozzle calibration tools are available from certain suppliers. These calculate flow rate electronically, and may store the flow values for analysis.

Nozzle calibration cannot be done with the sprayer's flow meter or by measuring tank contents. Such approaches measure total flow and will not detect problems with individual nozzles or boom sections.

Nozzle sizing (conventional systems)

All sprayer nozzles come in standardized (ISO) sizes, and these sizes are usually identified by numbers stamped on the nozzle as well as the colour of the nozzle itself. The colours and flow numbers are shown in the nozzle chart on page 646.

For field sprayers, the fan angle has a value between 65 and 150, with 80 and 110 being most common. For any given nozzle, wider fan angles produce finer sprays and allow lower boom heights. Flow rate units on all nozzles are US gallons of water per minute (gpm) at 40 psi. An 04 nozzle will be red in colour and deliver 0.4 gpm at 40 psi.

Application volume (i.e., gallons per acre or litres per hectare) is a function of travel speed, nozzle spacing along the boom and nozzle flow rate. The following formulae identify this relationship:

$$\text{US units: } speed\ (mph) = \frac{(nozzle\ flow\ rate\ (gpm) \times 5940)}{(application\ volume\ (gpa) \times nozzle\ spacing\ (inch))}$$

For example, a sprayer exhibits an average nozzle flow of 0.5 gpm, the nozzle spacing is 20" and the intended application volume is 10 gpa.

$$speed\ (mph) = \frac{(0.4 \times 5940)}{(10 \times 20)}$$

$$speed = 11.9\ mph$$

$$\text{Metric units: } speed\ (km/h) = \frac{(nozzle\ flow\ rate\ (L/min) \times 600)}{(application\ volume\ (L/ha) \times nozzle\ spacing\ (m)}$$

For example, a sprayers exhibits an average nozzle flow of 1.6 L/min, the nozzle spacing is 50 cm and the intended application volume is 120 L/ha.

$$speed\ (km/h) = \frac{(1.6 \times 600)}{(120 \times 0.5)}$$

$$speed = 16\ km/h$$

The nozzle chart assumes the common 20" spacing and can be used to select the proper nozzle size. Along the left side are nozzle sizes and pressures (psi). Along the top is application volume (gpa or L/acre). The body of the table contains travel speed (mph).

1. Select the column that contains your application volume.
2. Move down the column until you encounter your target speed.
3. At the target speed, move to the left within that row to arrive at the spray pressure and nozzle size that produced the result.
4. If the spray pressure is above your nozzles' pressure range, continue down the column until your travel speed is encountered again. This solution will be for a larger nozzle size and a lower spray pressure.
5. Continue this process until the suitable pressure solution if found.
6. Once a nozzle size is selected, the possible travel speeds within its pressure range are shown in the original column.

It is important to know the pressure range of the nozzle model. Select a spray pressure that falls near the middle of this range in order to allow for travel speed flexibility.

If the installed nozzle is larger or smaller than the size resulting from this process, adjust water volume or travel speed to compensate. Do not operate the nozzle outside of its recommended pressure range.

Nozzle sizing (pulse width modulated (PWM) systems)

PWM uses a pulsing solenoid at the nozzle body to briefly interrupt the liquid flow to the nozzle. PWM systems should be operated at about 60 to 80% duty cycle on average to optimize features such as turn compensation and travel speed range.

In PWM systems, flow rate changes from different travel speeds are managed by duty cycle, not spray pressure. This allows the operator to select a spray pressure that produces the desired spray quality. This pressure does not change throughout the system's travel speed range.

The same chart can be used to size for PWM systems by adding 20 to 40% water volume to the desired solution. If wanting to apply 10 gpa, select a nozzle that delivers between 12 and 14 gpa. The duty cycle will automatically be reduced from 100% (wide open) to between 60 and 80% in order to produce the 10 gpa flow rate.

Calculating required product amounts

Step 1: Determine the number of acres to be sprayed.

Example: 160 acres

Step 2: Know the sprayer tank capacity, which is marked on sprayer tank.

Example: 1,200 gal (4,500 L)

Step 3: Determine spray volume needed per acre, which can be obtained by consulting the pesticide label or this publication.

Example: 10 gpa (40 L/acre)

Step 4: Calculate total spray solution needed by multiplying number of acres x litres per acre.

Example: 160 acres x 40 L/acre = 6,400 L
160 acres x 10 gpa= 1,600 gal

Some product will remain in the sprayer's plumbing system after it is pumped empty. This volume needs to be added to the calculated amount. It is advisable to monitor the amount of spray remaining in the tank throughout the spray operation to ensure the sprayer's flow meter operates properly and the intended application rate is achieved. The application rate can be adjusted slightly during the operation to minimize leftover spray mix.

Step 5: Calculate the total amount of pesticide needed by consulting the pesticide label or this publication (multiply litres of pesticide per acre x number of acres to spray).

Example 1: 0.6 L/acre
0.6 L/acre x 160 acres = 96 L of product

Example 2: 30 acres/case
100 acres x 30 acres/case = 5.3 cases

Step 6: For maximum efficiency, determine the number of tanks needed and the pesticide load required. For example, the product may be packaged so that 1 case is sufficient to treat 30 acres, and the field requires 5.3 cases. Dividing the loads accordingly, the last would require a partial case.

Example: Load 1 – 3 cases *
30 acres/case = 90 acres
90 acres * 10 gpa = 900 gal

Load 2 – 70 acres remaining
70 acres / 30 acres/case = 2.3 cases
70 acres * 10 gpa = 700 gal

Calibrating small sprayers

The spray volume a backpack or hand-held sprayer will apply per acre can be determined by field testing the sprayer on a portion of an acre. The size of the test area commonly used is 1/100 of an acre. It is important that the test area surface is similar to the surface to be sprayed, so the walking speed will remain the same.

Step 1: Establish a test run distance to spray 1/100 acre (40.5 m^2) according to the swath width of the sprayer.

Swath width	Test run length
0.5 metres	81 metres
1 metres	40.5 metres
1.5 metres	27 metres
2 metres	20.2 metres

Step 2: At a comfortable walking speed, spray the test area and measure the volume of water used (repeat 2 or 3 times to obtain an average). This is the amount applied to 1/100 acre.

Example: 2 litres

Step 3: Multiply the figure arrived at in Step 2 by 100 to get the spray volume per acre.

Example: 2 L x 100 = 200 L/acre

Step 4: Determine the amount of pesticide to add per tank load. Divide the volume applied per acre by tank capacity to determine the number of fills required to spray an acre.

Example: 200 L/acre ÷ 20 L/tank = 10 fills

Divide the chemical rate per acre by the number of tank loads required to spray an acre to determine the amount of product to add per tank load.

Example: 1 L/acre ÷ 10 fills = 0.1 L/tank

Preparation and application of pesticides

Tank mixtures

Tank mixtures are comprised of 2 or more pesticides that are combined in the sprayer tank, as opposed to a mixture formulated by the manufacturer. Tank mixing is often done to reduce the number of applications of pesticide. A grassy herbicide in combination with a broadleaf herbicide is one of the most common mixtures. Another reason to mix herbicides is to include multiple modes of action to combat the development of resistance in the target pest.

Preparing a tank mix

To avoid physical incompatibilities, go through the following general steps or use the appropriate mixing instructions below:

- Add half the required amount of water and mix with one pesticide.
- Agitate.
- With agitator running, add the other pesticide. Add pesticides to the spray tank in the following order to reduce the possibility of formation of precipitates or gums that may clog nozzles and filters.

– soluble powders
– wettable powders and flowable liquids
– solutions (amines and salts)
– emulsifiable concentrates (esters)
– additives (surfactants)

Water quality

The term "water quality" refers to its cleanliness and chemical composition and can be critical to the performance of pesticides. Ensuring good performance requires testing water and understanding the results.

There are 4 main water quality indicators related to pesticide performance.

1. **Water hardness**
   Water hardness is caused by positively charged minerals, primarily calcium (Ca^{++}) and magnesium (Mg^{++}), but also sodium (Na^{+}) and iron (Fe^{++}). These cations can bind to some herbicides (glyphosate is the best-known example, also 2,4-D amine), reducing their performance. Hardness is usually named "total hardness (calculated)," and is expressed in ppm or mg/L of calcium carbonate ($CaCO_3$) equivalent. Some tests refer to the older unit "grains," which is ppm divided by 17. Bayer suggests that total water hardness should be below 350 ppm (20 grains) for the low rate (1/2 L/acre equivalent) of glyphosate and below 700 ppm for the higher rates.

2. **Bicarbonate**
   Sometimes referred to as alkalinity, the bicarbonate ion (HCO^{-}_3) can inhibit herbicide activity and also make some herbicides more difficult to mix. The most commonly affected herbicides are members of the Group 1 modes of action, products such as clethodim, sethoxydim and others, as well as MCPA amine and 2,4-D amine. The antagonistic effect of the bicarbonate ion depends on the presence of other ions such as sodium and calcium.

3. **pH**
   This is a complex parameter because it is related to pesticide solubility, hard water antagonism and pesticide degradation. In most cases, pH values between 4 and 7 are considered acceptable. But some herbicides, notably those in the Group 2 modes of action, have specific pH needs to dissolve properly. For example, all Group 2 herbicides except for the imidazolinones dissolve better at higher pH, and this property has implications for both mixing and cleaning.

4. **Cleanliness / turbidity**
   Water may contain suspended solids such as clay. Glyphosate and diquat (Reglone) are sensitive to this, as these chemicals are readily adsorbed to soil particles and turbid water can reduce their effectiveness. This is also why dust generated by the sprayer can reduce the performance of these herbicides.

Select clean water sources and conduct a water test to identify possible problems. Use a conductivity meter to test the electrical conductivity (EC) of the spray water. Although this test will not identify the ions present, it will indicate the existence of a potential problem. EC values less than 500 μS/cm are considered safe. For values above 500, a hardness test is necessary to confirm the presence of antagonizing cations.

If the water is hard, a generally accepted solution is to add ammonium sulphate (AMS) fertilizer at rates between 1 and 3% w/v of 21-0-0-24 to the spray tank, preferably before adding the herbicide. Spray grade liquid concentrate AMS product is available from some suppliers. The sulphate anions tie up the hard water cations, preventing them from antagonizing the herbicide. Liquid urea-ammonium nitrate (28-0-0) has also been shown to help with hard water, although it is not as effective as AMS.

Caution is advised when adding foliar fertilizer specialty products to pesticide mixtures. Adding a blend of fertilizer salts, combined with associated changes in pH, can result in unpredictable interactions with pesticides and water. Ask for compatibility data and always conduct a jar test to be sure that the planned mixture does not result in a precipitate that can plug spray nozzles or make the pesticide inactive.

Turbidity is a problem with surface waters, especially in areas of clay soils and after surface runoff. If spray water is taken from a pond, its turbidity can be reduced by adding aluminum sulphate at rates between 10 and 60 mg/L of pond water. Thorough agitation is required, and 80 to 95% removal of turbidity is achieved within 24 to 48 hours.

Specific mixing instructions

Ensuring the compatibility of various products in a tank mix requires following manufacturer directions on the product label. The following are the 5 most common instructions found on product labels and are referenced in the specific product sections in this book.

The general principles of product mixing order are sometimes summarized using acronyms that can be followed when specific instructions are absent. The most common is WALES, where

W is wettable powders

A is agitate

L is liquid flowables

E is emulsifiable concentrates

S is solutions

There are exceptions to these rules. If in doubt, conduct a jar test using the actual water source. Water quality can affect mixing, with water that is hard, high in bicarbonates or cold sometimes causing issues. Excessive agitation should also be avoided.

"a" Single product mixing instructions

1. Fill clean tank to ½ full with clean water.
2. Turn on full agitation.
3. Add the proper amount of herbicide to the water in the spray tank with the agitator running. Maintain full agitation until completely dissolved and product is fully dispersed. Continuous agitation is required to keep the product in suspension.
4. After herbicide has been well mixed and is in suspension, add tank mix partners and then a recommended non-ionic surfactant, **if required**.
5. Add the remainder of the water.

On repeat tank loads, ensure that the amount of spray solution left in the tank from the previous load is less than 10% of the volume to be mixed.

"b" Multiple products mixing instructions

1. Fill tank ½ full of water.
2. Start sprayer agitation.
3. Add Group 2 herbicide and agitate vigorously; if a granule, agitate until dissolved.
4. Add tank mix partner herbicide and continue to agitate.
5. Add adjuvant (if required) and continue to agitate.
6. Add antifoaming agent if required and continue agitation.
7. Complete filling of the tank with the balance of the water.
8. If tank mix partner is an emulsifiable concentrate (EC), to avoid inducing an invert emulsion, do not over agitate.

"c" Multiple products mixing instructions

1. Clean spray tank and half fill with clean water. Start agitation or bypass system.
2. Add broadleaf herbicide to the tank first, prior to adding grassy herbicide, and agitate for 2 to 3 minutes.
3. Add correct amount of grassy herbicide.
4. Agitate for 2 to 3 minutes.
5. Add correct amount of adjuvant (if required).
6. Agitate for 1 to 2 minutes before adding remainder of water.
7. After any break in spraying operations, agitate thoroughly before spraying again.
8. Use the spray suspension as soon as it is prepared.
9. If an oil film starts to build up in the tank, drain tank and then clean with a detergent.

"d" Multiple products mixing instructions

1. Ensure the spray tank is thoroughly clean.
2. Fill the tank ½ to ¾ full with clean water and start agitation or bypass system.
3. Add grassy herbicide first. Vigorously agitate until dissolved.
4. Add broadleaf herbicide product second followed by any registered tank mix partner (if desired).
5. Add adjuvant/surfactant(if required) and complete filling the spray tank.

"e" Multiple products mixing instructions

1. Always start with a clean and empty sprayer tank.
2. Fill the tank 1/3 to 1/2 full of clean water.
3. With the agitator running, add the required amount of Express herbicide.
4. When Express herbicide has been thoroughly dissolved, add the required amount of the appropriate tank mix partner.

5. If the tank mix partner is an emulsifiable concentrate (EC), reduce agitation to avoid inducing an invert emulsion. Once dissolved, Express will remain in solution.
6. Add the rest of the water.
7. If required for tank mixture, add surfactant.
8. Refer to the label for specific tank mixing order and directions.
9. For repeat tank loads, reduce the material remaining in the tank to 10% of the original volume or less before proceeding with Step 1 because remaining chemicals may prevent Express from completely dissolving. If it is not possible, pre-slurry Express herbicide in a small amount (5 to 10 L) of water before adding to the tank.
10. If an anti-foaming agent is required, add last.

Avoid tank mix problems

When tank mixing, product labels should be consulted to determine proper usage as per specific crops and pests. When tank mixing, some products may have restricted uses as compared to the recommendations for each individual product. For example, either Poast or MCPA Amine alone can be used on several crops. A Poast + MCPA Amine tank mix can only be used on flax.

Crop injury, reduced pest control or physical incompatibilities may be the result of using tank mixes improperly. When herbicides for grassy weed control are mixed with herbicides for broadleaf weed control, a partial loss (sometimes total loss) of activity on grassy weed control is quite common. When reduced weed control or crop injury is likely to occur, the advantages of tank mixing are quickly lost.

- Tank mix properties are not necessarily the same as those of the individual pesticides applied separately.
- Use registered tank mixes only.
- Check the labels for recommended crops, pests, rates and adjuvants for tank mixing.
- Follow label directions for preparing the mix.
- Use only on crops or varieties registered for the particular tank mix.
- Apply at the recommended stage of growth or development of crop and pest(s).

Sprayer clean-out and waste disposal

Labels differ on their cleanout requirements. When in doubt, use the following general procedure.

1. Carefully measure the volume requirements of the last tank before a change of products is planned. Accurate filling will help minimize leftovers.

2. When a field has been sprayed, dispose of the tank remainders by spraying them out in the field or another designated site. Do not drain tank contents on the ground.

3. Use a clean water tank to introduce clean water into the sprayer tank via wash-down nozzles. Multiple batches of smaller volumes are more efficient at diluting remainders than a single larger volume. Run solution pump long enough to ensure that all plumbing, including agitation and sparge, has been exposed to clean water. Spray this volume out in the field until the tank is empty. When spraying out, make sure to rinse through any bypass valves. Repeat at least 2 more times. See Table 1 to evaluate efficiency of diluting spray mix remainders. Note the effect of smaller remainder volumes and more batches of smaller volumes on overall remainder dilution.

4. Some products specify the use of ammonia, surfactant or specific commercial products during cleanout.

   a. Ammonia acts to raise solution pH, which aids in cleaning products whose solubility improves with higher pH. These include all Group 2 products except those in the imidazolinone group. See “Herbicide group classification by mode of action” section for specific product names.

   b. Surfactants help solubilize oily products such as EC formulations. Oily layers may trap Group 2 products to which canola can be very sensitive.

   c. Commercial products contain proprietary components that aid in cleaning pesticide products from sprayer components.

5. Cleaning products should not be expected to degrade or neutralize pesticide residues. The cleaning process is all about effective dilution and removal of residues.

Table 1

Example	Remaining volume (A)	Clean water volume (B)	Rinse batches (C)	Total clean water	Dilution factor ((A&B)/A)[c]	Single rinse volume equivalent
1	10	150	1	150	16	150
2	10	1200	1	1200	121	1200
3	10	50	3	150	216	2150
4	10	30	5	150	1024	10230
5	20	150	1	150	9	150
6	20	50	3	150	43	860
7	50	150	1	150	4	150
8	50	50	3	150	8	350

6. Once dilution of the tank remainder is complete, rinse out boom ends and any other plumping components that were not open during dilution. Inspect and clean filters.

7. Consider modifications to your sprayer to improve cleaning performance. A continuous rinse system uses a second pump to rinse the tank while it is simultaneously sprayed empty. A recirculating boom allows the boom to be primed or flushed without spraying product. Leftover pesticide rinsate can be disposed of using a biobed. Details on all these approaches are available at *sprayers101.com*.

8. Sprayers should be cleaned as soon as possible after use. Dried pesticide residues are much more difficult to remove than pesticide in solution.

9. Do not clean sprayers near creeks, dugouts, sloughs, wells or any other water sources. Ensure that wash water does not come into contact with any desirable vegetation or its roots. Make sure discharged wash water (especially from insecticides) will not be accessible to children or animals. Do not contaminate any watercourse or water body with wash water.

10. Note: Pesticides may have specific recommendations for sprayer clean-out. Refer to product labels on the container for recommendations.

There are 3 main methods for sprayer tank clean-out. Selection of the appropriate method depends on the pesticide used.

Method A

Drain contents of tank followed by 1 or 2 water rinses, 2 ammonia rinses (**NOT containing chlorine**) followed by 2 water rinses (one just prior to next sprayer event). Products that require this cleanup method include 2,4-D, Accent, Ally, Atrazine, Avadex, dicamba, dichlorprop + 2,4-D, Escort, Everest, Express, MCPA, Muster, Valtera, Poast Ultra, Prism, Pursuit, Refine, Refine M, Rustler and Tordon 22K.

Method B

Drain contents of tank followed by 2 water rinses, 2 detergent rinses, then 2 more water rinses. Products that require this method include Axial, Liquid Achieve SC*, Achieve Liquid Gold*, Basagran, Bromoxynil + MCPA, clethodim, Liberty, Puma, Reglone Dessicant*, Reward*, Sencor and trifluralin products.

*Manufacturers of these products recommend adding a non-ionic surfactant such as All Clear, Agral 90 or Agsurf at 0.6 L per 100 L water.

Method C

Drain contents of tank followed by several repetitions of the water rinse with nozzles and screens removed and checked for debris.

Products that require this method are Amitrol 240, Assure II, Attain, Dual II Magnum, Eclipse, glyphosate products, Horizon, Lontrel, Odyssey, Prestige and Solo.

Always follow the instructions on the product label. Use the following guidelines if label recommendations don't cover tank cleanup.

Products that are water based can usually be cleaned from the spray tank using Method C. Products formulated as an emulsifiable concentrate (EC), soluble concentrate (SC) or flowable (F) or use a petroleum-based adjuvant should at least use Method B. The detergent breaks down the oil that may be sticking to the sides of the tank. Most Group 2 herbicides have tank clean-out recommendations, but those that do not should use Method A for tank clean-out. If the tank mix is composed of multiple pesticides, use the appropriate combination of methods to clean the tank.

Group 2 herbicides will occasionally get trapped on the tank wall by petroleum-based formulations or adjuvants, resulting in tank residues. Add detergent at 0.25 L/100 L to the ammonia rinse to prevent this situation from happening. The detergent breaks down the petroleum coating to allow the ammonia access to the Group 2 product.

What to do if results are unsatisfactory

- Determine whether or not the pesticide(s) used were suitable.
  Are the treated crops and pests listed on the product label(s)?
- Compare your method of pesticide preparation to the product label(s) instructions.
- Check for equipment malfunction: for example, plugged screens, nozzles worn or mixed type or size.
- Compare your application techniques with those given on label(s): for example, stage of growth or development of crop and pest(s), ground speed, pressure and incorporation.
- Consider weather conditions at application time. Certain labels include cautions against application during weather extremes: for example, cold, heat and drought.
- Consider time since application. Some results are not apparent for several days. Look for early symptoms of the chemical taking effect.
- If results are unsatisfactory, seek technical help. Gather all relevant data, particularly evidence such as photos or specimens. Record wind, rainfall, soil moisture condition, crop variety, fertility, quantity of material used, acres treated and temperature at time of spraying.
- Document everything in writing. If crop damage is involved, submit a specimen for diagnosis. Disease or insect damage can resemble herbicide injury.

Pesticide resistance

The problem

Agricultural pests can develop resistance to fungicides, herbicides or insecticides. Resistance occurs when a random and naturally occurring genetic mutation allows a low number of pests to survive a pesticide application. In the absence of other pest management strategies, these individuals grow and reproduce, resulting in an increase in the number of resistant individuals in the pest population. Farmers should follow agronomic practices that both mitigate the development of pesticide resistant pest populations and manage the spread of existing resistant populations.

Since the first documented case of chickweed resistance in Alberta in 1988, the numbers of herbicide resistant weeds, fungicide resistant pathogens and insecticide resistant insects have increased and the area infested by them continues to grow. Potato blights have developed resistance to common fungicides,

insects have developed resistance to *Bacillus thuringiensis* (BT), a common biopesticide, and 26 weed biotypes have developed resistance to herbicides. At present in Alberta, weed biotypes are resistant to herbicides from 6 herbicide groups (modes of action). In addition, some pests (including weeds) are resistant to multiple pesticide groups (see table below). It is essential that farmers be able to identify these resistant pests and take action to mitigate and manage the development of resistance on their farms.

How to identify herbicide resistance

Investigate all areas of the sprayed field where weed control was inadequate. Rule out other factors that might have affected herbicide performance including mis-application, spray misses, unfavourable weather conditions, herbicide application at an improper growth stage and weed flushes after application of non-residual herbicides. If resistance remains a likely possibility, check for the following.

- Are other weeds listed on the product label controlled satisfactorily?
- Is herbicide failure patchy with no reasonable explanation?
- Did the same herbicide or herbicide group fail in this area of the field in the previous year?
- Do weeds show herbicide injury symptoms such as root pruning by a Group 3 herbicide or yellow/purple coloration caused by Group 2 applications. Resistant weed biotypes will not show these typical injury symptoms.
- Do field histories indicate extensive use of the same herbicide (or herbicide group) year after year?

  The following webinar explains how to scout for herbicide-resistant weeds and which weeds to look out for in Alberta: *www.youtube.com/watch?v=3yJnquucDRw&feature=youtube.*

How to minimize the development of resistance

Follow the guidelines below to delay the appearance of resistance.

- **Integrated weed management practices**: Use herbicides as part of an integrated control program that includes scouting, historical information related to herbicide use and crop rotation, and consider mechanical, cultural, biological and other control practices, including harvest weed seed control.
- **Herbicide and crop rotations**: Effective herbicide modes of action (groups) must be rotated. It is important not only to use a different herbicide, but to use one from a different herbicide group with a different mode of action that is effective on the weeds present in the field.
- **Field history**: Records are needed to make sensible decisions on herbicide rotation and to evaluate the probability of resistance developing. A pesticide application record sheet can be found at the back of this book.
- **Tank mixture**: A tank mix may delay the appearance of resistant weeds if the components of the tank mixture effectively control the same weed and are from more than one mode of action. Be sure to check effective rates, and known resistant biotypes when designing a tank mix. When products are advertised as multiple modes of action be sure to check what herbicide modes of action are included. One of them may be a herbicide group to which resistance occurs already.
- **Monitor results**: Monitor treated weed populations for resistance development. Scouting is necessary both before and after herbicide application to monitor application needs and herbicide efficacy.
- **Preventive measures:** Prevent the movement of resistant weed seeds to other fields by cleaning harvest and tillage equipment as well as planting clean seed.

Herbicide resistant weeds in Alberta	
Herbicide group	**Weeds**
Group 1	Green foxtail, persian darrnel, wild oats
Group 2	Ball mustard, chickweed, cleavers, cowcockle, green foxtail, hemp-nettle, kochia*, lamb's-quarters, narrow-leaved hawks-beard, pale smartweed, Russian thistle, shepherd's-purse, spiny annual sow thistle, stinkweed, wild buckwheat, wild mustard, wild oats
Group 3	Green foxtail
Group 4	Hemp-nettle
Group 8	Wild oat
Group 2 + 9 (multiple resistance)	Kochia
Group 1 + 2 (multiple resistance)	Wild oats
Group 1 + 2 + 8 (multiple resistance)	Wild oats
Group 2 + 4 (multiple resistance)	Cleavers
Group 2 + 4 + 9	Kochia

NOTE: there are confirmed cases of glyphosate resistance (Group 9) in kochia in Southern Alberta. Other cases of glyphosate resistance have been reported in Ontario with Canada fleabane, giant ragweed and waterhemp. Glyphosate resistant waterhemp is present also in Manitoba. There are additional glyphosate resistant weeds (e.g., Russian thistle) in U. S. states that border Canada.

All kochia populations in Western Canada are considered Group 2 herbicide-resistant. It is safe to assume this without herbicide resistance testing (for this biotype only).

Screening of suspected herbicide-resistant weed biotypes known to exist in Alberta can be performed by the Saskatchewan Crop Protection Lab (306-787-8130) for a fee, ranging from $125 to $200 per sample. Other diagnostic labs include Ag-Quest (204-776-2087) or the Manitoba Pest Surveillance Initiative (204-813-2171). The following webinar explains how to sample weeds with suspected herbicide resistance and submit them to a diagnostic lab: *www.youtube.com/watch?v=bRYODrUAbI4.*

Suspected cases of novel herbicide resistance, or herbicide-resistant weed biotypes not known to exist in Alberta, can be submitted to the Agriculture and Agri-Food Canada Prairie Herbicide Resistance Research Lab for herbicide resistance testing free of charge. For more information on this service and sample submission, contact Charles Geddes (403-359-6967; charles.geddes@canada.ca).

Herbicide Resistance Diagnostic Labs

Saskatchewan Crop Protection Laboratory: *www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/programs-and-services/crops-programs/crop-protection-laboratory-services*

Ag-Quest: *agquest.com/resistance*

Pest Surveillance Initiative: *www.mbpestlab.ca*

Agriculture and Agri-Food Canada: charles.geddes@canada.ca

Technical expertise provided by Dr. Charles Geddes and Dr. Breanne Tidemann.

Pesticides and the environment

Spray drift management

1. Pesticide user responsibility

Pesticide drift is a concern for ground as well as aerial application. Landowners are responsible for ensuring that any pesticide applications conducted on their property are conducted in a safe, responsible manner.

The choice of chemical should be made with adjacent land uses in mind. If neighbours have livestock, bees, shelterbelts and gardens that may be affected by off-target drift, they should be notified prior to application. Perhaps a different chemical, formulation or application method will provide the same control and greater compatibility with neighbouring land uses.

Always assess the risk to adjacent landowners and never push weather conditions to meet deadlines. If completing an application as planned may mean damaging your neighbour's property, postpone the application or modify it to prevent off-target damage.

Landowners can be held liable for pesticide drift even if a custom applicator was hired to perform the application. When hiring a custom applicator the company should be registered, employ certified professionals and possess the knowledge, equipment and expertise to perform the work properly. Custom applicators must be aware of neighbouring residences and sensitive crops (including gardens, livestock, bees, shelterbelts and gardens) that could present problems if drift should occur.

All pesticide users, commercial pesticide applicators and farmers are legally responsible for safe pesticide use. Farmers who cause damage with their pesticide application activities or who counsel a commercial pesticide service to conduct either an illegal pesticide application or an application under questionable circumstances (e.g., extremely windy conditions) that results in damage, can be held liable for compensation and face potential prosecution. Farmers are cautioned not to counsel commercial applicators to apply pesticides not registered for the use intended or to direct applications to occur under known circumstances that could cause damage (such as under windy conditions). Should such actions result in charges being laid, this may subsequently cost the farmer time in court and payment for the remediation of damaged crops, shelterbelts, gardens, etc.

Buffer strips should be left when applying pesticides next to sensitive crops, watersheds and farmsteads. The size of these strips may be specified on the pesticide label, but if not, the size will depend on the chemical used, the application method and the degree of risk from escaping drift. Pesticide applications conducted near rivers, creeks, lakes, irrigation canals or other open bodies of water require extra care and caution to ensure water users will not be affected by the proposed pesticide application and that the application is conducted in a manner that will not adversely affect aquatic or riparian habitats.

Ideally, natural vegetation should be left along natural water bodies to ensure bank stability and to provide a natural buffer and filter for agricultural chemicals. A Special Use Approval must be obtained from Alberta Environment to perform pesticide applications within 30 metres of an open body of water when the adjacent land is unimproved rangeland, pasture or woodlot. Certified applicators applying pesticides within 30 metres of an open body of water do not require a Special Use Approval as long as the pesticide they are using is identified in the Environmental Code of Practice for pesticides and they are following the conditions of application specified in the code.

2. Recommended drift reduction practices

Spray quality, boom height and travel speed are the main factors under operator control. Follow these guidelines to manage drift damage.

1. Survey the area surrounding the field and identify sensitive areas. Consider waiting until wind direction is most favourable.

2. Maintain low boom heights. Adequate overlap of 80-degree nozzles can be achieved at a 20-inch boom height. 110-degree nozzles can be operated as low as 15 inches above target. Conduct visual assessment to ensure that the spray patterns produce at minimum a double overlap. This means the edges of the spray pattern should reach the adjacent nozzle locations.

3. Choose products that have lower buffer zones or are compatible with coarser sprays. Spray the coarsest spray quality that will provide adequate coverage for the product and pest. In most cases, an ASABE coarse spray is fine enough for good coverage at water volumes recommended on the pesticide label. Even coarser sprays can be used for systemic products and broadleaf weeds.

4. Formulation type can affect the droplet size produced by spray tips. Water-soluble solution (S) formulations typically produce finer sprays, whereas oily EC formulations suppress the production of fines. Some adjuvants can help reduce spray drift although spray pressure and nozzle selection will have a larger impact. Such adjuvants are useful when the pesticide effectiveness may be reduced with a spray quality that is too coarse.

5. Slower travel speeds allow the spray to move towards the target more quickly. Greater speeds create a larger airborne spray plume that may be displaced behind the sprayer. Slower speeds also allow for more consistent boom heights.

6. Higher water volumes require larger nozzles that typically produce coarser sprays. More water provides an opportunity for coarser sprays without sacrificing coverage.

7. Spray perpendicular to the wind, starting at the downwind side of the field. Spray headlands at lower spray pressures to increase droplet size. Additionally, spray such headlands on the downwind edge of the field so the remainder of the field can be sprayed at more normal pressures.

Spraying weather

Sprayer adjustments alone don't guarantee product performance or protect from spray drift. The following actions contribute to better applications.

1. Use forecasting services with good wind speed and direction capabilities to assist in planning an operation.

2. Use the directional consistency of wind as a planning tool.

3. Measure wind speed locally using a weather station or hand-held device. Official wind speeds are reported at a height of 10 metres where wind speed is usually greater than it is closer to the ground where drift is generated.

4. Spray on sunny days if possible. Solar heating creates thermal turbulence that helps disperse any spray drift.

5. Do not spray between dusk and dawn if skies are clear and winds are low. These times coincide with formation of temperature inversions that prevent spray dispersion and can cause long-distance transport of the spray cloud.

6. Extremes of air humidity during windy conditions can increase spray drift problems. Low humidity increases evaporation rates that reduce droplet size and increasing drift potential before deposition. When using fine sprays, high humidity can extend the life of smaller droplets, prolonging the damage that drifting droplets cause.

7. High temperatures increase the vapour loss of volatile products. Volatile products should not be sprayed during, or prior to, high air temperatures.

Responding to a pesticide related concern

The *Environmental Protection and Enhancement Act* prohibits any person from causing adverse effects when using pesticides. Farmers who witness or suspect a pesticide drift or runoff that could affect their family, pets or livestock or cause an adverse effect to their shelterbelt, crop or their land should take the following actions to protect themselves and assist in an investigation that may result at a later date.

- Immediately request family members take shelter indoors to protect themselves from exposure. Close all windows and air conditioning units in the home. If spray has settled on them, they should immediately remove clothing and wash exposed skin. If physical symptoms develop, seek medical assistance or call the Poison & Drug Information Service at 1-800-332-1414.
- Pets should be removed from the immediate spray area or where drift has occurred.
- If livestock are at risk, the applicator should be asked to stop the application until the livestock can be removed or conditions change so the wind is blowing away from the livestock.
- If drift has occurred in the farmyard, outdoor furniture and play equipment should be washed before use. Garden produce, berries and fruit

should not be harvested or consumed and should be monitored for discolouration. If the produce shows signs of damage, it should be destroyed. If berries or fruit trees show signs of damage, the berries or fruit should not be eaten. If no signs of damage occur after 1 to 2 weeks (depending on the pesticide), then all produce, berries and fruit should be washed thoroughly.

- Record as much detail as possible about the application equipment.This may include colour, type, make, model, licence plate number and additional distinguishing features as well as company information displayed on nurse trucks and aircraft call numbers. If possible, take pictures.
- Record every detail regarding the occurrence including date, time, weather conditions and type of crop being sprayed. The type of pesticide being applied may be determined by containers found at the site. Also note the description of persons carrying out or assisting the application as well as other witnesses.
- Attempt to contact the adjacent landowner and indicate your concerns.
- Contact the Alberta Environmental Response Centre at 1-800-222-6514 **promptly** for information and assistance in investigating the concern. Some pesticides degrade quickly, so prompt investigative action is required to proceed with enforcement action.

Pesticide residues found in Alberta water sources

The Alberta Environmentally Sustainable Agriculture (AESA) Stream Survey was initiated in 1999 and continued until 2006. It tested the water quality in 23 watersheds throughout the agricultural areas of the province several times each year. This produced information on the presence and distribution of 68 possible pesticide residues in the water. 4 of the watersheds received irrigation return flows and the rest were dryland.

Pesticide residues were commonly found in survey water samples. Keep in mind that testing processes are able to detect very small amounts of chemical, far below any observable effect. Maximum pesticide concentrations were typically found in spring and also coincided with summer pesticide application. Concentrations of detected pesticides occasionally exceeded existing water quality guidelines for either the protection of aquatic life or irrigation use.

This study highlights the importance of using due care and attention when applying pesticides as they do not necessarily remain where they are applied. Use integrated pest management strategies to improve the impact of applied pesticides and established benchmarks for the use of registered pesticides. The Farmer Pesticide Certificate program is an excellent example of training for the when, where and how to use pesticides.

Pesticide applicator certificate

Anyone applying pesticides (herbicides, insecticides, fungicides or rodenticides) on property not owned, rented or leased by them or in exchange for a fee must hold a Pesticide Applicator Certificate (issued by Lakeland College) and a Pesticide Service Registration (issued by Alberta Environment). If someone is offering to spray your property, ask to see a Pesticide Service Registration and a Pesticide Applicator Certificate (all applicators are issued wallet-sized identification cards).

For questions pertaining to pesticide applicator certification, please call Lakeland College at 1-866-853-8646. For questions pertaining to service registrations, contact the nearest regional office of Alberta Environment.

Please remember that a certificate is not a guarantee of performance. A certificate only certifies the certificate holder has met a minimum standard of knowledge; it cannot assess an applicator's integrity or the honesty of his business practices. If you are uncertain about the reliability of a particular applicator, ask for references.

Farmer certification requirements

Pesticide manufacturers and the federal Pest Management Regulatory Agency (PMRA), in consultation with provincial agriculture and environment departments across Canada, have agreed that some pesticides have higher toxicity and/or greater potential to adversely affect health or the environment and require farmers to obtain further knowledge to purchase and use them. This means farmers must take a course and pass an exam verifying they have the knowledge to safely and effectively manage and apply these pesticides on their own property. Currently, pesticides containing the active ingredient aluminum phosphide require mandatory certification for farmers to purchase and use. In addition, a fumigation management plan must be developed prior to the treatment and an appropriate self-contained breathing

apparatus (SCBA) must be available for use at the application site. Farmers must read the entire label and follow all the requirements and restrictions. Aluminum phosphide is used to treat stored grain pests and for rodent control in the field.

Farmers are encouraged to consider obtaining a Farmer Pesticide Certificate. The course contains detailed grain fumigation and rodent management information that can assist in preventing outbreaks and managing them more effectively when they occur. The Environmental Farm Plan further encourages farmers to learn more about safe and effective handling, use, application, storage, transportation and disposal of pesticides. The Farmer Pesticide Certificate course has been developed for farmers and meets the Standard for Pesticide Education, Training and Certification in Canada. Not only does it provide farmers with essential information, it also provides evidence to consumers that farmers hold current knowledge required to safely and effectively apply pesticides.

For more information on the Farmer Pesticide Certificate, contact the Ag-Info Centre or your local fieldman.

Note: The Farmer Pesticide Certificate does not qualify the holder to apply pesticides for other farmers or for a fee.
Farmers wanting to provide any pesticide application service outside their own property must obtain a Pesticide Applicator Certificate. The training materials and examinations for this certificate are offered through Lakeland College at 1-866-853-8646.

Notification of neighbours before applying pesticides

It is strongly recommended that you notify your neighbours prior to spraying or having your crop sprayed, particularly if your fields border your neighbour's farmstead or other sensitive areas (e.g., where beehives, gardens or shelterbelts may be located). Many potentially harmful situations can be avoided if you talk to your neighbour and advise what and when you anticipate spraying. Let them know whether you will spray by ground or by air (noise from low flying aircraft has been known to cause panic in livestock). Also ask if your neighbour is planning events (e.g., family reunions, picnics) where a number of people may be gathered and could potentially be exposed to pesticides from your application. By notifying your neighbours, you are not seeking their consent, but rather letting them know you are concerned about them and their property and want them to be able to take whatever action they believe is necessary before spraying to reduce the potential exposure to the pesticide.

Disposal of pesticide treated seed

Seed treated with a fungicide, fungicide mixture or fungicide-insecticide combination can be very toxic and should be treated with respect. A blue or red colouration on seed indicates it is pesticide-treated. Extra care must be taken during the transport and disposal of pesticide treated seed to prevent domestic animals, birds and other wildlife from consuming the treated seed.

Spillage

To prevent treated seed spillage, move treated seed in labelled, marked bags. Open container transport is not recommended. Bags should be checked for damage and containers should be sealed or lined with plastic or other suitable material. Truckloads of seed should be tarped down securely to avoid possible highway spillage. Treated seed blowing off along the road can kill birds. All treated seed and seed treatment residue should be placed into the seeder at planting time and never dumped in a field. Never leave surplus treated seed unburied. Spills of treated seed can kill deer or cattle that consume it. Any spilt seed should be buried. Incorporate granular pesticides immediately after application to prevent birds and other wildlife from consuming them.

Disposal

Normally, treated seed is planted within 1 or 2 years of treatment. Consider disposing of bagged or loose seed that is old or of diminished viability. Such treated seed should be mixed with new seed and planted at higher rates or seeded by itself. For example "old canola seed" can be mixed and sown with new canola seed or overseeded alone along field margins or low areas. If disposal is necessary, check with your local landfill authority before disposing in a sanitary landfill. Ensure the treated seed is covered immediately after dumping.

Pesticide disposal

Unwanted or out-of-date pesticides should be disposed of safely and responsibly. Pesticides are hazardous wastes and cannot be disposed of in sanitary landfills or by burning. If you will not be able to use pesticide supplies, check to see whether a neighbour may have some use for them. Make sure the product is retained in the original container and

has the label/booklet attached to it. Pesticides that have no further use must be disposed of through a qualified (approved) hazardous waste disposal firm. Names of companies that are licenced to handle hazardous waste can be obtained by contacting the Alberta Recycle Information Line toll-free at 1-800-463-6326 or in Edmonton at 780-427-6982.

Water protection

The preservation of surface water is critical to our sustained quality of life and agricultural production. Surface water throughout Alberta has been monitored for a number of years. Monitoring data collected over a 7-year period indicated that 98% of more than 3,000 samples contained at least 1 pesticide active ingredient. The majority of the pesticides found in surface water are shown to have originated from either agricultural or urban areas. Farmers must take the necessary steps to prevent pesticides from continuing to enter surface water. Pesticides can be carried to a water body in 3 ways:

- spray drift from application equipment
- water runoff from farmland
- attached to soil and carried by wind

The greatest protection of surface water occurs by maintaining vegetation (trees, shrubs and grasses) surrounding small streams, rivers and lakes. This riparian vegetation acts as a filter to protect surface waters. Where the riparian vegetation no longer exists, grass buffers should be left next to water to help filter the runoff from agricultural land. Additional protective actions can also assist in protecting water.

- Pesticide must **not** be stored or mixed or application equipment cleaned within 30 metres of any water body and water sources including wells and dugouts.
- Pesticides subject to leaching should not be used on coarse-textured soils (i.e., sandy or gravelly) to prevent groundwater contamination.
- Never store pesticides in well houses.
- Haul water to your sprayer and fill it in the field rather than taking the sprayer near the water source.
- Do not leave sprayers unattended while filling.
- Empty pesticide containers should never be left near a water body.
- Where possible, spray when wind is blowing away from the water body.
- Have an emergency pesticide spill kit available when mixing pesticides.

Pesticide container disposal

Triple rinsing or pressure rinsing of pesticide containers is the recommended method of cleaning them prior to disposal. Triple rinsing renders used pesticide containers (metal, plastic, glass) more than 99% free (less than 1 ppm) of residues in most cases. There are a number of systems for pressure rinsing. The simpler style consists of a hollow spike connected to a water line, which injects water under pressure into the jug, which is then drained into the spray tank. A newer style consists of a small hopper mounted on the sprayer with a sharp metal jug opener and a pressure rinse nozzle in the bottom of the hopper. The full jug is inserted on the jug opener, which drains the chemical into the tank. Wash water is injected under pressure to rinse the container. The chemical and rinse solution is then pumped into the spray tank by direct hose connections.

Unrinsed containers have the potential to contaminate soil, ground water and surface water, and can be toxic to fish and wildlife. Unrinsed containers impede the processing and recycling of empty pesticide containers, as containers must be emptied, and workers are exposed to the residue. Residues can be transported to the atmosphere during storage, processing, shipping and energy recovery, or they can contaminate end products from plastic recycling processes. In addition, it is estimated that 6 to 7% of product can be left in unrinsed containers. This amount of material can treat between 1/2 and 1 acre of land and result in the saving of several dollars.

It is the responsibility of the farming community to ensure their empty pesticide containers are directed to a designated collection site, whether it is a municipal site or back to the point of purchase (depending on the product and size of container). Determine the correct disposal site at the time of purchase.

Containers disposed of at a container collection site are to be clean (triple rinsed or pressured rinsed) and well drained (dry). Paper bags and cardboard containers that contained pesticides should be thoroughly emptied and disposed of at a sanitary landfill. **Do not burn paper bags or cardboard containers**.

Under the Alberta *Environmental Protection and Enhancement Act*, non-refillable plastic or metal pesticide containers (restricted, agricultural and industrial products) must be disposed of at a pesticide container collection site.

Outer packaging (cardboard box) and paper booklets (affixed to plastic containers) can be disposed of in a regular landfill, or they can be recycled if non-contaminated. The presence of the paper attached to the containers that are to be recycled impairs the quality of the plastic, which will be used for other end products. Some pesticide container sites have bins or separate areas for collecting outer packaging and label materials.

Steps to follow for manual triple rinsing

(without using a pressure rinse system).

- Empty contents of the container into the spray tank and drain in a vertical position for 30 seconds.
- Add water to container to about 1/5 capacity.
- Shake the container thoroughly, empty into the spray tank and drain for 30 seconds.
- Repeat the procedure 2 more times. This should take about 5 minutes in total.
- Triple rinsed containers should be punctured or broken to render them non-reusable. Punctured containers also identify themselves as being triple rinsed. **Note:** Do not puncture unrinsed containers. Pesticide found within unrinsed containers is concentrated material. Puncturing an unrinsed container will cause it to leak. This will expose the environment and persons handling the container to its contents.
- Dispose of all plastic and metal containers at a pesticide container collection site (see list).

Pesticide spill cleanup

The best way to minimize the effects of a pesticide spill is to have an emergency response plan prepared and in place. This should include a copy of the Safety Data Sheet (SDS) and an established procedure to handle all types of pesticide emergency. In addition, a spill cleanup kit should be prepared and be available near the pesticide storage site and at the mixing and loading site. A spill cleanup kit should include the following:

- personal protective equipment (see the Protective Clothing and Equipment section)
- absorbent material such as activated charcoal, vermiculite, dry coarse clay, kitty litter or commercial absorbent. Contaminated absorbents can be disposed at a sanitary landfill
- neutralizing material as indicated on the SDS
- long-handled broom for dry formulations
- shovel for liquid formulations
- waste-receiving container with a lid
- blank labels to identify contents of waste container

In the event of a pesticide spill, follow these steps.

- Isolate affected area.
- Put on protective clothing and equipment.
- Ventilate the area (if indoors). For outdoor spills, work from the upwind side of the spill.
- If possible, stop the containers from further leaking.
- Contain the spread of the spill using soil, sand bags, vermiculite, kitty litter, etc. to provide a barrier to the spread of the spill. Prevent pesticide entry into sewers or water supply.
- Report the spill immediately (if into or threatening a watercourse or if the pesticide is or will cause an adverse effect off your property).
- Clean up the spilled pesticide. Absorb spill on paper, sand, dirt or other inert material (e.g., kitty litter). Contaminated absorbents can be disposed at a sanitary landfill.
- Decontaminate the spill area by washing the site with detergent or other cleaning products such as ammonia. Check the product label SDS (safety data sheets) or contact the manufacturer for advice on cleanup procedures (most products have a 1-800 customer service number on the label) and disposal. If the spill is large, evacuate the area and notify safety personnel.

Emergencies or spills must be reported to the 24-hour Alberta Environmental Response Centre: 1-800-222-6514.

The CleanFarms initiative offers a free empty pesticide container recycling program. The program requires pesticide containers to be pressure rinsed or triple rinsed. Paper booklets must be removed and the clean, empty containers can be returned to a pesticide container site (see following pages). For more information, contact your local collection site or visit *www.cleanfarms.ca*. Drums and totes (23 L and over) can be returned to the point of purchase.

cleanfarms

Visit *www.cleanfarms.ca* for the most up to date list of collection sites.

Pesticide container site locations

Municipality	Site	Legal land location	Contact
Acadia, MD of	Acadia Valley Transfer Station	NW7-25-1-W4	403-972-3879
Athabasca, County of	Colinton Waste Transfer Site	NE7-65-22-W4	780-675-1117
Barrhead, County of	Barrhead Regional Landfill	SW3-60-4-W5	780-674-3301
Beaver County	Beaver Regional Landfill	NE10-50-17-W4	780-663-3888
Beaver County	Viking Transfer Station	NE31-47-12-W4	780-718-7965
Big Lakes, MD of	High Prairie Regional Landfill	NW9-73-15-W5	780-523-5955
Birch Hills County	Wanham Transfer Station	SW3-77-2-W6	780-694-3793
Birch Hills County	Tangent Landfill	NE36-78-25-W5	780-694-3793
Bonnyville, MD of	Goodridge Landfill	SW4-63-9-W4	780-826-3951
Brazeau County	Drayton Valley	SE20-49-7-W5	780-542-7777
Calgary, City of	Calgary – Forest Lawn Landfill (includes MD #44)	3801, 68 St. SE Calgary	403-268-9947
Camrose, County of	Camrose Regional Landfill	NE16-46-20-W4	780-672-4765
Camrose, County of	West Dried Meat Lake Regional Landfill	SW14-44-21-W4	780-672-4765
Cardston County	Spring Coulee Waste Transfer Station	NW29-4-23-W4	403-653-4977
Clear Hills, MD of	Worsley Landfill	SE25-87-8-W6	780-685-3925
Clearwater County	Rocky Mountain House Waste Transfer Station	SE2-39-5-W5	403-845-4444
Cypress County	Irvine Waste Transfer Station	NE31-11-2-W4	403-526-2888
Cypress County	Schuler Waste Transfer Station	SE20-16-1-W4	403-526-2888
Drumheller, Town of	Drumheller Regional Landfill.	2500, Highway 10 East	403-823-1345
Edmonton, City of	Edmonton – Clover Bar Landfill	SW28-53-23-W4	780-496-5403
Fairview, MD of	North Peace Regional Landfill	SW27-82-3-W6	780-835-2576
Flagstaff County	Sedgewick – Flagstaff Reg. Landfill	SW11-45-12-W4	780-384-3950
Foothills, MD of	Foothills Regional Landfill	SE32-19-29-W4	403-652-2341
Forty Mile, County of	Bow Island Landfill	SE23-11-11-W4	403-867-3530
Forty Mile, County of	Foremost Waste Transfer Station	NW19-6-11-W4	403-867-3530
Grande Prairie, County of	Clairmont Centre	NW27-72-6-W6	780-513-3955
Grande Prairie, County of	Elmworth Transfer Station	NE18-70-11-W6	780-513-3955
Grande Prairie, County of	Teepee Creek Transfer Station	NE23-74-3-W6	780-513-3955
Grande Prairie, County of	West Grand Prairie Regional Landfill	S1/2-22-73-9-W6	780-513-3955
Greenview, MD of	Valleyview – MD Yard	NW10-70-22-W5	780-524-7602
Greenview MD	New Fish Creek Transfer Station	NW16-72-21-W5	780-524-7602
Greenview MD	Puskwaskau Landfill	SW36-74-26- W5	780-524-7602
Greenview MD	Sweathouse Landfill	SW4-70-19-W5	780-524-7602
Greenview MD	DeBolt Transfer Station	SE2-72-1-W6	780-524-7602
Kneehill County	Three Hills Waste Transfer Site	SW25-31-24-W4	403-443-5541
Lac La Biche County	Beaver Lake Landfill	NW36-66-13-W4	780-623-1747
Lac La Biche County	Plamondon	NW36-67-16-W4	780-623-1747
Lac Ste. Anne County	Gunn – Lac Ste. Anne Reg. Landfill	NE18-55-3-W5	780-785-3411
Lace Ste Anne County	Mayerthorpe Transfer Station	SE23-57-09-W5	780-785-3411

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Municipality	Site	Legal land location	Contact
Lacombe County	Eckville Waste Transfer Station	NW34-39-3 W5	403-782-6601
Lacombe County	Mirror-Alix Waste Transfer Station	NW24-40-23-W4	403-782-6601
Lacombe County	Prentiss Waste Transfer Station	NW7-40-25-W4	403-782-6601
Lamont County	Lamont Regional Landfill	NW7-56-18-W4	780-895-2585
Leduc County	Nisku Sewage Transfer Station	SW31-50-24-W4	780-955-3555
Leduc County	Thorsby – County Yard	SE17-49-1-W5	780-955-3555
Lesser Slave River, MD of	Flatbush Waste Transfer Station	NW36-65-2-W5	780-681-3929
Lethbridge, County of	Coaldale Waste Transfer Station	SW23-9-20-W4	403-328-5525
Lethbridge, County of	Iron Springs Waste Transfer Station	SW27-11-20-W4	403-328-5525
Lethbridge, County of	Nobleford Waste Transfer Station	SE10-11-23-W4	403-328-5525
Lethbridge, County of	Picture Butte Waste Transfer Station	NW27-10-21-W4	403-328-5525
MacKenzie, MD of	High Level Regional Landfill	SE1-110-20-W5	780-927-3717
Minburn, County of	Vegreville Landfill	NW21-52-14-W4	780-632-4033
Minburn, County of	Mannville Landfill	SW16-50-9-W4	780-632-4033
Minburn, County of	Ranfurly Landfill	SE3-52-12-W4	780-632-4033
Mountain View County	Didsbury – near airport	SW5-32-1-W5	403-335-3311
Newell County of	Newell Regional Landfill	SE34-19-15-W4	403-362-2772
Newell, County of	Bassano Waste Transfer Station	SE19-21-18-W4	403-362-2772
Northern Lights, MD of	Dixonville – Long Lake Regional Landfill	NW3-86-24-W5	780-836-3348
Northern Lights, County of	North Star Transfer Station	NW32-90-23-W5	780-836-3348
Northern Lights, County of	Hawk Hills Transfer Station	NE21-94-22-W5	780-836-3348
Northern Sunrise County	Nampa Waste Transfer Station	SE19-81-20-W5	780-322-3831
Northern Sunrise County	Peace Regional Landfill Site	SW2-84-20-W5	780-322-3831
Paintearth, County of	Castor Transfer Station	SW3-38-14-W4	403-882-3211
Paintearth, County of	Coronation Transfer Station	NE34-36-11-W4	403-882-3211
Parkland County	Stony Plain Landfill	SE35-52-1-W5	780-968-2231
Parkland County	Tomahawk Transfer Station	SW13-51-5-W5	780-968-2231
Peace, MD of	Griffin Creek Landfill	SW18-81-25-W5	780-338-3845
Pincher Creek, MD of	Cowley Regional Landfill	NW8-7-1-W5	403-628-3849
Pincher Creek, MD of	Pincher Station	SW1-7-30-W4	403-627-4151
Ponoka County	Bluffton Landfill	NE6-44-2-W5	403-783-3333
Ponoka County	Ponoka Waste Transfer Station	NE36-42-25-W4	403-783-3333
Provost, MD of	Provost Regional Landfill	SW3-40-3-W4	780-753-2368
Red Deer County	Horn Hill Waste Transfer Station	NE33-36-27-W4	403-350-2163
Rocky View, MD of	Bragg Creek Transfer Site	NE13-23-5-W4	403-520-7288
Rocky View, MD of	Langdon Transfer Station	505 Railway Ave	403-520-7286
Rocky View, MD of	Irricana Transfer Site	SW28-27-26-W4	403-520-7287
Saddle Hills County	Blueberry Transfer Station	SE3-80-8-W6	780-864-2004
Smoky Lake County	Smoky Lake Transfer Station	NW2-60-17-W4	780-656-3730
Smoky River, MD of	Smoky River Waste Commission Landfill	NW15-78-21-W5	780-837-2221 ext 115
Special Area #2	Bindloss Waste Transfer Station	SE24-22-3-W4	403-854-5627
Special Area #2	Hanna Waste Transfer Station	NW16-31-14-W4	403-854-5627
Special Area #3	Oyen Waste Transfer Station	LSD3-27-27-4-W4	403-664-3618
Special Area #3	Youngstown – Big Country Regional Landfill	SE29-29-9-W4	403-664-3618

Municipality	Site	Legal land location	Contact
Special Area #4	Monitor Waste Transfer Station	NW32-34-4-W4	403-577-3523
Spirit River, MD of	Spirit River Landfill	SW31-77-5-W6	780-864-3500
St. Paul, County of	Mallaig Waste Transfer Station	NE24 60 10 W4	780-645-3301
St. Paul, County of	Evergreen Regional Landfill	NW16-56-10-W4	780-645-3301
Starland County	Rumsey Waste Transfer Station	SW24-33-21 W4	403-772-3793
Starland County	Michichi Waste Transfer Station	NW19 30 18 W4	403-772-3793
Stettler, County of	Stettler Regional Landfill	NW22 40 19 W4	403-742-4441
Strathcona County	Fort Saskatchewan Transfer Station and Recycling Depot	11121 88 Ave. Ft. Sask.	780-417-7134
Sturgeon County	Roseridge Landfill	SW36 55 25 W4	780-939-8325
Taber, MD of	Enchant Waste Transfer Station	NW16 14 18 W4	403-223-8735
Taber, MD of	Grassy Lake Waste Transfer Station	NW23 9 13 W4	403-223-8735
Taber, MD of	Taber Waste Transfer Station	SE12-10-17-W4	403-223-8735
Taber, MD of	Vauxhall Transfer Station	SW12 13 16 W4	403-223-8735
Thorhild, County of	Thorhild Transfer Station	NE5 60 21 W4	780-398-3741
Two Hills, County of	Two Hills Regional Landfill	NE5 55 11 W4	780-657-3358
Two Hills, County of	Willingdon Seed Cleaning Plant	NE1 56 15 W4	780-657-3358
Vermilion River, County of	Marwayne Waste Transfer Station	SE34 52 3 W4	780-846-2244
Vermilion River, County of	Paradise Valley Waste Transfer Station	NW7-47-2-W4	780-846-2244
Vermilion River, County of	Vermilion Transfer Station	SW5 51 6 W4	780-846-2244
Vulcan County	Mossleigh Transfer Station	NW14-20-25-W4	403-485-3003
Vulcan County	Vulcan Waste Transfer Station	SW4 17 24 W4	403-485-3003
Vulcan County	Lomond Transfer Station	NE11-16-20-W4	403-485-2241
Vulcan County	Milo Transfer Station	SW6-19-21-W4	403-485-2241
Vulcan County	Champion Transfer Station	SW29-14-23-W4	403-485-3003
Wainwright, MD of	Wainwright – Parrish and Heimbecker	SW28 44 6 W4	780-842-4454
Wainwright MD of	Irma Shop Yard	5016, 53 ave. Irma	780-842-4454
Wainwright MD of	Edgerton (south of the railway tracks on Railway Avenue)	SW1-44-4 –W4	780-842-4454
Wainwright MD of	Chauvin Landfill	NW 8-43-1-W4	780-842-4454
Warner, County of	Border Seed Cleaning Plant	SW29 2 14 W4	403-642-3635
Warner, County of	Sunshine Seed Cleaning Plant	NW12 6 l9 W4	403-642-3635
Westlock County	Westlock Regional Landfill	NE27-59-26 W4	780-349-3346
Wetaskiwin, County of	Peace Hills Transfer Station	SW29-46-24-W4	780-352-3321
Wheatland County	Hussar Waste Transfer Site	NW1 24 20 W4	403-934 3321
Wheatland County	Standard Waste Transfer Site	SW10 25 22 W4	403-934-3321
Wheatland County	Wheatland West Waste Transfer Site	NE34 23 25 W4	403-934-3321
Willow Creek, MD of	Willow Creek Regional Landfill	NW22-11-26-W4	403-687-2603
Woodlands County	Fort Assiniboine – County Yard	SW2 62 6 W5	780-584-3866
Woodlands County/ Whitecourt	Whitecourt Regional Landfill	NW29-58-10-W5	780-648-2273
Yellowhead County	Parkcourt Waste Transfer Station	SE35-54-08-W5	780-325-3782

Note: Some municipalities maintain additional temporary sites for the drop off of empty pesticide containers. Phone the municipal contact number for locations and operating hours.

Safety precautions

Warning symbols

Visual warning symbols on pesticide labels indicate the kind of harm that can result from pesticide misuse or mishandling. They alert the user to the degree of the hazard (by the shape of the border) and to the type of hazard (by the centre picture).

Flammable

The "fire" symbol is a warning the pesticide is flammable or easily ignited. Keep the pesticide away from heat, sparks and open flames. Do not smoke while mixing or applying the product.

Explosive

The "exploding grenade" symbol indicates the pesticide can explode (e.g., pesticide in pressurized cans). Explosive conditions may also be created by using Roundup or Rustler (glyphosate) in a galvanized steel spray tank.

Corrosive

The "corroded hand" symbol indicates that the pesticide is corrosive to the skin and eyes. The chemical is either acid or alkali (caustic) and can burn the skin. Protect the skin and eyes when using these products.

Poisonous

The "skull and crossbones" symbol warns that the chemical is poisonous if taken into the body. Keep the product out of reach of children. Use the appropriate safety measures when dealing with poisonous products.

The following table relates the oral LD_{50} value (mg/kg) of a pesticide to its toxicity symbol.

Danger Poision

LD_{50} less than 500 mg/kg indicates high toxicity

Warning Poision

LD_{50} 500 - 1,000 mg/kg indicates moderate toxicity

Caution Poision

LD_{50} 1,000 - 2,500 mg/kg indicates low toxicity

LD_{50} greater than 2,500 mg/kg indicates very low toxicity

Pesticide toxicity, hazard and risk

The terms "toxicity," "hazard" and "risk" do not all have the same meanings. Users of pesticides should understand how the meanings of these terms differ.

Pesticides vary in **toxicity** or the degree to which they are poisonous. A pesticide's degree of toxicity depends on its inherent chemical and physical properties.

The relative **hazard** posed by a pesticide depends on the toxicity of the pesticide, the dose received and the length of time exposed. No hazard exists when the pesticide container is sealed, but once the seal is broken and the pesticide is handled, exposure can occur and a hazardous situation is created.

Risk of exposure is a function of how an individual handles the product. Although the hazard may be the same whenever a pesticide is being poured into the spray tank, the risk is different if 1 person wears a hard hat, goggles, respirator, nitrile gloves, waterproof apron and neoprene or rubber boots and the other person wears none of these. A knowledge of the toxicity of a product and the potential for personal exposure can be used to lower the risk of exposure. The user can control the risk by carefully managing the hazard. Even when highly toxic pesticides are used, if the degree of exposure is kept low enough, the risk can be kept at an acceptable level. The toxicity of the pesticide can't be changed but the risk can be managed.

LD_{50} values are used to rate the toxicity of the pesticides. The LD_{50} is the abbreviation used to indicate the lethal dose of a chemical that would kill 50% of an animal population in a test group (expressed in milligrams per kilogram of body weight of the test animal). For example, if a pesticide has an oral LD_{50} value of 10 mg/kg and the test animals each weigh 1 kg, 50% of the animals would die of poisoning if each ate 10 mg of the pesticide.

The smaller the LD_{50} value, the more toxic the pesticide. The LD_{50} value usually refers to the active ingredient in the pesticide formulation. In this publication, the LD_{50} of the formulated product is also given when available.

Symptoms of poisoning

The symptoms of a suspected poisoning may vary depending on the person's age, the type of poisonous substance, the amount of poison involved and how much time has passed since the poisoning occurred. Sometimes a poison doesn't cause any symptoms. Some common symptoms that might indicate a poisoning include:

- **Nausea and vomitting**
- **Cramps**
- **Throat pain**
- **Drooling**
- **Sudden sleepiness, confusion or decreased alertness**
- **Anxiousness, nervousness, irritability or tremors**
- **Seizures**
- **Substance residue or burn around the mouth, teeth, eyes or on the skin**
- **Trouble breathing**
- **Headache**

In case of poisoning, immediatiely contact a poison control centre, hospital or medical doctor for advice. Have the pesticide container available or the products safety data sheet so you can give complete information, such as what the substance is, how much was taken and when. Do not try to make the victim vomit.

Alberta Poison Control Centre
Calgary, AB
1-800-332-1414

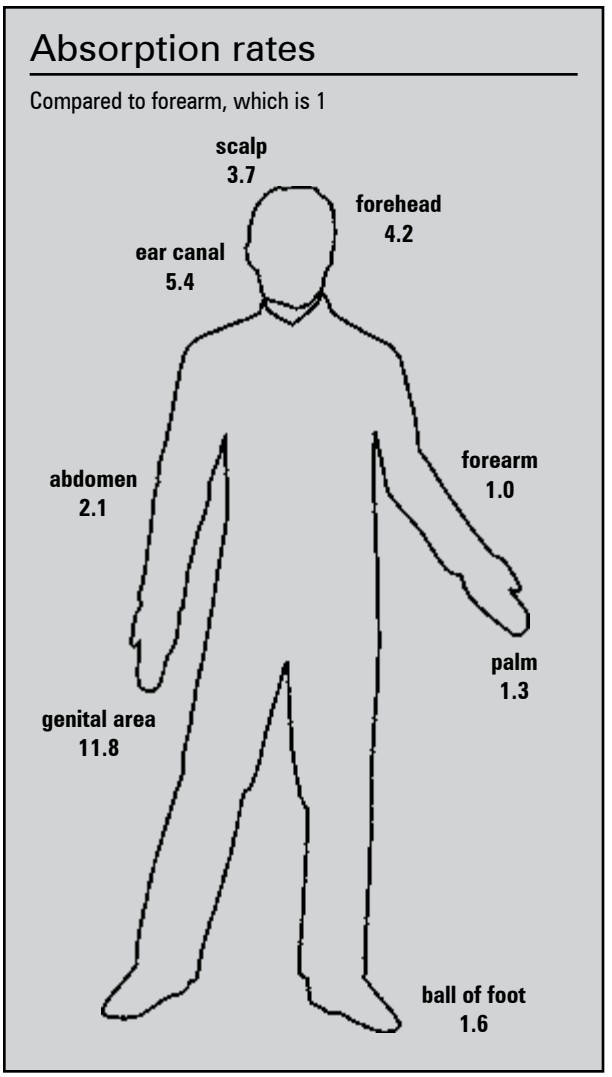
Reducing the risk of exposure to pesticides

Pesticides may enter the body through the skin (dermally), the mouth (orally) or the nose (inhalation).

Skin

Absorption through the skin is the most common route of exposure. Various areas of the body absorb pesticides at differing rates. For example, assuming the forearm is given an absorption rate of 1, the relative absorption rate of pesticides in the ear canal is 5.4, on the scalp 3.7, on the forehead 4.2 and the genital area 11.8 or almost 12 times greater than the forearm.

The genital area and the head are the areas where absorption is the greatest.



Reducing the risk of exposure through the skin is possible through the careful selection, use and care of protective clothing and safety equipment. Protective clothing and equipment can provide a barrier that reduces contact between the skin and pesticides. See the section on *Protective Clothing and Equipment* for recommended wear. To help reduce pesticide build-up, clothing should be washed daily using recommended procedures: see *Cleaning of Clothes and Equipment* section.

How skin is exposed to pesticides

- Direct handling of pesticides may include any activity in which the pesticide could come into direct contact with the skin. This could occur as a result of spills and splashes during mixing and handling of the concentrated pesticide, during equipment adjustment and from spray drift during application. The greatest risk occurs when the chemical concentrate is being handled and extra protection should be used at that time. The use of a waterproof apron is highly recommended when handling all pesticide concentrates regardless of toxicity.
- Pesticide transfer from contaminated clothing or equipment: clothing worn during pesticide use should be restricted to that use only, thereby eliminating the possibility of continued dermal exposure due to pesticide residues that remain on the clothing. Some types of concentrated pesticides are not removed by multiple washings. Clothing contaminated by accidental spills of concentrated pesticide should be discarded rather than laundered. Avoid entering equipment or living quarters wearing contaminated clothing and equipment. Pesticides may be transferred from boots to floors and carpets where children and pets may be exposed.
- Transfer of pesticides to clothing not exposed to pesticide concentration: do not wash contaminated garments in the same wash cycle as regular family laundry items. Pesticides can be transferred to other clothing during the laundering process.

Protective clothing and equipment

Even pesticides not absorbed by the skin may still cause skin problems such as redness, blisters or dry scaliness, which may lead to serious skin eczema and dermatitis. Good personal hygiene is important to help minimize pesticide absorption through the skin. Shower, shampoo your hair and put on clean clothing immediately after you finish using pesticides

for the day or after an accidental spill. Cuts and scrapes should be cleaned and bandages changed after handling pesticide to avoid possible dermal absorption from contaminated bandages.

Eyes

Eyes are very sensitive to pesticides and can be exposed to vapour or fumes, dust, spray drift or accidental spills and splashes when containers of liquid concentrates are being opened or when the concentrated chemical is being poured into the sprayer tank. Do not wear contact lenses when mixing or applying pesticides.

Ears

Sprays and spills may contaminate the head and ear canal.

Nose

Pesticides can enter the body when fumes, dust or spray mist is inhaled. Fumes and extremely fine particles of dust or spray can be completely absorbed by the lungs. To minimize exposure, respirators should always be worn when opening and mixing concentrated pesticides. Read the pesticide label and follow the precautions outlined. A respirator may be required when applying pesticides. Reference the safety data sheet to determine the appropriate respirator to use.

Mouth

Pesticides can enter the body through the mouth when users eat, lick their lips or smoke when hands are contaminated. Face and hands should be washed thoroughly prior to eating or smoking. Children may be poisoned if they drink pesticides stored in pop bottles. All pesticides must be stored in their original containers and should be placed in a locked area out of reach of children.

Coveralls

Wear coveralls that are closed at the neckline and wrists. Wear these over full-length pants and long-sleeved shirts. Where appropriate, duct tape may be used where the sleeve cuffs come over the gloves or the pant leg cuffs come over the boots to help keep fine particles from getting inside the coveralls.

Minimum protection

- Cloth: If cotton or cotton/polyester coveralls are worn, they should be washed after daily use. Some pesticides are difficult to remove from cloth.
- Disposable, nonwoven: A number of limited-use, disposable, nonwoven, hooded coveralls are now on the market. Rather than laundering, dispose of these at an approved landfill, thus avoiding the necessity of decontamination. Not all disposables are suitable for pesticide use, especially for liquid pesticides. Check with your supplier.

Extra protection

- Coveralls are available that provide greater durability and are more repellent to larger pesticide spills. However, they are more expensive and must be specially ordered. These coveralls are uncomfortable when worn for long periods because of heat build-up and lack of breathability in hot weather.
- Impermeable rainwear: Coveralls and 2-piece suits are available. They are similar in price to the more expensive disposable coveralls. Generally, they are comprised of polyvinyl chloride (PVC) on nylon. Although they repel liquid well, they do not breath, can become uncomfortable and cannot be worn for long periods in hot conditions. After use, they should be hosed down and washed with soap and water.

Remember, when using disposable coveralls . . .

- Before purchasing disposable coveralls, make sure they are recommended by the manufacturer for pesticide use. Avoid wearing all-purpose disposables.
- When removing disposable coveralls, take care not to contaminate the interior if the coveralls are to be worn more than once. Between wearings, hang in a well ventilated area away from other clothing.
- Do not launder disposables, but do launder all clothing worn under disposables, just as you would other clothing worn during pesticide use.
- Replace with a new coverall when severe pilling (balls of fibre on the surface), rips or holes occur. To discard, place in a plastic garbage bag and take to an approved landfill site; do not burn.

Minimum protection

A minimum level of protection is required when working with dilute, less toxic or granular pesticides. Where there is a direct contact with the pesticide, take extra protection.

Hard hat
wide brimmed, no leather liner

Coveralls
cloth or disposable (wear closed at neck, over long-sleeved shirt and full-length pants)

Gloves
unlined, nitrile or neoprene (cuff gloves and wear sleeves over gloves)

Boots
neoprene overboots or high rubber boots (wear pants outside boots)

Extra protection

Extra protection is required for mixing, loading and handling pesticide concentrates, especially when working with highly toxic pesticides. Check pesticide label.

Goggles or face shield

Respirator
(check label if needed for less toxic pesticides)

Hooded coveralls
chemically resistant (when mixing, loading or applying very toxic pesticides and when application drenches applicator)

Waterproof apron
(when handling all concentrated pesticides)

Gloves

Unlined gloves are required when handling, mixing or pouring concentrated pesticides, during field application and when equipment needs adjusting. Never use bare hands to do these jobs. Studies reveal that the greatest exposure is often through the hands. A variety of glove materials may be found on the market. Unlined nitrile and neoprene gloves are suitable for most pesticides. All gloves should be washed soon after the concentrated chemical has been mixed as pesticide may penetrate into the material if it is not cleaned off. Care should be exercised to avoid contaminating the interior of gloves when they are taken off and put on. If possible, wash the outside of the gloved hands prior to glove removal to avoid contaminating the interior. At the end of the day, both the inside and outside of the glove should be washed.

Prior to use, inspect gloves and replace immediately if cracks, swelling, discolouration, holes or rips develop. Cuff glove and wear sleeves over top of gloves to help prevent pesticide spills and splashes from running down inside the gloves.

Do not continue to wear contaminated gloves and avoid wearing leather, cloth or natural rubber gloves as they soak up the chemical and become a source of continuous contamination.

Boots

Neoprene overboots or long rubber boots are the recommended footwear as they are less likely to absorb pesticides and are more easily cleaned. Be sure to wear the pant leg over the boot to avoid pesticides running down into the boot. In case of such an accident, wash the boots out immediately. Otherwise, wash the outside of the boots daily.

Minimum protection

Prevent powders, dusts and spray mists from being deposited on the hair or scalp by wearing a hard hat. The hard hat should be washed daily. Avoid the use of a hard hat with a leather inner band.

Extra protection

Protect hair, scalp, ears and neck from dust, sprays and spills when you are likely to contaminate the head area. Wear a wide brimmed hat that covers the neck or hooded coveralls with the hood under the hard hat. Only wear ear plugs if required for hearing protection. Use disposable ear plugs made of self-moulding foam and dispose of them after use.

Goggles or face shields

Protect the eyes and face against pesticide vapours, dust and splashes when handling concentrated pesticides. Goggles and face shields must be resistant to chemicals and be ventilated to prevent fogging. Clean after each day of use and store away from direct sunlight.

Avoid wearing

These materials absorb chemicals and prolong exposure to the wearer; most are not easily cleaned.

- fabric baseball caps
- cloth or leather gloves, shoes or boots
- natural rubber or plastic gloves (not resistant to pesticides)
- leather belts, watch bands and cell phone holders
- contact lenses

Respirators

Purchase a respirator recommended for the pesticides used and make sure it fits properly. A good, airtight fit is required over the nose and mouth. Beards, moustaches, stubble (hair regrowth) and sideburns can prevent a close fit and proper seal.

2 cartridges are attached to the respirator facepiece. Each cartridge contains a pre-filter that removes dust particles and an activated charcoal filter that absorbs chemicals. The cartridges should be unscrewed and replaced as soon as pesticide odour is detected in the facepiece. Clean respirators after each day's use in accordance with manufacturer's recommendations. Unscrew the cartridges and wash the facepiece with neutral soap and water. Rinse the facepiece in clean water, dry with a clean cloth and screw on the cartridges. Once completely dry, the clean respirator should be stored away from direct sunlight in a sealed plastic bag to prevent cartridges from absorbing airborne contaminants. Disposable respirators are also available. Replace as soon as pesticide odour is detected. Wash after daily use, but do not get the charcoal filter wet. Store in a sealed plastic bag. **Note:** Gauze and dust masks are not respirators and are not recommended for pesticide use.

Gas masks

These are used when an applicator is likely to be exposed to very high levels of pesticides (fumigants). The face piece covers the eyes, nose and mouth. It is connected by a flexible hose to a charcoal canister worn on the belt. The lifespan of this canister is longer than that of respirator cartridges. Manufacturer's directions are to be followed for cleaning and storing gas masks and canisters.

Minimize exposure

- Wear recommended protective clothing and safety equipment.
- Limit clothing worn for pesticide use to that use only.
- Wash clothing and equipment daily after use.
- Replace clothing and equipment that is no longer serviceable.

Cleaning of clothes and equipment

Skin can absorb chemicals from inadequately cleaned clothing and equipment. Safe removal of pesticide demands special care in handling and washing contaminated clothes.

Handling pesticide soiled clothing

- Handle soiled clothing with unlined, nitrile gloves.
- Remove pesticide granules from cuffs and pockets outdoors.
- Discard any garment saturated with pesticide concentrate.
- Temporarily store clothing in disposable plastic bags before washing.
- Take disposables to approved landfill.

Washing pesticide soiled clothing

- Separate from regular laundry and wash daily.
- Wear gloves and protective eyewear when handling products containing bleach and limonene.
- Pre-treat with a stain removal product if an emulsifiable formulation is used or pre-rinse on washer's pre-soak cycle.
- Avoid overcrowding washer.
- Use hot water setting.
- Use full water level and normal cycle.
- Use extra heavy-duty detergent as recommended for heavily soiled loads.
- Repeat wash procedure.
- Clean washer after use (run empty washer through full cycle with hot water and detergent).

Drying

- Line dry to prevent contamination of dryer and increase the chemical breakdown of pesticide residues.

Washing other equipment

- Wash other equipment daily in hot soapy water: hard hat, goggles, apron, gloves, boots and respirator (avoid getting charcoal wet; remove if possible).

Specific cleaning procedures for pesticides

The standard washing procedure mentioned above reduces pesticides from contaminated clothing, but new research is gradually identifying more specific washing procedures to further reduce the residues on contaminated clothing or equipment. Note that each product requires unique washing procedures, but high residue levels remain in some cases. Refer to the guide in figure 1.

Recommendations

1. 18% residue is an unacceptable level.
   For better protection, choose a disposable coverall and discard after use.
2. Soak contaminated clothing in undiluted limonene for required time. Examples of this product are Odor Crush and Citra-Solv.
3. Pre-treat contaminated clothing before washing; let soak.
4. Fill 70 L washing machine with warm water (50°C); add 280 mL of chlorine bleach. Soak for required time.
   Note: loss of strength and colour results from bleach soak, more so for cotton than for cotton-polyester blends.
   Note: acceptable residue level is less than 3%.

Figure 1

Product	Suggested washing procedure	% Residue remaining
2,4-D (amine)	1 wash	<1%
2,4-D (ester)	1/2 hour Limonene soak (2) (degreaser), 1 wash	18% (1)
Captan	1 wash	1%
Chlorpyrifos (Lorsban, Dursban, Pyrinex)	3 hour bleach soak (4), 1 wash	<1%
Diazinon	Hot wash (60°C) or Spray'n Wash soak, 1 wash	1%
Iprodione (Rovral)	1 wash	1%
Malathion (diluted)	2 washes	3%
Triallate (Avadex)	Spray'n Wash soak (3), 2 washes	18% (1)
Any concentrated pesticides	Discard	Too high

Source: *Effective Pesticide Decontamination Procedures for Clothing, Equipment and Spills*, *Research Project Report*, University of Alberta, Alberta Occupational Health and Safety Heritage Grant Program, 1994.
Numbers displayed in parentheses denote recommendations listed on previous page.

Other precautions and safety tips

Fresh water supply

Always carry a supply of fresh water to clean up accidental spills and a clean pair of gloves for equipment adjustments.

Remote control devices

Devices (e.g., solenoid valves) can be installed to remotely control the sprayer, preferably from within the tractor cab, to reduce exposure to pesticides.

Tractor cab cleanup

After spraying pesticides, the inside of the tractor (seat, steering wheel, etc.) can be decontaminated by wiping with warm soapy water and a sponge.

Tractor cab filters

Charcoal filters can be fitted to the tractor air intake system to prevent pesticides from entering the cab. The use of these filters is highly recommended to reduce pesticide exposure during spraying operations. Check with tractor manufacturers to determine which charcoal filter is recommended for your tractor.

Grazing and haying restrictions

Traditionally, pesticides have been registered for use on crops grown to maturity. Grazing or cutting of the immature crop for hay was not considered as the intended use, so residue information on the immature plant was not requested in the registration process. A grazing or haying interval is considered in the registration process only if the green matter is to be fed to livestock. Consequently, many pesticide labels have no statement as to whether or not it is safe to graze the crop(s) listed prior to maturity. The absence of this information may lead farmers to assume that since there is no specific warning with respect to grazing, it is safe to do so.

Present pesticide labelling policy is meant to define only the acceptable uses of the product. It does not list or take into account the "don'ts." Therefore, it cannot be assumed that if something is not stated on the label, it is accepted for use. A new accepted use can only be made through the submission of relevant data to support that use.

In light of the above, pesticide labels that are silent on grazing will carry the following statement: "Don't graze the treated crops or cut for hay; there is not sufficient data available to support such use."

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Honey bee safety

Bees may be affected by pesticides, including those on and associated with treated seed. Spray early in the morning or late in the afternoon when bee activity is at a minimum. Warn beekeepers of your intentions so they can confine the bees or move them until risk of poisoning bees is over. Imidacloprid is toxic to bees. Dust generated during the planting of treated seed may be harmful to bees and other pollinators.

For guidance on minimizing dust generated during planting, refer to the following Health Canada webpage: *www.healthcanada.gc.ca/pollinators.*

When using a seed flow lubricant with this treated seed, only the Fluency Agent recommended by the registrant is permitted. Carefully follow directions for this seed flow lubricant.

Do not load or clean planting equipment near bee colonies and avoid places where bees may be foraging such as flowering crops or weeds. When turning on the planter, avoid engaging the system where emitted dust may contact honey bee colonies. Spilled or exposed seeds and dust must be incorporated into the soil or cleaned up from the soil surface.

Farm safety

For further information on farm safety, please contact:

AgSafe Alberta: *www.agsafeab.ca*

First aid

Alberta Poison Control Centre
Calgary, AB
1-800-332-1414

The emergency departments of most hospitals are equipped to deal with pesticide poisoning. However, the Poison Control Centre can provide information on the identification of poisoning symptoms and the provision of treatment.

In case of pesticide poisoning, the following manufacturers also provide emergency telephone numbers.

BASF Canada
1-800-454-2673

Bayer CropScience Inc.
1-800-334-7577

Corteva Agriscience
1-613-996-6666

FMC Corporation
1-800-331-3148

Interprovincial Cooperative Ltd.
1-613-996-6666

Nufarm Canada
1-800-424-9300

Syngenta Crop Protection Canada Inc.
1-800-327-8633

UAP Canada
1-800-561-8273

Standard first aid measures

Before using a pesticide, look for the warning symbol on the label. This label indicates the toxicity of the pesticide. If you are severely exposed to a pesticide and you are alone, do not panic. The symptoms of the pesticide do not show up immediately. You will have some time to decontaminate yourself.

If in eyes

Rinse eyes with lukewarm running water for 15 to 20 minutes. Get help to take you to the emergency department of the nearest hospital and take the pesticides safety data sheets with you. Do not use any eye medication unless prescribed by a doctor.

If on skin

Remove any clothing and jewellery that the poison has touched. Rinse skin with lukewarm running water for 15 to 20 minutes. Obtain medical attention if area of contact is large or if irritation persists.

If swallowed

Call a poison control centre or doctor immediately for treatment advice. Do not induce vomiting unless told to do so by a doctor or poison control centre personnel. Do not give any liquid to the person. Do not give anything by mouth to an unconscious person.

If inhaled

If you or another person have inhaled poisonous fumes, seek fresh air immediately. Do not put yourself in danger by breathing in poisonous fumes. If person is not breathing, call 911 and request an ambulance for medical assistance, then give artificial respiration if possible.

Glossary of terms in pest control

Active ingredient (AI): The accepted chemical name of the product responsible for efficacy.

Antagonism: Opposing action of different chemicals such that the sum of their total effect is less than the effect if each pesticide were used alone.

Antidote: A first aid treatment to offset the toxic effect of a pesticide.

Bioassay: Determination of concentration of a pesticide by comparing its effect on a test organism with that of a standard preparation.

Adjuvant: Any substance added to a pesticide formulation or spray tank to facilitate application.

Chlorotic: Loss or fading of green colour in foliage.

Contact pesticide: Causes localized injury to plant tissue or causes an effect when the pesticide hits the pest or the pest contacts the treated surface.

Degradation: Breakdown of a pesticide by action of air, water, sunlight, microbes or other agents.

Desiccant: Chemical used to accelerate drying of plant tissues.

Efficacy: Effectiveness of chemical on the pest.

Established forage: A forage crop that has gone through 3 months of a growing season.

Foliar application: Made to the leaves of plants, as opposed to soil application.

Formulation: Form in which the manufacturer prepares a pesticide to facilitate its use: granular, solution, emulsifiable concentrate, dry flowable, liquid flowable, wettable powder.

Fumigant: Vapour active chemical used against pests.

Incompatibility: Where 1 pesticide is mixed with another and causes unsatisfactory results.

Inhibit: Prevent or stop a process, for example, inhibits inhibits photosynthesis.

LC_{50}: Lethal concentration – concentration of pesticide in air or water that can kill 50% of the test population.

LD_{50}: Lethal dose – quantity of pesticide that will kill 50% of a test population.

Mode of action: The specific mechanism through which a pesticide affects a pest.

Necrosis: Localized death of plant tissue usually characterized by browning and desiccation.

Non-cropland: Land not in crop production or not intended for crop production.

Pesticide group: A number of pesticides that have the same mode of action.

Photosynthesis: Process by which green plants use sunlight, carbon dioxide and water to produce carbohydrates.

Phytotoxic: Injurious to a plant.

Plant growth regulators (PGR): Chemical that affects the normal growth process of plants.

Preharvest interval (PHI): Time (days) between the last application of the pesticide and harvest. Harvest includes cutting (swathing) or grazing, it does not include combining or baling for hay.

Residual herbicide: Persists in soil, kills regrowth and/or germinating seedlings over an extended time.

Resistance: A genetic change in a pest population as a result of selection by a pesticide that results in a loss of control.

Synergism: Complementary action of different pesticides such that the total effect is greater than the sum of their independent effects.

Systemic pesticide: Able to move in the plant, insect or other organism from the initial point of contact.

Weed control: A minimum of 80% reduction in weed stand and/or growth.

Weed suppression: A minimum of 60% reduction in weed stand and/or growth.

Herbicide index

Active ingredient names for registered products can be found in the *herbicide group classification by mode of action* table starting on page 44

Product registrations

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Product registrations (cont'd)

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Product registrations (cont'd)

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Product registrations (cont'd)

Herbicide group classification by mode of action

Chemical family	Active ingredients	Found in*			
Group 1	**Inhibitors of acetyl CoA carboxylaseACCase. These chemicals block an enzyme called ACCase. This enzyme helps the formation of lipids in the roots of grass plants. Without lipids, susceptible weeds die.**				
Aryloxyphenoxy proprionate (Fop)	clodinafop propargyl	Aurora Cadillac Foothills SG	Harmony Grass 240 EC Horizon SG	NextStep SG Signal	Signal FSU Traxos
	fenoxaprop-p-ethyl	Cirray Hellcat	Puma Advance	Tundra	Vigil
	quizalofop-p-ethyl	Anaconda Assure II Co-op Contender II	Elegant 10 EC Idol	IPCO Contender/ Contender II Leopard	Marshall Quiz Yuma
Cyclohexanediones (Dim)	clethodim	Advantage Clethodim Antler Arrow 240 EC Arrow-All-In Centurion	Clethodim 250 Duet FBN Clethodim 240 IPCO GraminX	Independence Ninja Master Samurai Master Patron	Select Select 1EC Shadow RTM Statue
	sethoxydim	Poast Ultra	Odyssey Ultra/Odyssey Ultra NXT		
	tralkoxydim	Bison	Liquid Achieve	Marengo	Nufarm Tralkoxydim
Phenylpyrazolin (Den)	pinoxaden	Avenza Axial Axial Xtreme	Axial Xtreme iPak Brazen Broadband	Cirray Rezuvant Rezuvant XL	Traxos Traxos Two Trondus

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Group 2	ALS/AHAS inhibitors. These chemicals block the normal function of an enzyme called acetolactate (ALS) actohydroxy acid (AHAS). This enzyme is essential in amino acid (protein) synthesis. Without proteins, plants starve to death.				
Imidazolinones	AC 299, 263 120 AS	Altitude FX			
	imazamox	Ares SN Altitude FX3 Benz Davai	Mizuna Anaconda Boa Pro Samurai	Samurai Master Next 70 WDG Python Quasar	Solo/Solo ADV Venim Viper
	imazamox + imazethapyr	Davai Duet	Judo Ninja	Ninja Master Odyssey/Odyssey NXT	Odyssey Ultra/ Odyssey Ultra NXT
	imazapyr	Arsenal	Ares SN	Quasar	
	imazethapyr	Gladiator	Kamikaze	Phantom	Pursuit
Sulfonylamino-carbonyltriazolinones	flucarbazone sodium	Batalium Denali CM	Everest 3.0 AG Inferno Duo	Inferno Trio Himalaya	Himalaya Pass
	propoxycarbazone sodium	Olympus			
Sulfonylureas	chlorsulfuron	Telar			
	ethametsulfuron methyl	Muster			
	halosulfuron	Permit			
	metsulfuron-methyl	Ally Toss-N-Go Escort	Express Pro Navius FLEX	Reclaim/Reclaim II Smoulder	Travallas TruRange
	nicosulfuron	Accent	Nicosh Herbicide	Steadfast IS	
	rimsulfuron	Hinge Prism	Sharda Rimsulfuron 25% Sortan IS	Steadfast IS	Titus Pro
	thifensulfuron-methyl	Ammo DR Audible Barricade II Boost Broadside	Draft Draft CT Foxxy CRX Foxxy Pro RX Foxxy R	Foxxy MR Foxxy RCK MP RX Picket Predicade	Refine SG Retain Sentrallas Travallas Volta
	tribenuron-methyl	Ammo DR Audible Barricade II Boost Broadside, Cleat Draft Draft CT	Express Pack Express FX Express Pro Express SG Foxxy MR Inferno Duo Inferno WDG Intruvix Herbicide	Involve 50 WDG Foxxy CRX Foxxy Pro RX Foxxy R Foxxy RCK Extra MP RX Pinnacle SG	Predicade Refine SG Refine M Retain Revenge E Signal FSU Tribe
	triflusulfuron methyl	UpBeet			
Pyrazole	halosulfuron	Permit			
Triazolpyramidines	florasulam	Avenza Akito Benchmark Blitz Broadband Cirpreme Co-op Exhilarate Exhilarate	FBN Florasulam First Pass Flora Frontline XL Frontline 2,4-D Hotshot Inferno Trio IPCO Exhilarate	Korrex II Battlestar Battlefront Deathstar Himalaya Pass Outshine Paradigm PRE	PrePass PrePass Flex Priority Stellar/Stellar XL ThunderHawk Topline Tridem
	pyroxsulam	Exhilarate	Simplicity/ Simplicity GoDRI	Tandem	Tridem
Triazolones	thiencarbazone-methyl	Predicade	Varro	Velocity m3	

* A herbicide may appear in more than 1 group if it contains more than 1 active ingredient.

(continued)

Herbicide group classification by mode of action

Chemical family	Active ingredients	Found in*			
Group 3	**Microtubule assembly inhibitors. These chemicals inhibit cell division in roots.**				
Dinitroanilines	ethalfluralin	Edge			
	trifluralin	Bonanza	Fortress MicroActiv	Rival	Treflan

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Group 4	Synthetic auxins. These chemicals disrupt plant cell growth in newly forming stems and leaves; they affect protein synthesis and normal cell division, leading to malformed growth and tumours.				
Benzoic acids	dicamba	Ammo Ammo DR Diflux Disha 480	Distinct Engenia Express FX Intruvix Herbicide	Korrex II Oracle Pulsar Sword	Tracker XP Vanquish VMD 480 Xtendimax
Carboxylic acids	aminocyclopyrachlor	Navius FLEX	TruRange		
	fluroxypyr	Akito Altitude FX3 Audible Axial Xtreme Axial Xtreme iPak Avenza Barricade II Certain Co-op OcTTain Batalium Denali CM Diflux Enforcer D Enforcer M	Erebus Xtreme Esteem Flurox-24 ForceFighter M Foxxy Canuck Foxxy MR Foxxy RCK Ikwin Inertia Infinity FX IPCO OcTTain Momentun Battlestar Deathstar	Foxxy CM Foxxy CRX Foxxy M Foxxy Pro Foxxy Pro RX Foxxy R OcTTain XL Outshine Pierce Pixxaro Predicade Prestige XC Prominex Pulsar	Retain SG Rezuvant Rezuvant XL Rush 24 Sentrallas Signal FSU Stellar/Stellar XL Tandem Travallas Traxos Two Tridem Trophy
	quinclorac	Clever	Facet L	Ingenious	
Picolinic acid	aminopyralid	Reclaim/Reclaim II	Restore II		
	clopyralid	Advantage Clopyralid Akito CT Mix 360 Curtail M Eclipse III Denali CM	Draft CT Esteem FBN Clopyralid Inertia Lontrel	Momentum Clobber Clobber G Clobber M Foxxy CM	Foxxy CRX Prestige Prestige XC Prominex Pyralid
	halauxifen	Cirpreme Co-op Exhilarate Exhilarate	IPCO Exhilarate Paradigm PRE Pixxaro	Prospect Prominex	Rezuvant Rezuvant XL
	picloram	Grazon XC	Tordon 22K		
Phenoxy	2,4-D	2,4-D Ammo DR Benchmark Calmix Pellets Co-op Convex Desormone Dichlorprop-DX	Enforcer D Estaprop XT Flurox-24 Frontline 2,4-D Grazon IPCO Convex	Leader Battlefront 24D Foxxy Pro Foxxy Pro RX OcTTain Reclaim/Reclaim II	Restore II Retain SG Rush 24 Thrasher Thumb Thumper
	dichlorprop (2,4-DP)	Desormone	Dichlorprop-DX	Estaprop XT	
	2,4-DB	2,4-DB	Caliber 625	Cobutox 625	Embutox 625
	MCPA	Badge Batalium Broadside Buctril M Canuck Certain Clovitox Plus Co-op Exhilarate Curtail M Denali CM Enforcer M	Esteem Exhilarate ForceFighter M Foxxy Canuck Foxxy MR Frontline XL Goldwing Horizon BTM IPCO Exhilarate Logic M MCPA	Mextrol Battlefront Battlestar Clobber M Deathstar Foxxy CM Foxxy M Outshine Pierce Pixxaro	Predicade Prestige XC Refine M Stellar/Stellar XL Sword ThunderHawk Tracker XP Topline Trophy Tropotox Plus
	MCPB	Clovitox Plus	Tropotox Plus		
	mecoprop (MCPP)	Mecoprop-P	Sword	Tracker XP	

* A herbicide may appear in more than 1 group if it contains more than 1 active ingredient.

(continued)

Herbicide group classification by mode of action

Chemical family	Active ingredients	Found in*	
Group 5	**Photosynthetic inhibitors at Photosystem II, Site A. These chemicals interfere with photosynthesis and disrupt plant growth, ultimately leading to death.**		
Phenyl carbamates	desmedipham	Betamix	Betamix ß

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	phenmedipham	Betamix	Betamix ß		
Triazines	atrazine	Aatrex	Laddok	Primextra II Magnum	
	simazine	Princep Nine-T			
Triazinones	hexazinone	Velpar DF	Velpar DF CU		
	metribuzin	Buzzin Metrix Meter 75 DF	Meteor Sencor 480 F	Sencor 75 DF Squadron	Strim MTZ Tricor
Uracils	bromacil	Calmix Pellets	Hyvar X/X-L	Krovar I	
Group 6	**Photosynthetic inhibitors at Photosystem II, Site II.**				
Benzthiadiazoles	bentazon	Basagran Basagran Forte Benta Super	Benz Berserk Broadloom	Hurricane Anaconda Boa Pro	Python Viper
Nitriles	bromoxynil	Axial Xtreme iPak Badge Batalium Bromotril II Brotex 240 Buctril M Canuck Certitude Conquer	Co-op Brotex Co-op Octagon Emphasis Enforcer D Enforcer M ForceFighter M Foxxy Canuck Hotshot Infinity	Infinity FX IPCO Brotex IPCO Octagon Koril Leader Logic M Mextrol Pardner	Pierce Revenge B Starbuck Thrasher Thumb Thumper Tundra Velocity m3
Group 7	**Photosynthetic inhibitors at Photosystem II, Site B.**				
Ureas	diuron	Diurex 80W	Karmex XP	Krovar I	
Group 15	**Lipid synthesis inhibitors (not ACCase inhibition). These chemicals inhibit the cell division and elongation in the seedling shoots before they emerge above ground.**				
Thiocarbamates	EPTC	Eptam			
	triallate	Avadex Liquid EC	Avadex MicroActiv	Fortress MicroActiv	
Group 9	**Inhibitors of EPSP synthesis. These chemicals inhibit the amino-acid synthesis.**				
None	glyphosate	Advantage Glyphosate 360 Advantage Glyphosate 540 Clearout 41 Credit Crush'R Plus	Destroyer Glyphosate 540 Eclipse III Glyphogan Plus KnockOut Extra Matrix MP Clobber G	PrePass Roundup Transorb HC Roundup WeatherMax Roundup Weather PRO R/T 540 Sharda Glyphosate 360	Smoke StartUp Vector 540 VP 480 Xtendimax

* A herbicide may appear in more than 1 group if it contains more than 1 active ingredient.

(continued)

Herbicide group classification by mode of action

Chemical family	Active ingredients	Found in*			
Group 10	**Inhibitors of glutamine synthetase.**				
None	glufosinate ammonium	Advantage Glufosinate 150	Justice FBN Glufosinate 150	Liberty 150 SN	MP Vigor
Group 13	**Inhibits DOXP, which is needed in plant metabolism.**				
Isoxazolidinone	clomazone	Command 360 ME	Command Charge	IPCO Clomazone	
Group 14	**Inhibits an enzyme of chlorophyll and heme biosynthesis.**				
Aryl triazone	carfentrazone	Aim Command Charge Co-op Convex Co-op Octagon Emphasis	Conquer Focus/Focus SE Inferno Trio Instep IPCO Convex	IPCO C-Zone IPCO Octagon Maxunitech Carfentrazone-ethyl 240 EC	Intruvix Prospect Revenge Revenge B Revenge Pro
	sulfentrazone	Authority	Authority Supreme		
Dicarboximide	flumioxazin	Chateau	Fierce	Valtera	
Pyrazole	pyraflufen-ethyl	Blackhawk	Goldwing	ThunderHawk	
Pyrimidinedione	saflufenacil	Heat	Smoulder	Zidua SC	

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Diphenyl ethers	acifluorfen	Hurricane	Ultra Blazer		
Group 15	**Inhibitors of cell growth and division.**				
Chloroacetamides	metolachlor	Dual II Magnum Komodo	Metallica Primextra II Magnum	Stallion	Strim MTZ
Pyrazole	pyroxasulfone	Authority Supreme Fierce	Focus	Focus SE	Zidua
Group 16	**Unknown.**				
Benzofuranyl alkylsulfonate	ethofumesate	Ethos SC	Nortron		
Group 19	**Auxin transport inhibitor allowing buildup in the meristem area.**				
Semicarbazone	diflufenzopyr	Distinct			
Group 20	**Inhibits actively dividing merestems in roots and shoots as well as seed gemination.**				
Nitriles	dichlobenil	Casoron			
Group 22	**Cell membrane disrupters. Chemicals that disrupt the internal cell membrane and prevent the cells from manufacturing food.**				
Bipyridyliums	diquat	Advantage Diquat Armory Craven Co-op Bolster II	Diquat 240 Dessicash Desiccant DriFast Desiccant FBN Diquat	IPCO Bolster II Masterline Diquat Clone Reglone Desiccant	Reglone 240 Desiccant Reglone Ion Reward Stage Desiccant
Group 27	**Inhibits plant pigment biosynthesis and photosynthesis.**				
benzopyrazole	pyrasulfotole	Axial Xtreme iPak Infinity	Infinity FX	Tundra	Velocity m3
	topramezone	Armezon	Certitude	Impact	
	tolpyralate	Shieldex 400SC			

* A herbicide may appear in more than 1 group if it contains more than 1 active ingredient.

2,4-D

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
2,4-D 600 amine (PCP# 17511)	IPCO	560 g/L	Solution	10 L, 115 L
2,4-D 600 amine (PCP# 14726)	Nufarm Agriculture	564 g/L	Solution	10 L
2,4-D 600 amine (PCP# 5931)	Loveland Products Canada	560 g/L	Solution	10 L
2,4-D 600 amine (PCP# 29248)	IPCO	560 g/L	Solution	10 L
2,4-D 700 ester (PCP# 27819)	IPCO	660 g/L	Emulsifiable concentrate	10 L, 115 L, 450 L
2,4-D 700 ester (PCP# 27820)	Nufarm Agriculture	660 g/L	Emulsifiable concentrate	10 L, 115 L, 500 L
MPower 2,4-D 700 ester (PCP# 30460)	NewAgco Inc	660 g/L	Emulsifiable concentrate	10 L, 115 L, 510 L
2,4-D 700 ester (PCP# 27818) Salvo	Loveland Products Canada	660 g/L	Emulsifiable concentrate	10 L, 115 L
2,4-D ester 700 (PCP# 33111)	ADAMA	660 g/L	Solution	10 L, 120 L
Co-op 2,4-D 700 ester (PCP# 32882)	Federated Co-operatives Ltd	660 g/L	Emulsifiable concentrate	10 L, 115 L

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Product	Company	Active ingredient	Formulation	Container size
ULA 5 (PCP # 33921)	Sharda Cropchem Ltd	2,4D Amine: 470 g/L	Solution	10 L, 115 L, 1,000 L
ULA 6 (PCP # 33920)	Sharda Cropchem Ltd	2,4D Amine: 564 g/L	Solution	10 L, 115 L, 1,000 L
Lima 660 EC (PCP # 34240)	Sharda Cropchem Ltd	2,4 -D ester: 660 g/L	Emulsifiable concentrate	10 L

Crops, staging and rates

Crop	Stage	Rate
Wheat, barley, rye (not under-seeded with legumes)	From the 4-leaf expanded to the early flag-leaf (shot blade) stage	600 g/L formulation: up 0.24 - 0.38 L/acre 700 g/L formulation: up to 0.323 L/acre
Winter wheat, fall rye	Spring: full tillering to the shot blade stage Fall: do not apply to seedling in the fall	600 g/L formulation: up to 0.24 - 0.38 L/acre 700 g/L formulation: up to 0.33 L/acre
Field corn	As an overall spray, before the corn is 15 cm tall (leaf extended) and/or before the 6-leaf stage. For later applications (corn 15 - 75 cm, leaf extended), use a shielded spray or a directed spray with drop pipes. Keep spray off corn foliage	600 g/L formulation: up to 0.19 - 0.37 700 g/L formulation: up to 0.33 L/acre
Established grasses grown for forage and seed production	Spring: up to the shot blade stage of the grass Fall: after harvest	600 g/L formulation: up to 0.38 L/acre 700 g/L formulation: up to 0.33 L/acre
Established pasture and rangeland (without legumes)		600 g/L formulation: up to 1.62 L/acre 700 g/L formulation: up to 1.38 L/acre
Stubble land, roadsides, summerfallow	Apply at a time of rapid growth, usually May, June and/or September	600 g/L formulation: up to 1.11 L/acre 700 g/L formulation: up to 0.95 L/acre
Golf courses (roughs and fairways only), sod farms	Apply at a time of rapid growth, usually May, June and/or September, before grasses are in the flag-leaf (shot blade) stage	600 g/L formulation: up to 1.1 L/acre 700 g/L formulation: up to 0.77 L/acre (1.53 L per year)
Weeds and brush control (non-crop land)	Apply at time of rapid growth (usually May, June and/or September)	600 g/L formulation: 1.11 - 3.20 L/acre 700 g/L formulation: 1.31 - 2.75 L/acre
Basal bark and stump treatment		700 g/L formulation: 2.5 Litres in 100 L of diesel fuel. Spray to run-off

Weeds, rates and staging

Apply at lower rates when weeds are small (2 - 4 leaf), growing rapidly, under good growing conditions. Higher rates are needed when weeds are larger, growing under stress conditions (dry or cold weather) or in heavy infestation.

Susceptible weeds

Apply at: 0.22 - 0.38 L/acre (600 g/L) 0.19 - 0.32 L/acre (700 g/L)

annual sow thistle
ball mustard
bluebur (before the 4-leaf stage)
burdock (before the 4-leaf stage)
cocklebur
common plantain
common ragweed
daisy fleabane
false flax
false ragweed
flixweed*
giant ragweed
goat's beard
hare's-ear mustard
Indian mustard
lamb's-quarter
narrow-leaved hawk's-beard
prickly lettuce
ragweed
redroot pigweed
Russian pigweed
Russian thistle
shepherd's-purse
stinging nettle
stinkweed
sweet clover (seedling)
thyme-leaved spurge)
tumble mustard
volunteer canola
wild mustard
wild radish
wild sunflower
wormseed mustard

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2,4-D (cont'd)

Harder-to-control weeds
Apply at: 0.40 - 0.61 L/acre (600 g/L)
0.34 - 0.53 L/acre (700 g/L)

curled dock (before 4-leaf)	hairy galinsoga	oak-leaved goosefoot	tansy mustard
dog mustard	hawkweed	pineapple weed	tumble pigweed
field pepper-grass	heal-all	prostrate pigweed	
flixweed**	knotweed	purslane	
groundsel	narrow-leaved hawk's-beard**	sheep sorrel	

Very-hard-to-control weeds (top growth only)
Apply at: 0.40 - 0.61 L/acre (600 g/L)
0.45 - 0.53 L/acre (700 g/L)

biennial wormwood	curled dock	hemp-nettle***	scentless mayweed
blue lettuce	dandelion	hoary cress	smartweed***
bull thistle	field bindweed	lady's-thumb***	tartary buckwheat
burdock	field chickweed***	leafy spurge	teasel
buttercup	field horsetail*	mouse-eared chickweed***	volunteer sunflower,
Canada thistle	gumweed	perennial sow thistle	wild buckwheat***
chicory	hedge bindweed	Russian knapweed	yellow rocket

Brush species
Apply at: 1.11 - 2.22 L/acre (600 g/L)
1.31 - 2.53 L/acre (700 g/L)

alder	cherry	Manitoba maple	western snowberry
balsam poplar	elm	sumac	willow
birch	hazelnut	trembling aspen poplar	

* Late fall applications or spring seedlings. ** Spring: prior to bolting. *** Use highest listed rate for suppression.

Registered tank mixes

All formulations of 2,4-D may be recommended in tank mix with other products. Consult the label of the tank mix partner product and follow the most stringent set of precautions, restrictions and directions for use.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground applications – barley, corn, rye and wheat – 20 - 40 L/acre. **Established pasture and rangeland:** 40 - 80 L/acre. Non-crop uses – 40 L/acre or more. **Turf:** 40 - 80 L/acre. Lawns and parks, sod farms and golf courses – 40 - 80 L/acre. **Brush species:** 400 - 800 L/acre. **Aerial applications:** 22 - 66 L/acre. Some formulations of 2,4-D may be applied by air. Check the label for detailed instructions.

Note: Higher application volumes reduce the risk of crop injury.

Application tips

Recommendations vary from label to label; read label of product used. Do not use on sanfoin, bentgrasses or freshly seeded grass. Spray during warm weather when the weeds are young and growing actively. Do not spray during periods of high temperatures (> 27ºC) when crops may be under stress as damage to the crop may occur. Do not spray during periods of high winds when spray is likely to drift. Coarse sprays are less likely to drift.

How it works

Systemic, non-selective herbicide. Readily absorbed through leaves or roots. Translocated primarily in phloem with the sugars but can also move with water in the xylem. Accumulation is primarily in the young, rapidly growing meristematic regions of roots or shoots. It inhibits pigments, including chlorophyll, leading to death.

Expected results

Susceptible plants become malformed before they die.

Restrictions

Rainfall: 2, 4-D amine: A rain-free period of 4 hours is needed after application. **2,4-D ester:** A rain-free period of 2 hours is needed after application. **Grazing:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest or cut treated crops for forage until 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Re-cropping:** No restrictions the year after treatment. **Re-entry interval:** 12 hours.

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Environmental precautions

Toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants. **Leaching:** The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow. **Runoff:** Reduce risk of runoff by avoiding application on moderate or greater slopes and bare soil.

Toxicity

Acute oral LD_{50} (rats) = technical 300 - 1,200 mg/kg.

Storage

2,4-D amine requires heated storage. 2,4-D ester may be frozen.

Aatrex

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Aatrex Liquid 480 (PCP# 18450)	Syngenta	Atrazine: 480 g/L	Liquid suspension	10 L

Crops, staging and rates

Timing	Rate	Crop
Pre-plant incorporated	Light and sand: 0. 85 - 1.25 L/acre Loam and clay: 1.25 L/acre 0.85 - 1.25 L/acre plus 6.88 L/acre corn oil or 1.11 - 2.23 XA Oil concentrate	Silage corn Field corn Sweet corn
Pre-emergence*		
Post-emergence (1 - 6 leaf stage)		

* Rainfall is required within 10 days or a shallow cultivation will be necessary.

Note: For pre-plant incorporated and pre-emergence application, nitrogen solutions or complete liquid fertilizers may replace the water as a carrier. Do not apply after the corn has emerged as there is danger of liquid fertilizer causing crop injury.

Weeds controlled

annual smartweed	lamb's-quarter	volunteer clover	wormseed mustard
common purslane	ragweed	wild oats	wild mustard
lady's-thumb	redroot pigweed	wild buckwheat	

Registered tank mixes

Fertilizers: For pre-plant incorporated and pre-emergence application, nitrogen solutions or complete liquid fertilizers may replace the water as a carrier. Do not apply after the corn has emerged as there is danger of liquid fertilizer causing crop injury.

Many dry bulk granular fertilizers may be impregnated with Aatrex or Aatrex plus Dual II Magnum or Eradicane 8E as a pre-plant incorporated application to control weeds in corn.

Oil-water emulsions (post-emergent treatment): Atrazine 480.

Pre-plant-incorporated: Aatrex Liquid 480 (0. 85 - 1.25 L/acre + Dual II Magnum (0.5 - 0.7 L/acre).

Application tips

Continuous gentle agitation is needed. Avoid excessive agitation, especially with oil mixtures as a grease-like mass may form. Use oil mixes at once and clean tank and system with a strong detergent solution. Use 50 mesh or larger strainers and use only metal filters. Bypass line should discharge to bottom of tank. Band treatments are desirable when cultivation is to alleviate hard soil conditions or to control annual weeds.

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Aatrex (cont'd)

How it works
A systemic herbicide absorbed through both roots and foliage, and it is translocated to the leaves where it inhibits photosynthesis.

Expected results
Affected plants are slow to emerge and are wilted, yellowish and eventually turn brown and die. Poor weed control may be expected if improper incorporation is done, or when post-emergent application is made without oil concentrate or sprayed too late. Heavy rainfall on sandy soils may cause leaching and a decrease in weed control and/or crop injury.

Restrictions
Re-cropping: Plant only to corn in year of treatment. The use of atrazine on the Prairies is not recommended when corn is grown in rotation with other crops except triazine-tolerant canola. Breakdown of atrazine in the soil is slow and may cause injury to sensitive crops (e.g., cereals, canola, sugar beets) 1 or more years after application. Crops most tolerant after corn and triazine-tolerant canola are sorghum, then flax, faba bean and peas. The risk of damage to succeeding crops from atrazine residues may be reduced by ploughing or deep tilling treated fields in the fall prior to seeding the next crop in the rotation. Spreading and incorporating manure may also help to reduce the atrazine levels. Uneven application, excessive sprayer overlap or applications in excess of recommended rates will not injure corn but may result in a longer carryover of atrazine residues. A prolonged period of dry weather will also lengthen the time that atrazine residues remain in the soil. **Rainfall:** Rainfall will activate the chemical, carrying it into the root zone where kill will begin. **Grazing:** Do not graze treated immature crops or cut for fodder.

Environmental precautions
Leave at least a 10-metre buffer between treated area and sensitive habitats. Do not mix or load within 30 metres of wells and aquatic habitats such as lakes, ponds, dugouts or sinkholes. Heavy rainfall on sandy soils may cause runoff and leaching. The use of Atrazine may result in contamination of groundwater, particularly on areas where soils are permeable (e.g., sand, loamy sand and sandy loam soils) and/or the depth to the water table is shallow.

Toxicity
Acute oral LD_{50} (rats) Aatrex = > 5,000 mg/kg.

Storage
Heated storage required. If stored in unheated areas, the product should be warmed and agitated thoroughly prior to using.

Accent 75 DF/Nicosh Herbicide

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Accent 75 DF (PCP# 25116)	Corteva Agriscience	Nicosulfuron (75%)	Water dispersible granules	270 g bottle
Nicosh Herbicide (PCP# 33227)	Sharda Cropchem Ltd.			

Note: 1 bottle of Accent treats 20 acres.

Crops, staging and rates

Crop	Stage	Rate
Field corn	1 - 8 leaves* (6 visible collars)	13.5 g/acre plus 0.2% v/v non-ionic surfactant (Agral 90 or Ag-Surf)
Sweet corn**	1 - 6 leaves* (4 visible collars)	

* The coleoptile (short, blunt leaf) is counted as the first leaf. ** Accent is registered on all sweet corn varieties. However, tolerance may vary depending on variety. Refer to seed supplier for variety tolerance.

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Weeds and staging

Weeds	Staging
barnyard grass fall panicum	1 - 6 leaves (up to 2 tillers)
green foxtail/	1 - 6 leaves (up to 2 tillers)
old witchgrass	1 - 6 leaves (up to 2 tillers)
quackgrass	3 - 6 leaf stage (10 - 20 cm in height - leaf extended)
wild oats	3 - 6 leaves
yellow foxtail (suppression)	1 - 6 leaves (up to 2 tillers)

Registered tank mixes

Accent/Nicosh (13.5 g/acre) + Banvel II (0.24 L/acre) + 0.2% v/v non-ionic surfactant (Agral 90 or Ag-Surf).

Accent/Nicosh (13.5 g/acre) + Pardner (0.4 L/acre) + 0.2% v/v non-ionic surfactant (Agral 90 or Ag-Surf).
Use tank mixing procedure "a" on page 13.

Application information

How to apply: Ground applications only. Do not apply by air. **Water volume:** 40 L/acre.

Application tips

Warm, moist conditions following application promote the activity of Accent/Nicosh, while cool and/or dry conditions may reduce or delay activity. Poor weed control or crop injury may result from applications made to plants under stress from abnormally hot or cold weather, environmental conditions such as drought, water-saturated soils, hail damage or frost, disease, insect or nematode injury and prior herbicide, or carryover from a previous year's herbicide application. Delay application until stress passes and both weeds and corn resume growth. If corn has been injured by frost, wait 48 to 72 hours before applying Accent/Nicosh. Severe stress conditions immediately following application may also result in crop injury or poor weed control. Do not apply a foliar organophosphorus insecticide within 7 days before or after applying Accent/Nicosh.

How it works

Accent/Nicosh is a systemic herbicide that is absorbed by the foliage and translocated to the growing points of the plant. Growth of susceptible plants stops shortly after application. It rapidly stops the growth of susceptible species; typical symptoms usually appear within 5 to 7 days, but may not be noticeable for 2 to 3 weeks after application, depending on the prevailing growing conditions.

Expected results

Typical injury symptoms include yellowing, purpling and reddening of the newest leaves and usually appear within 5 to 7 days, but may not be noticeable for 2 to 3 weeks after application, depending upon the prevailing growing conditions. Eventually, the entire plant discolours and dies.

Restrictions

Rainfall: A rain-free period of 2 to 4 hours is needed after application. **Grazing:** Do not graze treated crops or cut for hay. **Pre-harvest intervals:** Do not harvest field corn until 30 days and sweet corn for 40 days after application.
Re-entry interval: 12 hours.
Re-cropping restrictions: Winter wheat may be seeded 4 months after application. Spring cereals, canola, field pea, flax, corn, potato, dry bean*, sunflower, alfalfa may be seeded 10 months after application.

*Since not all dry bean varieties have been tested for tolerance to Accent/Nicosh, first planting of each variety to previously treated field should be limited to a small area to confirm tolerance prior to general field scale.

Environmental precautions

Accent/Nicosh is toxic to terrestrial plants and aquatic organisms. Leave a buffer zone of at least 2 metres between the downwind point of direct application and the closest edge of sensitive terrestrial and aquatic habitats.

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Accent 75 DF/Nicosh Herbicide (cont'd)

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in a dry place. Keep water-soluble bags in original outer container or bag away from moisture.

Achieve (Liquid Achieve SC)/Bison 400L/ Marengo/Nufarm Tralkoxydim

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Liquid Achieve SC (PCP# 28555)	Corteva Agriscience	Tralkoxydim: 400 g/L	Suspension concentrate	8 L, 96 L
Bison 400L (PCP# 29256)	ADAMA Canada	Tralkoxydim:400 g/L + Addit adjuvant	Suspension concentrate	8 L + 8 L Addit copack
Marengo (PCP# 29289)	Loveland Products	Tralkoxydim: 400 g/L	Suspension concentrate	8 L Marengo + 4 L Turbocharge
Nufarm Tralkoxydim* (PCP# 30176)	Nufarm Agriculture Inc.	Tralkoxydim: 400 g/L	Suspension concentrate	8 L

*** Carrier Adjuvant sold separately.**

Crops, staging and rates
No staging restrictions. Apply at 200 mL/acre plus an approved adjuvant.

barley (all 2 or 6 rows)
durum wheat (all varieties)
fall rye
spring rye
spring wheat (all varieties)
triticale
winter wheat (all varieties)

Underseeded crops
Apply at 2-leaf and 4-leaf of the forage legumes and grasses.

Cereal crops underseeded to forage legumes (if not tank mixed with broadleaf herbicides)

alfalfa
bird's-foot trefoil
clover
sainfoin

Forage grasses underseeded to cereals or grown alone

Minor Use Registration. Corteva assumes no responsibility with respect to performance and/or crop tolerance.

crested wheatgrass
intermediate wheatgrass
creeping red fescue
meadow and smooth bromegrass (seed production)

Weeds, rates and staging

Weeds	Stage
barnyard grass, Persian darnel	1 - 4 leaf
green foxtail, yellow foxtail	1 - 5 leaf
volunteer oats, wild oats	1 - 6 leaf

Rate
200 mL/acre of Liquid Achieve/Bison 400 L/Marengo/Nufarm Tralkoxydim. Add Carrier or Norac/Destination MSO spray adjuvant at a rate of 0.5% (0.5 L/100 L of solution) to Liquid Achieve. Add Carrier adjuvant at a rate of 0.5% (0.5 L/100 L of solution) to NuFarm Tralkoxydim. Add ADAMA Addit to Bison 400L at 0.5% (0.5 L/100 L of solution). Add Intake at 0.66% v/v (0.66 L/100 L of solution) to Marengo. When water analysis indicates bicarbonates levels are 400 ppm or greater, add ammonium sulfate at 0.75 - 1.5 kg/100 L (7.5 - 15 lb/100 gallons) or 1% v/v of spray water prior to mixing. All Achieve tank mixes with an emulsifiable concentrate broadleaf herbicide require 7% ammonia (Finish) at 0.25% v/v.

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Registered tank mixes

For all tank mixes, use 0.2 litres Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim plus the following:

Tank mix partner	Product rates	Crop stage
2,4-D ester	400 m L/acre (600 g/L formulation)	4-leaf to flag leaf stages
Attain XC/Flurox 24	Attain XC A: 95 - 130 mL/acre + Attain XC B: 260 - 340 mL/acre; Flurox 24 - 180 mL/acre fluroxypyr + 260 mL/acre 2,4-D	4-leaf to flag leaf stages
Buctril M/Bromotril II	Buctril M: 400 mL/acre, Bromotril II: 500 mL/acre	Apply between 2-leaf and early flag leaf
Curtail M	810 mL/acre	Apply between 3-leaf and early flag leaf
Dichlorprop plus 2,4-D ester	710 mL/acre	Prior to 4-leaf stage of the crop
Enforcer D	Enforcer D: 250 - 500 mL/acre	4-leaf to early flag
Enforcer M/ForceFighter M	Enforcer M: 250 - 500 mL/acre or Badge II: 500 mL/acre + 240 mL/acre Fluroxypyr 180	2-leaf to early flag
Infinity	334 mL/acre	Apply at the 1 to flag leaf stage
Lontrel + MCPA ester	Lontrel: 110 mL/acre + MCPA ester 500: 450 mL/acre	Apply between 3-leaf expanded and flag leaf
MCPA ester 500	450 mL/acre	Apply between 3-leaf and early flag leaf
Matador	24 - 32 mL/acre	
Mextrol 450/Logic M, Badge, Mextrol 400	450 mL/acre 560 mL/acre	Spring wheat (including durum) and barley: 2-leaf to early flag leaf
OcTTain XL	450 mL/acre	4-leaf to flag leaf stages
Pardner	Pardner: Maximum rate of 390 mL/acre, Bromotril, Brotex, Koril: maximum rate of 500 mL/acre	
Pixxaro	125 mL/acre Pixxaro A + 235 mL/acre Pixxaro B	Spring wheat, barley: 2-leaf to flag leaf
Prestige XL	710 - 950 mL/acre	Spring wheat and barley: 3-leaf to early flag leaf
Trophy/Rush M	Trophy A: 240 mL/acre + 450 mL/acre Trophy B: 450 mL/acre or Rush M (Fluroxypyr 180: 240 mL/acre + MCPA Ester 600: 380 mL/acre)	Spring wheat (including durum) and barley: 3-leaf to early flag leaf
Thumper, Thrasher, Leader, Approve	Thumper: 400 mL/acre, Leader, Thrasher, Approve: 500 mL/acre	Spring wheat (including durum) and barley: 4-leaf to early flag leaf
Decis Flowable (insecticide)	63 - 83 mL/acre	Spring wheat (including durum) and barley: 3-leaf to early flag leaf
Silencer (registered for use with Bison)	25 - 33 mL/acre	Wheat, barley: 3-leaf to early flag leaf

Note: Do not tank mix with 2,4-D amine or MCPA amine formulation or with any other herbicide, insecticide, fungicide, fertilizer solution or adjuvant not recommended on the label as poor grass control and/or unacceptable crop injury may result. Check label of individual herbicides as not all products are registered for all the above listed tank mixes.

Do not tank mix. Liquid Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim with broadleaf herbicides when applying to cereal crops underseeded to forage legumes as the forages may be injured or killed.

With reduced water volumes, tank mixes with Buctril M, Thumper or Pardner (and associated herbicides) may result in some initial injury in the form of "tip burn." This injury, however, will not have an adverse effect on crop maturity or yield.

Tank mixes with Attain may cause temporary crop injury if applied before the 4-leaf stage.

Tank mixes with 2,4-D ester/dichlorprop and Buctril M plus MCPA may cause some injury in barley. Use tank mixing procedure "d" on page 13.

Application information

How to apply: Ground and aerial applications. **Water volume:** Ground – 20 - 40 L/acre. Air**:** 12 - 18 L/acre.

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Application tips

Weed control: Optimum weed control is obtained by applying herbicides when targeted weeds are actively growing. Applying herbicides under stressful conditions (drought, heat, frost, poor soil fertility, flooding or prolonged cool temperature) may delay or reduce weed control. **Crop safety:** Applications of Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim to non-tillered crops exposed to 4°C temperatures before or after spraying should be avoided to prevent the possibility of crop injury. Tillered cereal crops may incur injury if Achieve SC *et al* are sprayed within 48 hours of freezing temperatures. **Sequential applications:** Always apply Liquid Achieve SC/Bison 400L/Marengo/Nufarm Tralkoxydim first and allow 5 to 7 days before applying any other non-registered tank mix herbicide. This is especially critical for Group 2 herbicides.

How it works

Tralkoxydim is a systemic herbicide that is absorbed through the leaves and translocated to the growing points within the plant where it inhibits an enzyme involved in lipid biosynthesis. Thorough coverage of the foliage is important for consistent grass control.

Expected results

Grass growth stops in 48 hours. Young shoots turn brown in 7 to 8 days. Complete death of plant will take 2 to 3 weeks.

Restrictions

Rainfall: No effect 1 hour after application. **Grazing:** Immature cereal crops may be grazed, harvested or cut for hay 16 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment. **Pre-harvest intervals:** Immature cereal crops may be grazed or cut for hay 16 days after treatment. Grain may be harvested 60 days after treatment. Mature straw may be fed to livestock. Do not feed or graze underseeded forage crops in the year of treatment; sufficient data are not available to support this use. **Re-cropping restrictions:** Do not replant treated areas to tame oats or corn for at least 4 weeks after application. Other crops: none.
Re-entry interval: 12 hours.

Environmental precautions

Do not apply to any body of water. Do not apply within 15 metres by ground and (50 metres by air) of non-crop areas. This includes fish-bearing waters, wetlands (potholes, sloughs, etc.) and wildlife habitat (hedgerows, rights of way, etc.).

Toxicity

Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, dry place. Keep packages dry at all times. Product is not affected by freezing.

Aim EC Herbicide/Revenge /Maxunitech Carfentrazone-ethyl 240 EC/InStep/IPCO C-Zone

Group 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Aim EC Herbicide (PCP# 28573)	FMC of Canada Ltd	Carfentrazone-ethyl: 240 g/L	Emulsifiable concentrate	1.2 L, 4.8 L
Revenge (PCP# 33716)	NewAgco Inc	Carfentrazone-ethyl: 240 g/L	Emulsifiable concentrate	4.8 L

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Product	Company	Active ingredient	Formulation	Container size
Maxunitech Carfentrazone-ethyl 240 EC (PCP # 33127)	Oriental Agrochemicals Co Ltd distributed by UAP	Carfentrazone-ethyl: 240 g/L	Emulsifiable concentrate	2.4 L
InStep (PCP # 33956)	Rotam North America	Carfentrazone-ethyl: 240 g/L	Emulsifiable concentrate	2.4 L
IPCO C-Zone (PCP # 33580)	IPCO	Carfentrazone-ethyl: 240 g/L	Emulsifiable concentrate	2.4 L

Crops, staging and rates

Prior to seeding of:

Pre-seed/Pre-emergence: up to 3 days after seeding (Aim EC only)	Rate per acre
Canola, rapeseed, mustard, flax, sunflower, safflower, buckwheat, dry bean, chickpea, lentil, field pea, soybean, barley, corn (field, pop and sweet), pearl millet, proso millet, oats, rye, triticale, wheat (including spring, winter and durum), faba bean, potato (pre-seed only)	14.8 - 47.3 mL
Sorghum	14.8 - 29.6 mL

Use a non-ionic surfactant at 0.25 L per 100 L of spray solution, or use Merge at 1 L per 100 L of spray solution when used alone.

Use in fall for harvest aid:

Crop: Harvest aid	Rate per acre
Barley, oats, wheat, millet, dry bean, chickpea, field pea, faba bean, soybean	29.5 - 47.3 mL
Sorghum	29.5 mL
Potato	94 - 142 mL

Use Agral 90 or Ag-Surf at 0.25 L per 100 L of spray solution, or use Merge at 1 L per 100 L of spray solution when used alone. **DO NOT** apply as a tank mix with glyphosate to crops if grown for seed purposes.

Post-harvest burndown: AIM® EC Herbicide can be applied after harvest to control actively-growing emerged weeds. DO NOT apply a post-harvest application to fields where two applications of AIM® EC Herbicide were made in that same year.

Weeds, rates and staging

Apply to listed weeds up to 10 cm in height.

Weeds controlled	Rate per acre
Redroot pigweed, lamb's-quarter (up to 7.5 cm tall), morning glory (up to 3-leaf), tall waterhemp, black nightshade and eastern black nightshade (all 3 up to 5 cm tall)	14.8 mL
Above weeds plus lamb's-quarter, round-leaved mallow, hairy nightshade, flixweed[1], stinkweed[1], prostrate pigweed, smooth pigweed, tumble pigweed, purslane, tansy mustard, common waterhemp, Pennsylvania seedling smartweed, field bindweed	23.5 mL
All above weeds plus cocklebur, kochia, volunteer canola (all herbicide tolerant canola, up to 4 leaf), cleavers[1], jimsonweed, shepherd's-purse[1], Russian thistle[1] (up to 5 cm tall)	29.6 mL
Above weeds plus prickly lettuce, corn spurry	47.4 mL

[1] Aim herbicide only.

Registered tank mixes

Tank mix partners	Product rate	Weeds controlled
Glyphosate	glyphosate acid equivalent at 0.5 - 1.0 L/acre (360 g ae/L)	Weeds controlled under glyphosate label
2, 4-D Ester 700*	2,4-D Ester 700 acid equivalent at 0.202 L/acre - 0.324 L/acre + glyphosate acid equivalent at 0.5 - 1 L/acre (360 g ae/L)	Weeds controlled under the 2,4-D label

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Aim EC Herbicide/Revenge /Maxunitech Carfentrazone-ethyl 240 EC/InStep/IPCO C-Zone (cont'd)

Tank mix partners	Product rate	Weeds controlled
Nufarm Koril 235*, IPCO Brotex 240*, IPCO Brotex 480*, IPCO Brotex 4AT*, Bromotril II 240 EC*, Bromotril 240 EC*	Nufarm Koril 235 or Bromotril II 240 EC: 243 ml/ac; IPCO Brotex 240 or Bromotril 240 EC: 236 ml/ac; IPCO Brotex 480 or IPCO Brotex 4AT: 118 ml/ac + glyphosate acid equivalent at 0.5 – 1 L/acre (360 g ae/L)	Weeds controlled under the corresponding label
Express SG or NC-0050 Herbicide + Glyphosate (present as potassium salt, isopropylamine salt, ammonium salt). See note below.**	Express SG Herbicide 6 g/acre or or NC-0050 6.07 g/acre + glyphosate acid equivalent at 0.5 L/acre (360 g ae/L)	Weeds controlled under the Express SG and glyphosate labels
Express FX or DB-878 Herbicide + Glyphosate (present as potassium salt, isopropylamine salt, ammonium salt). See note below.**	Express FX Herbicide 46.5 g/acre or DB-878 Herbicide 46.07 g/acre + glyphosate acid equivalent at 0.5 L/acre (360 g ae/L)	Weeds controlled under Express FX and glyphosate labels
Express Pro or NC-00439 Herbicide + Glyphosate (present as potassium salt, isopropylamine salt, ammonium salt or trimethylsulfonium salt)	Express Pro Herbicide at 7g/acre or NC-00439 Herbicide 7.08 g/acre + glyphosate acid equivalent at 0.5 L/acre (360 g ae/L)	Weeds controlled under the Express Pro and glyphosate labels
Command 360ME + glyphosate	134 mL/acre + glyphosate acid equivalent at 0.5 - 1 L/acre (360 g ae/L)	Extended control of cleavers
Authority + glyphosate	Authority at 89 mL/ac or 118 mL/ac + glyphosate acid equivalent at 0.5 - 1 L/acre (360 g ae/L)	Weeds controlled under corresponding labels
Authority Supreme + glyphosate	Authority Supreme at 162 mL/ac, 202 mL/ac or 243 mL/ac + glyphosate acid equivalent at 0.5 - 1.0 L/acre (360 g ae/L)	Weeds controlled under corresponding labels

*Registered glyphosate products can be added to these tank mixes at 0.5 - 1 L/acre (360 g/L equivalent). **When applied with Express SG (NC-0050) or Express FX (DB-878) + glyphosate, injury to pulse crops may occur on coarse textured soil (>50% sand), low organic matter (<3%) or in fields with variable soils.

Herbicides:

Pre-plant maximum 47.4 mL/acre of Aim EC Herbicide: FMC also supports the following mixes that are not on the Aim EC label. Apply mixes according to the most restrictive use limitations for either label.

Pre-seed to all registered crops:

MCPA amine/ester (114 g active ingredient/acre). Pardner: 202 mL/acre.

Harvest aid treatment: When Aim EC Herbicide is used as a harvest aid alone, wait 3 days before harvest, except for potatoes, which require 7 days. When used with glyphosate*, refer to the glyphosate label for specific recommendations.

Reglone** (0.5 - 0.9 L/acre)

* Isopropyl amine or potassium salts only. ** For potatoes only.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 40 L/acre minimum.

Application tips

Due to rapid absorption by the leaves, translocation is very limited. It is essential to get good plant coverage. Extremes in environmental conditions such as temperature, moisture, soil conditions and cultural practices may affect activity. Under warm moist conditions, herbicide symptoms may be accelerated. While under very dry conditions, the expression of herbicide symptoms may be reduced as weeds hardened off by drought are less susceptible. Maximum two applications per growing season.

How it works

Rapidly absorbed by foliage. Inhibits the PPO enzyme involved in chlorophyll and heme synthesis. This action results in leaky cell membranes and rapid browning and death.

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Expected results
Initial symptoms are observed within hours and death occurs within a few days.

Restrictions
Rainfall: Avoid application when heavy rain is forecast. Heavy rainfall shortly after application may reduce weed control. **Grazing:** There are no grazing restrictions on the label. **Re-entry interval:** 12 hours.

Environmental precautions
Recommended buffer zone of 5 metres from any sensitive habitat without the use of any drift control aids.

Toxicity
Acute oral LD_{50} (rats) = 4,077 mg/kg.

Storage
Store in a cool, dry place and avoid excess heat. Store above 5°C to prevent freezing.

Akito

Group 2,4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Akito (PCP # 33657)	UPL AgroSolutions	Florasulam: 2.5 g/L Fluroxypyr: 100 g/L Clopyralid: 80 g/L	Emulsifiable concentrate	8.1 L, 97.2 L

Crops, staging and rates

Crop	Stage	Rate per acre
Wheat (spring, durum, winter), barley	**3-leaf to just before flag**	400 mL
Oat	**3 - 6 leaf**	400 mL

Weeds, rates and staging

Canada thistle* (10 cm to pre-bud)
volunteer canola
scentless chamomile
common chickweed
cleavers (1 - 8 whorl)
dandelion (up to 30 cm in diameter)
kochia (2 - 8 leaf)
narrow-leaved hawk's-beard**
shepherd's-purse
perennial sow thistle
volunteer flax
wild buckwheat

*Season long control with some regrowth in the fall.
**Suppression.

Registered tank mixes

Tank mix partners	Crop	Tank-Mix Partner Rate	Additional weeds controlled
MCPA Ester 600	wheat (spring, durum, winter)	235-425 mL/acre	See tank-mix partner label
MCPA Ester 600	wheat (spring, durum, winter), barley, oat	188 mL/acre	Lamb's-quarter, imi-tolerant canola
MCPA Ester 600	oat	235-364 mL/acre	See tank-mix partner label
2,4-D Ester 700	wheat (spring, durum, winter), barley	206-518 mL/acre	See tank-mix partner label

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Akito (cont'd)

Tank mix partners	Crop	Tank-Mix Partner Rate	Additional weeds controlled
2,4-D Ester 700	wheat (spring, durum, winter), barley	172 mL/acre	Lamb's-quarter, imi-tolerant canola
Everest 2.0*	wheat (spring, durum, winter)	15-30 mL/acre	Green foxtail, wild oat
Simplicity GoDri*	wheat (spring, durum, winter)	28 g/acre	barnyard grass, downy brome**, green foxtail (suppression), hemp-nettle, Japanese brome, redroot pigweed, smartweed, volunteer canola (excluding Clearfield), wild oat, yellow foxtail
Axial*	wheat (spring, winter), barley	486 mL/acre	barnyard grass, green foxtail, proso millet, tame oat, volunteer canary seed, wild oat, yellow foxtail
Traxos*	wheat (spring, durum)	486 mL/acre	barnyard grass, green foxtail, yellow foxtail, Persian darnel, proso millet, volunteer canary seed, tame oat, wild oats

* Tank-mixes with Akito alone or Akito + MCPA or 2,4-D.
** Suppressed in the spring season.

Application information
How to apply: Ground application only. **Water volume:** 40 L/acre minimum.

Mixing instructions
Use mixing instructions "d" as described on page 15.

Application tips
Best results are obtained when Akito is applied to actively growing weeds in the seedling stage and when Canada thistle is between 10 cm and up to but not including the early bud stage. Poor weed control may result under cool and dry conditions.

How it works
Group 2 herbicides inhibit the production of the ALS enzyme in plants. This enzyme is essential for the production of certain amino acids essential for plant growth. Group 4 herbicides are synthetic auxins, which act at multiple sites in the plant to disrupt hormone balance and protein synthesis and thereby cause a variety of plant growth abnormalities.

Expected results
The florasulam component inhibits the ALS enzyme in plants resulting in a rapid halt in plant growth followed by yellowing, most noticeable after 1 to 2 weeks. Fluroxypyr will cause uncontrolled growth with distorted plant browning and dying. Clopyralid symptoms include swollen growing points and roots, cupping of leaves, twisted and distorted stems and leaves. Plants will gradually stop growing and change colour, first to dark green and then to yellow before turning brown as they die.

Restrictions
Rainfall: No restrictions. **Grazing:** Do not cut the treated crop for hay or graze treated crop within 7 days after application. **Re-cropping:** Fields previously treated with Akito can be seeded the following year to wheat, barley, oat, rye, canola, flax, mustard or field pea. If severe drought conditions are experienced in the months of June to August inclusive in the year of application, delay seeding peas an additional 12 months (total 22 months following application). **Pre-harvest intervals:** Do not harvest the treated crop within 60 days after application.
Re-entry interval: 12 hours.

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Environmental precautions
Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones.

Toxicity
Acute oral LD_{50} (rats) = 3,378 mg/kg.

Storage
Store in cool (above 5°C). If product is frozen, bring to room temperature and agitate before use.

Ally Herbicide Toss-N-Go

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Ally Herbicide Toss-N-Go (PCP# 24388)	FMC of Canada Limited	Metsulfuron methyl (60%)	Water dispersible granules	122 g

Crops, staging and rates

Crop	Rate	Stage
Barley	Up to 3 g/acre + non-ionic surfactant	2-leaf to the emergence of the flag leaf
Spring wheat (including durum)		
Forage grasses for forage or seed production		
Creeping red fescue	Up to 3 g/acre + non-ionic surfactant	2-leaf to the emergence of the flag leaf
Orchard grass		
Wheatgrass (crested and intermediate)		
Timothy (fall application only)*		Fall application to post-emergent timothy that has been established for at least 1 growing season

*Applications should be made from early September until late fall, prior to soil freeze-up. Weeds controlled in timothy are narrow-leaved hawk's beard, flixweed, dandelion, scentless chamomile and alsike clover.

Weeds and staging
Weeds must be actively growing at the time of application, unless otherwise indicated.

Ally 3 g/acre + non-ionic surfactant

ball mustard
bluebur
Canada thistle (suppression)**
chickweed*
common groundsel
corn spurry
cow cockle
flixweed
green smartweed
hemp-nettle
kochia*
lady's-thumb
lamb's-quarter (suppression)****
prostrate pigweed
redroot pigweed
Russian thistle (suppression)****
scentless chamomile
shepherd's-purse
sow thistle (annual) (suppression)**
sow thistle (perennial) (suppression)**
stinkweed
stork's-bill
tartary buckwheat
toadflax (suppression)
volunteer canola (excluding Group 2 tolerant canola
wild buckwheat (suppression)***
wild mustard

* The majority of kochia populations in Alberta have tested resistant to Group 2 herbicides. ** Before the thistle are more than 15 cm tall.
*** Cotyledon to 3-leaf stage. **** Before these weeds are more than 8 cm tall.

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Ally Herbicide Toss-N-Go (cont'd)

Ally 2 g/acre + 2,4-D (amine or ester) + non-ionic surfactant

annual sunflower	green smartweed	redroot pigweed	tartary buckwheat*
ball mustard	hemp-nettle	Russian pigweed	toadflax (suppression)
bluebur*	kochia	Russian thistle	volunteer canola (including Group 2 tolerant varieties)
Canada thistle (suppression)	lady's-thumb*	scentless chamomile*	wild mustard
chickweed	lamb's-quarter	shepherd's-purse	wild buckwheat (suppression)
common groundsel*	narrow-leaved hawks-beard**	sow thistle (suppression)	wormseed mustard
corn spurry*	plantain	stinkweed	
cow cockle	prickly lettuce	stork's bill*	
flixweed	prostrate pigweed*	sweetclover	

* Weeds controlled only when Ally + 2,4-D mixture contains Ally Toss-N-Go at 3.0 g/acre. ** Spring seedling only.

Ally 2 g/acre + MCPA (amine or ester) + non-ionic surfactant

annual sunflower	green smartweed	Russian pigweed	toadflax (suppression)
ball mustard	hemp-nettle	Russian thistle	tumble mustard
bluebur*	kochia	scentless chamomile*	volunteer canola (including Group 2 tolerant varieties)
Canada thistle (suppression)	lady's-thumb*	shepherd's-purse	wild buckwheat (suppression)
chickweed	lamb's-quarter	sow thistle (suppression)	wild mustard
common groundsel*	plantain	stinkweed	wormseed mustard
corn spurry*	prickly lettuce	stork's bill*	
cow cockle	prostrate pigweed*	sweetclover	
flixweed	redroot pigweed	tartary buckwheat*	

* Weeds controlled only when Ally + MCPA mixture contains Ally Toss-N-Go at 3.0 g/acre. ** Spring seedling only.

Rate

Cereals and forage grasses (for forage or seed production): up to 3 g/acre plus recommended surfactant (Agral 90, AgSurf, Companion, Super Spreader, Stricker or Liberate) at 0.2 L/100 L of spray solution.

Registered tank mixes

Tank mix partners	Product rate	Crop stage	Remarks
In spring wheat (including durum) and barley			
2,4-D ester or amine 600 500 **2,4-D 700 ester**	0.28 - 0.36 L/acre (ester) 0.34 - 0.45 L/acre (amine) 0.24 - 0.32 L/acre	Full 3-leaf to just before flag leaf	Add recommended non-ionic surfactant
MCPA 500 amine or ester	0.28 - 0.45 L/acre		
Puma Advance	0.21 - 0.41 L/acre	1 leaf to 6-leaf (main stem) + 3 tillers	No surfactant is required
Spring wheat only			
Horizon + Score adjuvant	92 - 117 mL/acre	2-leaf to flag leaf	Add Score adjuvant at 0.8 - 1.0 % v/v
Established creeping red fescue for seed			
Assure II+ Sure Mix adjuvant	0.2 - 0.3 L/acre	2-leaf to flag leaf	Use SureMix at 2 L/1000 L spray solution

FMC supports the following mixes that are not on the Ally label. Apply mixes according to the most restrictive use limitations for either product. Herbicides: Everest® 3.0AG/Sierra® 3.0AG + 2,4-D (Amine/Ester) and clodinafop.

Mixing instructions

Refer to mixing instructions "b" on page 15.

Application information

How to apply: Ground applications only. Do not apply by air. **Water volume:** Cereal and forage grasses – 40 L/acre.

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Application tips

Effectiveness may be reduced if spray mixture remains in tank for more than 48 hours. Warm, moist growing conditions promote active weed growth and enhance the activity of Ally, allowing maximum foliar uptake and contact activity. If cold, dry conditions prevail, delay treatment until active weed growth resumes. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

How it works

Ally is absorbed by the foliage and roots, readily translocated throughout the plant and inhibits cell division.

Expected results

Ally rapidly inhibits the growth of susceptible weeds; however, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application depending upon growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, growing conditions, soil pH and spray coverage.

Restrictions

Rainfall: Heavy rainfall immediately before or after application may cause temporary lightening of crop. Rainfall within 2 to 4 hours of application may lessen degree of weed control. **Grazing:** Wheat, barley or forage crops may be grazed by or fed to livestock any time after treatment. **Re-cropping restrictions:** Do not use on soils with pH greater than 7.9. Do not apply to irrigated land where tail water will be used to irrigate other cropland.
Re-entry interval: 12 hours.

Crops for rotation	Soil pH	Minimum cropping interval* (months)	
		Black and Grey Wooded soils	Brown and Dark Brown soils
Alfalfa, peas, flax and red clover	7.5 or lower	22	Field bioassay
Spring wheat, barley and durum wheat	7.9 or lower	10	10
Canary seed	7.9 or lower	48	48
Canola	6.9 or lower	10	22
	7.0 - 7.9	22	34
Flax	6.9 or lower	10	22
	7.0 - 7.9	34	34
Fescue	7.5 or lower	10	Field bioassay
Lentils	6.9 or lower	34	34
	7.0 - 7.9	48	48
Oats	6.9 or lower	10	10
	7.0 - 7.9	10	22
Yellow mustard	7.9 or lower	48	48
All other crops	7.9 or lower	Field bioassay	Field bioassay

* If land has been treated with Ally and Assert the same year or in successive years, seed only wheat, excluding durum, until a field bioassay demonstrates that other crops can be seeded. When recropping to broadleaf crops following an Ally application, extend the rotational interval by 1 year if rainfall was less than 130 mm in the Brown and Dark Brown soil zones or 250 mm in the Black and Grey Wooded soil zones in any year within the stated interval prior to planting.

Environmental precautions

Highly toxic to non-target plants. Leave a 15-metre zone between the last spray swath and the edge of any of these habitats. Do not use on highly variable soils that have large gravely or sandy areas, eroded knolls or calcium deposits. Do not contaminate irrigation water. Do not apply within 15 metres of a body of water. **Runoff:** Do not apply to frozen ground where surface runoff may occur.

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Ally Herbicide Toss-N-Go (cont'd)

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in a cool, dry place.

Altitude FX3

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Altitude FX3				
AC 299,263,120 AS (PCP# 26705)	BASF Canada	Imazamox: 120 g/L	Solution	2.68 L
Starane II (PCP# 29463)		Fluroxypyr: 333 g/L	Emulsifiable concentrate	5 L

Altitude FX3 must be tank mixed with 1 of the registered tank mix options found under the "Registered tank mix" section below.

1 case of Altitude FX3 treats 40 acres.

Crops, staging and rates
CLEARFIELD wheat varieties only. Apply at 3-leaf (after appearance of first tiller) to a 6-leaf stage to ensure optimum crop tolerance. Rate: 67 mL/acre AC299 120AS + 120 mL/acre Starane II + 380 mL/acre of MCPA ester 600 + surfactant. (Non-ionic surfactant at 0.25% v/v of spray solution or 2.5 L per 1000 L spray solution).

Note: Surfactant not included with Altitude FX3. MCPA 600 not included with Altitude FX3.

Weeds and staging
Grasses: 1 - 4 true leaf stage up until early tillering (maximum 2 tillers).

Broadleaf weeds: Apply up to 4-leaf stage, unless otherwise indicated.

Grasses

barnyard grass
green foxtail
Japanese brome*
Persian darnel
volunteer barley
volunteer canaryseed
volunteer wheat (durum and spring) - non Group 2 tolerant
volunteer tame oats
wild oats
yellow foxtail

* Suppression.

Broadleaves

annual sunflower
chickweed
cleavers (1 - 4 whorl)
cocklebur
common burdock
common ragweed
cow cockle
flixweed
green smartweed*
hemp-nettle (2 - 6 leaf)
kochia (incl. group 2 resistant biotype)
lamb's-quarter
mustard (except dog and tansy)
prickly lettuce
red root pigweed
round-leaved mallow*
Russian thistle*
shepherd's-purse
stinkweed
stork's-bill (1 - 8 leaf)*
vetch
volunteer canola (all varieties)
volunteer flax (1 - 12 cm)
wild buck wheat
wild radish

* Suppression.

Registered tank mixes
For Altitude FX3 only: MCPA Ester 600 (0.38 L/acre) or 2,4-D Ester 700 (0.32 L/acre); Curtail M (0.61 to 0.81 L/acre).

Mixing instructions
Use mixing instructions "b" on page 15. Add anti-foaming agent last, if needed.

Application information
How to apply: Ground applications only. Do not apply by air. **Water volume:** 20 - 40 L/acre.

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Application tips

Initial crop injury may be observed after application but this is outgrown and should not affect yield. Severe crop injury will occur as a result of spray overlap. Avoid sprayer overlap.

Do not spray Altitude FX3 if temperatures of 5ºC or lower are forecasted within 3 days of application. Temperatures near freezing (below 5ºC) will prevent optimum herbicide performance, as weeds are not actively growing. Do not apply more than once per year. For best results, treat CLEARFIELD wheat during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth.

How it works

Absorbed through the foliage and roots. Disrupts plant metabolism causing growth to stop within 24 hours. Visible symptoms appear within 7 to 10 days and, depending on environmental conditions, weed death occurs within 14 to 21 days after application.

Restrictions

Rainfall: Rainfall within 3 hours of application may reduce activity. **Grazing:** Do not graze or silage the treated crop within 14 days of application or cut for hay within 42 days of application. **Pre-harvest intervals:** Wheat grain and straw can be harvested 79 days after treatment. **Re-cropping:** The following crops may be grown safely the year following an application: field pea, field corn, canary seed*, Group 2 tolerant canola, non-Group 2 tolerant canola*, lentils, spring wheat, durum wheat*, spring barley, sunflower, tame oats*, flax*, chickpea. The following crop may be grown safely 2 years following an application: mustard* (condiment type only). Winter wheat can be grown 3 months after treatment*. There are insufficient data for other following crops. Conduct a field bioassay (a test strip grown to maturity) the year before growing any crop other than those listed above. **Re-entry interval:** 12 hours.

* If drought conditions are experienced between June 1 and September 1 in the year of application, delay planting of winter wheat, durum wheat, canary seed, tame oats, flax, or canola (non-Clearfield) by an additional year. If drought is received between June 1 and September 1 in the year of application OR between June 1 and September 1 in the year following application, delay planting of mustard by an additional year. In the grey, black, and dark brown soil zones, drought is defined as less than 125 mm of total precipitation between June 1 and September 1. In the brown soil zone, drought is defined as less than 125 mm of total precipitation between June 1 and September 1, OR less than 15 mm of precipitation in any month between June 1 and September 1.

Environmental precautions

These products are highly toxic to non-target plants. Avoid situations where drift may occur. Leave a 15-metre buffer zone between sprayed and sensitive areas moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application.

Toxicity

AC 299,263,120 AS: Acute oral LD_{50} (rats) = 5,000 mg/kg. Starane: Acute oral LD_{50} (rats) = 3,738 mg/kg. MCPA ester 600: Acute oral LD_{50} (rats) = 1,046 mg/kg.

Storage

Store above 5°C. Store in a cool, dry place away from children, animals, food, feed or fertilizers. Keep from freezing.

Ammo DR

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Ammo DR co-pack of: Ammo (PCP# 34024), MPower 2,4-D Ester 700 (PCP# 30460), and MPower R (PCP # 30945)	NewAgco Inc.	Dicamba: 480 g/L	Solution	4.7 L, 113 L
		2,4-D Ester: 660 g/L	Emulsifiable concentrate	9.8 L, 235 L

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Ammo DR (cont'd)

Product	Company	Active ingredient	Formulation	Container size
		Thifensulfuron-methyl: 50% + tribenuron-methyl: 25%	Water dispersible granules	320 g

Note: If not mixed with a wild oat herbicide, add a non-ionic surfactant such as Agral 90 or Ag-Surf at 0.2% v/v (2L per 1000L spray solution)

Crops, staging and rates

Crops	Stage	Rates
Spring wheat, barley	4 - 5 leaf stage	MPower R: 8 g/acre Ammo: 118 mL/acre 2,4-D: 245 mL/acre

Weeds and staging

Apply Ammo DR when weeds are less than 10 cm in height or diameter, unless otherwise noted.

Weeds controlled

- blue-bur
- burdocks
- Canada thistle (top growth only)
- chickweed[2,3]
- cleavers
- cocklebur
- common groundsel
- common ragweed
- corn spurry
- cow cockle
- daisy fleabane
- false flax
- false ragweed
- flixweed
- goat's-beard
- giant ragweed
- green smartweed
- hemp-nettle
- kochia
- lady's-thumb
- lamb's-quarter
- mustards (except dog and tansy)
- narrow-leaved hawk's-beard
- perennial sow thistle (top growth only)
- plantain
- prickly lettuce
- redroot pigweed
- Russian pigweed
- Russian thistle
- shepherd's-purse
- stinging nettle
- stinkweed
- stork's-bill* (2 - 6 leaf)
- sweet clover
- tartary buckwheat
- thyme-leaved spurge
- volunteer canola[1]
- volunteer sunflower
- wild buckwheat
- wild mustard
- wild radish

* Suppression.

Weeds Suppressed

annual sow thistle, round-leaved mallow, scentless chamomile, toadflax

[1] Including all HT biotypes. [2] Apply when chickweed is small (1 - 6 leaf) and actively growing, but before crop canopy prevents thorough herbicide coverage of weeds. [3] Not including group 2 resistant biotypes.

Registered tank mixes

AgraCity supports the following mixes not on the label. Apply mixes according to the most restrictive use limitations for either product. **Herbicides:** Aurora Extreme, Himalaya.

Application information

How to apply: Ground equipment only. Do not apply by air. Water volume: 40 L/acre.

Mixing instructions

Use mixing instructions "b" on page 15

Application tips

Best activity occurs when applied between 10 - 25°C. Avoid application when crop is under stress from adverse environmental conditions such as drought, excessive rainfall or severe heat or cold. Do not spray if risk of frost or severe drop in night temperature is forecast. Do not apply in conditions conducive to thermal inversions or product may drift into sensitive crops.

How it works

Ammo DR is absorbed primarily through the foliage. MPower R inhibits cell elongation. The other components mimic naturally occurring plant hormones and control weeds by disrupting normal plant growth patterns. Accumulation occurs primarily in the young, rapidly growing meristematic regions of roots or shoots. Symptoms include discolouration, twisting of stems, leaf cupping and swollen nodes.

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Expected results
Results may take 14 days to appear. Symptoms may include discolouration at the growing point, twisting, bending of stems and cupping of leaves. Shortening of the crop may occur but not affect yield. If applied at other than recommended crop stage, head and stem deformities may occur.

Restrictions
Rainfall: Rainfall within 4 hours of application may reduce efficacy. **Grazing:** Harvest forage or cut hay 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Re-cropping:** Grow all major crops the year after application. **Re-entry interval:** 12 hours.

Environmental precautions
Ammo DR may cause injury to non-target terrestrial plants, especially in their developmental and growing stage. Leave an adequate buffer zone between treatment areas and sensitive plants. This product is toxic to small mammals, birds and aquatic organisms. Avoid contamination of aquatic systems and groundwater.

Toxicity
Ammo: Oral LD_{50} (rats) > 2,000 mg/kg MPower R: Oral LD_{50} (rats) > 2,000 mg/kg. 2,4-D Ester 700: Oral LD_{50} (rats): 737 mg/kg.

Storage
If frozen, shake thoroughly before use.

Anaconda

Group 1, 2, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Anaconda co-pack of: Samurai (PCP#33033) + Boa (PCP#33011) + Quiz (PCP#33481)	NewAgco Inc	Imazamox: 70%	Emulsifiable concentrate	470 g
		Bentazon: 480 g/L	Emulsifiable concentrate	14.5 L, 348 L
		Quizalofop-p-ethyl: 96 g/L	Emulsifiable concentrate	8 L, 192 L

Must be mixed with 28% UAN (28-0-0) AND Merge at 0.5% v/v (sold separately)

Crops, staging and rates

Crop	Staging	Rate
Field Pea	3 to 6 true leaf stage	Samurai: 11.7 g/acre + Boa: 0.36 L/acre + Quiz: 200 mL/acre 28% UAN: 0.81 L/ac Merge: 0.5% v/v

Weeds and staging
Grass weeds: 2 leaf to early tiller stage

- barnyard grass
- green foxtail
- Japanese brome* (spring seedlings, 2 - 5 leaf stage)
- volunteer barley
- volunteer corn (2 - 6 leaf)
- volunteer tame oats
- volunteer wheat
- wild oats
- fall panicum
- foxtail barley (spring seedlings)
- old witchgrass
- proso millet
- yellow foxtail

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Anaconda (cont'd)

Broadleaf weeds: Cotyledon to 4-leaf stage

cleavers[1]*	lamb's-quarter	shepherd's-purse	wild buckwheat*
cow cockle	redroot pigweed	stinkweed	wild mustard[1]
green smartweed	round-leaved mallow*	volunteer canola (including all HT varieties)	
kochia*	Russian thistle		

*Suppression. [1]Including group 2 resistant biotypes

Registered tank mixes

None registered.

Application information

How to apply: Apply with ground equipment only. Do not apply by air. **Water volume:** 40 L/acre.

Mixing instructions

Use mixing instructions "b" on page 15.

Application tips

Water soluble bags will dissolve better when kept intact; do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Anaconda if temperatures of 5ºC or lower are forecasted within 3 days before or after application. Cold temperatures near freezing will negatively affect herbicide performance, as weeds are not actively growing. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield. Apply Anaconda when broadleaf weeds are small and actively growing and before weeds reach the maximum size recommended for control.
Do not apply Anaconda to field peas that have been subjected to stress from conditions such as hail damage, flooding, drought, hot, humid weather, widely fluctuating temperature conditions, prolonged cold weather or injury from prior herbicide applications, as crop injury may result. Failure to include UAN will result in significantly reduced product performance.

How it works

Bentazon is a contact herbicide that interferes with photosynthesis. Uptake into the plant occurs primarily through the leaves. Thorough coverage of foliage is important for consistent weed control. Imazamox is absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Quizalofop-ethyl is a systemic herbicide that is rapidly absorbed and readily translocated from the treated foliage to the root systems and growing points of the treated plants.

Expected results

Initial symptoms such as yellowing may appear within a few days, while complete plant death may take 2 to 3 weeks depending on growing conditions.

Restrictions:

Rainfall: Rainfall within 6 hours of application may reduce activity. **Grazing:** Do not graze treated field pea or harvest for forage or hay. **Pre-harvest intervals:** Do not apply within 65 days of harvest. **Re-cropping:** Winter wheat may be seeded 3 months after application. Canary seed, Group 2 tolerant canola, non-Group 2 tolerant canola, chickpea, field corn, field pea, flax, lentil, oat, barley and spring wheat (including durum), Group 2 tolerant sunflower and sunflower may be seeded the first spring after application and tame mustard the second season after application. A field bioassay (a test strip grown to maturity) is recommended the year before growing any crops other than those listed above. Contact manufacturer for additional information on re-cropping intervals.
Re-entry interval: 12 hours. Do not apply Anaconda more than once per year.

Environmental precautions

Anaconda tank mixture is highly toxic to non-target plants. Observe buffer zones specified on the label.

Toxicity

Imazamox: Acute oral LD_{50} (rats) = > 5,000 mg/kg. Bentazon: Acute oral LD_{50} (rats)= > 1,089 mg/kg. Quizalofop-p-ethyl- Acute oral LD_{50} (rats) = >5,000 mg/kg.

Storage

Do not freeze. Store in a cool, dry place above 5ºC.

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Ares SN

Group 2

Formulation

Product	Company	Active Ingredient	Formulation	Container size
Ares SN (PCP# 33167)	Corteva Agriscience	Imazamox: 33 g/L, Imazapyr: 15 g/L	Solution	9.8 L + Surjet 8.1 L jug

Note: The Surjet surfactant is included in the package.

Crops, staging and rates

Rate: 244 mL/acre

Crop	Stage
CLEARFIELD tolerant canola	2 - 7 leaf stage
CLEARFIELD canola quality oilseed mustard (*Brassica juncea*)	2 - 7 leaf stage

Weeds and staging

Grasses: 1 to 6 main stem leaves, until tillers are visible stage unless otherwise indicated.

barnyard grass
green foxtail
Persian darnel
Japanese brome grass[1]
wild oats
yellow foxtail
volunteer cereals
wheat (excluding Group 2 tolerant varieties)

[1] Spring germinating Japanese brome grass 1 - 4 leaf stage.

Broadleaf weeds: cotyledon to 4-leaf stage unless otherwise indicated.

Broadleaf weeds

chickweed
cleavers (up to 4 whorls)[3]
cow cockle
green smartweed
hemp-nettle
lamb's-quarter[2]
redroot pigweed
round-leaved mallow
Russian thistle
shepherd's-purse
stork's-bill
volunteer canola (not Group 2 tolerant varieties)
volunteer tame mustard (not Group 2 tolerant oilseed (*B. juncea*) varieties)
wild buckwheat[2]
wild mustard[3]
stinkweed

[2] Controlled at cotyledon to 6 leaf stage. [3] Does not include Group 2 resistant biotypes.

Registered tank mixes

Herbicides

In Group 2 tolerant canola only: Lontrel XC at 51 mL/acre. Additional weeds controlled: Canada thistle, annual sow thistle, perennial sow thistle (season-long, top growth control).

Note: The above mixes are those listed on the Ares SN label only.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions.

Application information

How to apply: Ground application only. Do not apply by air.
Water volume: 20 - 40 L/acre. When tank mixed with Lontrel XC, 40 L/acre is recommended.

Application tips

Use a combination of nozzles and pressure designed to deliver thorough, even coverage and a minimum of fine droplets that are prone to drift.

DO NOT spray if temperatures of 5°C are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

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Ares SN (cont'd)

How it works
Ares SN is absorbed by foliage and roots and disrupts plant metabolism, causing growth to stop. Maximum efficacy results from foliar applications to young, actively growing plants.

Expected results
Susceptible weeds may stop growing within 24 to 48 hours. Yellowed growing points, yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 to 10 days, starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 to 3 weeks.

Restrictions
Re-entry interval: 12 hours. **Rainfall:** Rainfall within 2 hours of application may reduce activity. **Grazing:** Not specified. **Pre-harvest intervals:** DO NOT apply within 60 days of harvesting Group 2 tolerant canola and Group 2 tolerant oilseed Brassica juncea.
Re-cropping restrictions: Field pea, lentil, Group 2 tolerant canola, canaryseed, barley, field corn, chickpea and spring wheat may be seeded the first full season after application. Flax, canola, durum wheat and sunflower may be seeded the second full season after application. Sensitivity to injury can vary depending on the crop. With less than 125 mm rainfall during the growing season, it is recommended you grow field pea, lentil or Group 2 tolerant wheat on Group 2 tolerant canola stubble. If rainfall was less than 125 mm during the growing season (June 1 to August 31) the company recommends growing field peas, lentils or CLEARFIELD wheat on CLEARFIELD canola stubble. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

Environmental precautions
Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 11 metres between the outside boundary of the sprayed area and sensitive areas.

Toxicity
Acute oral LD_{50} (rats) > 5,000 mg/kg.

Storage
Store in a cool, dry place.

Armezon/Impact

Group 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Armezon (PCP# 30131)	BASF Canada	Topramezone: 336 g/L	Suspension	600 mL
Impact (PCP# 28141)	AMVAC	Topramezone: 336 g/L	Suspension	600 mL

1 case does 160 acres.

Crops, staging and rates
Rate: 15 mL/acre.

For stand-alone applications, use appropriate adjuvant: Field corn – Armezon + Merge at 0.25% v/v. Sweet corn – Assist at 1.25% v/v + 28% UAN at 1.25% v/v. Impact – field corn, sweet corn, seed corn – MSO with Lecitech at 1.0% v/v or XA Oil at 1.0% v/v + UAN at 1.25% v/v or Assist Oil Conc. at 1.25% v/v + UAN at 1.25% v/v or Merge at 0.5% v/v or HastenNT at 0.5% v/v.

Addition of Merge when tank-mixed with glyphosate can improve performance under cool, dry conditions.

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Crop	Stage
Roundup Ready corn, Liberty Link corn, field corn, sweet corn, seed corn (hybrids and inbred lines)	1 - 7 leaf stage

Weeds and staging

Weeds controlled when mixed with Atrazine at 421 mL/acre + Merge at 0.5% v/v: 1 - 8 leaf stage unless otherwise indicated. Grass weeds suppressed must be in the 1- 4 leaf stage.

Broadleaf weeds

lamb's-quarter
common ragweed
kochia (up to 10 cm high)
pale smartweed
redroot pigweed
wild mustard
volunteer canola (all types)*

Weeds suppressed

barnyard grass
common chickweed
giant ragweed
green and yellow foxtail

* Armezon + glyphosate may be applied to field corn (up to 7-leaf stage) a second time at 15 mL/acre if required for a second flush of volunteer canola. Do not exceed a maximum seasonal application rate of 30 mL/acre.

Registered tank mixes

Herbicides: Glyphosate tolerant corn: glyphosate at registered rates. No adjuvant required when mixed with glyphosate. Aatrex 480 - 421 mL/acre + MSO with Lecitech at 1.0% v/v or XA Oil at 1.0 v/v + UAN at 1.25% v/v or Assist Oil Conc. at 1.25% v/v + UAN at 1.25% or Merge or Hasten NT at 0.5% v/v.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 40 L/acre.

Application tips

DO NOT spray if temperatures of 5°C or lower are forecast within 3 days of application. Treat crops during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be severely reduced.

How it works

Topramezone is absorbed through foliage and is translocated to the meristematic regions. It inhibits the HPPD enzyme causing bleaching of leaves.

Expected results

Rapid bleaching of leaves within days and plant death within 7 to 14 days.

Restrictions

Rainfall: Do not apply if heavy rain is forecast. Contact manufacturer. **Grazing:** Do not graze treated fields or cut for feed within 45 days of application. **Pre-harvest intervals:** 45 days from application to harvest. **Re-cropping:** At maximum seasonal rate of 15 mL: Winter wheat can be seeded 4 months after application. Canola (all types), spring wheat, field corn, lentil, navy (white) bean, soybean, field pea, potato, flax, sunflower and alfalfa may be seeded the year following 1 application. Maximum seasonal application rate of 30 mL/acre (Armezon only): Winter wheat may be seeded 4 months after application. Canola (all types), spring wheat and field corn may be seeded the year following 2 applications. **Re-entry interval:** 12 hours.

Environmental precautions

Avoid spraying in situations where drift may occur.

Toxicity

Acute oral LD_{50} (rats) > 2,000 mg/kg.

Storage

Store in a cool, dry place.

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Arsenal

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Arsenal (PCP# 23713)	BASF Canada	Imazapyr: 240 g/L	Aqueous solution	9.5 L

Note: This product is to be applied by licensed applicators only.

Crop, staging and rates

Rate: 121 mL/acre, 30 mL/100 ft^2 small areas.

Non-crop/non-graze areas such as industrial sites or railroad ballast. Spot treatments for hydro, pipeline and rail rights-of-way; pipeline stations including well sites; battery stations and compressor or valve stations. Site preparation prior to planting white spruce seedlings in the boreal forest region.

Weeds and staging

Apply post-emergence to actively growing weeds.

Annual grasses			
annual bluegrass	foxtail spp.	old witchgrass	
Annual broadleaves			
annual sow thistle	hemp-nettle	pigweed spp.	sow thistle (annual)
black medic	kochia*	pineappleweed	stinkweed
common groundsel (common)	lamb's-quarter	rough cinquefoil	wild buckwheat
fleabane (spp.)	mustard (spp.)	Russian thistle	
Biennials			
bull thistle	burdock	goat's-beard	mullein (spp.)
Perennials			
bladder campion	dog-strangling vine	plantain spp.	tufted vetch
bromegrass	fescue spp.	poison ivy	wild grape
Canada bluegrass	field bindweed	quackgrass	wild strawberry
Canada thistle	milkweed	sheep sorrel	yellow nutsedge
clover (spp.)	mouse-ear chickweed	sulfur cinquefoil	
dandelion	ox-eye daisy	toadflax	
Woody species (seedlings)			
maple	poplar	raspberry	wild rose
Prior to planting spruce seedlings			
aspen	bluejoint reedgrass		

* **Note**: Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

Registered tank mixes

None.

Application information

How to apply: Ground applications only. Do not apply by air. **Water volume:** 40 - 223 L/acre.

Application tips

Apply in sufficient water (40 - 223 L/acre) to wet all foliage during periods of active growth. Do not mix or store in unlined steel (except stainless steel) containers or spray tanks. Do not use where roots from desirable vegetation may extend into the treated area. Maintain a distance from desirable trees equal to at least twice the distance from the trunk to the drip-line. Do not apply where runoff water may flow onto agricultural land.

How it works

Absorbed by both roots and foliage of sensitive vegetation. Translocated throughout the plant including the root system in both the xylem and the phloem. Non-selective. Plant stops growing shortly after application.

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Expected results

Plants stop growing within 24 to 48 hours. Yellow, purplish and/or red discolouration of the leaves may occur. The growing point of the plant and the youngest leaves begin to die first, with symptoms eventually progressing to older leaves. Chlorosis and tissue necrosis may not be apparent in some plant species until 2 weeks after application. Complete kill of plants may not occur for several weeks.

Restrictions

Rainfall: Rainfall within 2 hours may decrease foliar activity. Rainfall does not affect root activity or the control of non-emerged sensitive species. **Grazing restrictions:** Do not graze the treated area or cut for hay.
Re-cropping restrictions: Non-crop/non-graze applications only. **Re-entry interval:** Do not enter treated areas until sprays have dried.

Environmental precautions

Arsenal is toxic to non-target aquatic and terrestrial plants. Leave a 20-metre buffer between area of application and sensitive habitats. Do not apply where runoff water may flow onto agricultural land as injury to crops may result.

Toxicity

Acute oral LD_{50} (rats) 5,000 mg/kg.

Storage

Store above -12°C. Arsenal should not be mixed or stored in unlined steel (except stainless steel) containers or spray tanks.

Assure II/Yuma GL/IPCO Contender/IPCO Contender II/Co-Op Contender II/Quiz/ Elegant 10 EC/Marshall/Idol/Leopard

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Assure II (PCP# 25462)	AMVAC	Quizalofop-p-ethyl: 96 g/L	Emulsifiable concentrate	8 L, 96 L, 500 L
Sure-Mix (PCP# 25467)		Surfactant blend (40%) + petroleum oil (60%)		8 L, 96 L, 500 L
Yuma GL (PCP# 30100) Surfactant required and sold separately	Gowan Canada	Quizalofop-p-ethyl: 96 g/L	Emulsifiable concentrate	8 L
IPCO Contender (PCP# 32091)	IPCO	Quazalopfop-p-ethyl: 96 g/L	Emulsifiable concentrate	8 L
IPCO Contender Adjuvant (PCP# 32198)		Surfactant blend: 70% soybean oil		8 L
IPCO Contender II (PCP # 33960)	IPCO	Quazalopfop-p-ethyl: 96 g/L	Emulsifiable concentrate	8 L
IPCO MSO Adjuvant (PCP # 33757)		Surfactant blend: 100% soybean oil		8 L
Co-op Contender II (PCP # 33961)	Federated Cooperatives Ltd.	Quazalopfop-p-ethyl: 96 g/L	Emulsifiable concentrate	8 L
Quiz (PCP# 33481) Surfactant required and sold separately	NewAgco Inc.	Quizalofop-p-ethyl: 96 g/L	Emulsifiable concentrate	8 L

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Assure II/Yuma GL/IPCO Contender/IPCO Contender II/Co-Op Contender II/ Quiz/Elegant 10 EC/Marshall/Idol/Leopard (cont'd)

Product	Company	Active ingredient	Formulation	Container size
Elegant 10 EC (PCP # 33617)	Sharda CropChem Ltd	Quizalofop-p-ethyl: 96 g/L	Emulsifiable concentrate	8 L, 96 L, 500 L
Marshall Unpacked (PCP # 33681) Surfactant required and sold separately	Winfield United Canada	Quizalofop-p-ethyl: 96 g/L	Emulsifiable concentrate	10 L
Idol (PCP # 33906) Surfactant required and sold separately	Nufarm Agriculture	Quizalofop-p-ethyl: 96 g/L	Emulsifiable concentrate	8 L
Leopard (PCP # 33715) Surfactant required and sold separately	ADAMA Canada	Quizalofop-P-ethyl: 100 g/L	Emulsifiable concentrate	7.8 L

Crops, staging and rates

No stage restrictions. Rate: 150 - 300 mL/acre. Rate used determined by type and number of weeds present.

alsike clover (est., seed production)*
camelina*
canola
chickpea
common dry beans (pinto, navy, great northern, small red, pink)*
crambe[1]
creeping red fescue (seed production)*
cucurbit vegetables (Group 9)*
faba bean*
flax
hemp, industrial (fibre, seed, oil)*
lentils
narrow-leaved lupin*
oriental, brown, yellow mustard, Ethiopian (carinata) mustard*
pea (field and processing)
red clover (est., seed production)*
seed alfalfa
seedling legumes (seed production)[2]*
snap bean*
soybean
sugar beet*
sunflower[1]

[1] Not registered for use with Quiz. [2] Seedling legumes includes bird's-foot trefoil, alsike, red, white and sweet clover and sainfoin.

*Minor use registration. AMVAC assumes no responsibility for crop safety or performance.

Weeds, rates and staging

Weeds controlled	Weed leaf stage	Rate
green foxtail volunteer barley	2 leaf to early tillering	Assure II: 0.15 L/acre + Sure-Mix: 0.5% v/v, IPCO Contender II/Co-Op Contender II: 0.15L/acre + IPCO MSO Adjuvant 0.5% v/v, Yuma GL/Quiz/IPCO Contender/Elegant/Marshall/Idol: 0.15 L/acre + recommended adjuvant as per label. Leopard: 0.148 L/acre + recommended adjuvant as per label.
volunteer corn	2 - 6 leaf	
volunteer oats[1] volunteer wheat	2-leaf to early tillering	
barnyard grass	2-leaf to early tillering	Assure II: 0.20 L/acre + Sure-Mix: 0.5% v/v or Assure II: 0.20 L/acre + Merge: 0.5 - 1.0% v/v or Assure II: 0.20 L/acre + LI700: 0.25 - 0.5% v/v or Assure II: 0.20 L/acre + Liberate: 0.5% v/v IPCO Contender II/Co-Op Contender II: 0.20L/acre + IPCO MSO Adjuvant: 0.5-1.0% v/v Yuma GL/Quiz/Elegant 10 EC/IPCO Contender/ Marshall/Idol: 0.20 L/acre + recommended adjuvant as per label. Leopard: 0.194 L/acre + recommended adjuvant as per label.
downy brome	2 - 5 leaf	
Japanese brome	2 - 5 leaf	
wild oats	1 - 5 leaf to early tillering (up to 2 tillers)	
foxtail barley	3 - 4 leaf (plus 3 tillers)	
fall panicum old witchgrass prosomillet yellow foxtail	2-leaf to early tillering	
quackgrass (suppression)	2 - 6 leaf	
quackgrass (season-long control)	2 - 6 leaf	Assure II: 0.30 L/acre + Sure-Mix: 0.5% v/v or Assure II: 0.30 L/acre + Merge: 0.5 - 1.0% v/v or Assure II: 0.30 L/acre + LI700: 0.25 - 0.5% v/v or Assure II: 0.30 L/acre + Liberate: 0.5% v/v or IPCO Contender II/Co-Op Contender II: 0.20L/acre + IPCO MSO Adjuvant: 0.5-1.0% v/v Yuma GL/Quiz/Elegant 10 EC/IPCO Contender/ Marshall/Idol: 0.30 L/acre + recommended adjuvant as per label. Leopard: 0.291 L/acre + recommended adjuvant as per label.

[1] Best results on volunteer oats/wild oats if application is made before tillering begins.

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Registered tank mixes

In canola: Assure II/Yuma GL/IPCO Contender/IPCO Contender II/Co-Op Contender II/Quiz /Elegant 10 EC (0.15 - 0.20 L/acre) + Muster (8 - 12 g/L) + surfactant (0.5% v/v).

In Liberty Link Canola: Assure II IPCO Contender II/Co-Op Contender II/Quiz (0.15 - 0.30 L/ac) + Liberty 150 SN (0.538 - 1.62 L/ac) + Suremix (0.5% v/v) or Merge (5 - 10 L/1,000 L) or IPCO MSO Adjuvant (5 - 10 L/1,000 L) or LI 700(0.25 - 0.5% v/v) or Liberate (0.5% v/v).

In creeping red fescue: Assure II/Yuma GL/IPCO Contender/IPCO Contender II/Co-Op Contender II/Quiz/Elegant 10 EC (0.20 - 0.30 L/acre) + Ally Toss-N-Go (3 g/L) + surfactant (0.5% v/v) Assure II/Yuma GL (0.20 - 0.30 L/acre) + Refine SG (12 g/acre) + surfactant (0.5% v/v).

In pinto, pink, great northern and small red beans: Assure II/Yuma GL/IPCO Contender/IPCO Contender II/Co-Op Contender II/Quiz/Elegant 10 EC (0.20 - 0.30 L/acre) + Basagran (0.70 - 0.91 L/acre) + surfactant (0.5% v/v).

In tribenuron tolerant sunflowers: Assure II/ IPCO Contender II/Co-Op Contender II/Yuma GL (0.15 - 0.30 L/acre) + Express SG (6 g/acre) + Merge (0.5 - 1.0% v/v) or IPCO MSO Adjuvant (5 - 10 L/1,000 L) or Sure-Mix (0.5% v/v).

AMVAC, IPCO and Gowan Company support the following unregistered mixes of quizalofop-p-ethyl and glyphosate on Roundup Ready canola, with Pursuit on field pea, with Odyssey on Group 2 tolerant lentils, field pea and soybean with Solo on Group 2 tolerant lentils that are not on the Assure II/Yuma GL/IPCO Contender label. Apply mixes according to the most restrictive use limitations for either product. For field pea and soybean only: Viper ADV. On Group 2 tolerant canola and mustard: Ares SN.

Mixing instructions

Use mixing instructions "c" on page 15.

Application information

How to apply: Ground and aerial applications. **Water volume:** Ground – 40 L/acre. Up to 162 L/acre of water may be used under heavy populations to improve coverage. Air: 10 - 20 L/acre. Refer to label for registered water volumes.

Application tips

How it works: Quizalofop-p-ethyl is a systemic herbicide that is rapidly absorbed and readily translocated from the treated foliage to the root systems and growing points of treated plants.

Expected results

Grassy weeds show a reduction in growth and a loss of competitiveness. An early yellowing or browning of the younger plant tissues is followed by a progressive collapse of the remaining foliage. These results will generally be observed in 1 to 3 weeks, depending on the grass species treated and the environmental conditions. Poor results may be expected if there is improper mixing, timing or coverage, or when weeds are under stress.

Restrictions

Re-cropping: No restrictions the year after application. **Grazing restrictions:** Do not graze treated fields or harvest for forage or hay. **Pre-harvest intervals:** Canola – 64 days; chickpea – 85 days; flax – 82 days; lentil or pea (field or processing) – 65 days; soybean – 80 days; faba beans – 30 days; industrial hemp – 73 days. **Re-entry interval:** Camelina 4 days. All other registered crops 12 hours. **Rainfall:** Rain within 1 hour of application may reduce effectiveness.

Environmental precautions

Quizalofop-p-ethyl is toxic to fish. Avoid spraying fish-bearing waters. Leave a 15-metre buffer between treated area and sensitive habitats.

Toxicity

Acute oral LD_{50} (rats) > 5,000 mg/kg.

Storage

Do not freeze.

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Authority 480 Herbicide

Group 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Authority 480 Herbicide (PCP# 29012)	FMC of Canada Limited	Sulfentrazone: 480 g/L	Suspension concentrate	3.8 L

Crops, staging and rates

Crop	Stage	Rate*
Chickpea, field pea, flax, sunflower, soybean, faba bean	Prior to seeding or up to 3 days post seeding	89 or 118 mL/acre
Tame mustard	Prior to seeding	89 mL/acre
Wheat (spring, durum)	Prior to seeding or up to 3 days post seeding	89 mL/acre

Note: * Rate Authority 480 Herbicide is dependent on soil type, pH and organic matter; please refer to the label.

Weeds controlled and staging

Broadleaf weeds controlled: 89 mL/acre

kochia
Russian thistle (suppression)

Broadleaf weeds controlled: 118 mL/acre

cleavers (suppression)
common groundsel
common purslane
common waterhemp
Eastern black nightshade
lamb's-quarter
Powell pigweed
red root pigweed
Russian thistle (suppression)
smooth and large crabgrass
wild buckwheat
yellow woodsorrel

Registered tank mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Additional weeds controlled
Nu Image Herbicide (Black and Gray Wooded soils only)	Field pea	28.3 mL/acre + adjuvant	Wild mustard, volunteer canola
Express SG* + glyphosate (potassium, isopropylamine or ammonium salts)	Faba bean, field pea, soybean, spring and durum wheat	glyphosate: 180 g ae/acre + Express SG: 6 g/acre	Narrow-leaved hawk's-beard, dandelion and others weeds controlled by glyphosate and Express SG

Apply tank mixes according to the most restrictive use limitations for either label. * When applying Express SG + glyphosate to pulse crops on coarse textured soils, low OM soil (<3% OM) or in fields with soil variability, gravel/sand areas, injury may occur. Avoid planting pulses in soils with >50% sand. FMC supports the following tank mixes not on the Authority label: glyphosate (180 - 360 g active ingredient/acre), Aim EC + glyphosate (180 - 360 g ae/acre), Aim EC + glyphosate + MCPA (flax only), Dicamba tolerant soybeans only: Xtendimax and Engenia.

Application information

How to apply: Ground application only. **Water volume:** 40 L/acre minimum.

Authority 480 herbicide may be applied to the soil as a pre-plant or pre-emergence (to weed and crop) single ground application. Authority 480 herbicide can be applied prior to planting or up to 3 days after planting, but before seed germination. Unless specified on the label, do not make fall application to any crops.

Application tips

All soil applications of Authority 480 require adequate rainfall for herbicidal activation.

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Do not apply Authority 480 (or any sulfentrazone products) in consecutive years (24 months). In case of drought in any of those years, a subsequent application of Authority 480 should be further delayed. **Do not** apply to soils classified as coarse-textured. **Do not** apply in fine texture soils with less than 1.5% organic matter. **Do not** apply in any type of soils with an organic matter content greater than 6%. **Do not** use on soils with a pH of 7.8 or greater. If using irrigation with water that has a pH greater than 7.5, please review the label for adverse crop response. **Rainfall:** Authority 480 requires 10 to 20 mm of rain or irrigation water, at once, to be effective. Dry weather conditions as well as excessive rainfall or irrigation following application may reduce weed control. **Do not** store the sprayer overnight or for an extended period of time with the sulfentrazone spray mixture in the tank.

How it works

Sulfentrazone controls weeds by the process of protoporphyrinogen oxidase inhibition (membrane disruption), a mode of action commonly referred to as PPO inhibition. Sulfentrazone is primarily taken up by the roots of treated plants.

Expected results

Plants emerging from treated soil turn necrotic and die after exposure to light. Shoot-root soil placement studies indicate that sulfentrazone is primarily absorbed by the roots of the plant following soil applications.

Restrictions

Rotational Crop	Replant Interval (months)
Chickpea, faba bean, field pea, flax, soybean, sunflower, wheat (spring, durum; low rate only) and tame mustard (low rate only)	0 months
Winter wheat	after 4 months
Alfalfa, barley, canola, field corn, wheat (spring and durum; high rate)	after 12 months
Corn (sweet and pop), lentil, sorghum	after 24 months

Re-cropping: For crops not listed above, a minimum rotational crop interval of 36 months must be observed and a representative bioassay of the field must be conducted with the rotational crop and adequate soil moisture to evaluate potential crop sensitivity. If there is a lack of adequate or normal soil moisture due to drought conditions following an application of AUTHORITY® 480 Herbicide, the minimum rotational crop interval listed in the table must be extended for one additional year that the drought has occurred and a representative bioassay of the field must be conducted with the potential rotational crop and adequate soil moisture to determine the crop sensitivity to AUTHORITY® 480 Herbicide. Do not apply AUTHORITY® 480 Herbicide (or any other product containing sulfentrazone) to spring wheat if an application of FOCUS® Herbicide (or any other product containing pyroxasulfone) was applied in the previous fall. **Rainfall:** Rainfall is required following application to activate the sulfentrazone component and for adequate weed control. **Grazing:** No restrictions. **Re-entry interval:** 12 hours.

Environmental precautions

Leave 1 metre buffer between aquatic habitats less than 1 metre deep. and 10 metres between sensitive plants and treated area.

Toxicity

Oral (rats) LD_{50} = 2,084 mg/kg.

Storage

Do not freeze.

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Authority Supreme Herbicide

Group 14, 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Authority Supreme Herbicide (PCP# 32562)	FMC of Canada Limited	Sulfentrazone: 250 g/L Pyroxasulfone: 250 g/L	Suspension concentrate	8 L

Crops, staging and rates

Apply prior to seeding of or up to 3 days after seeding field pea, chickpea, soybean.

Treatment	Rate (per acre)		Treated per jug	
	Soil type		Soil type	
	Medium texture (1 - 3% OM)	Medium-fine texture (3 - 6% OM)	Medium texture (1 - 3% OM)	Medium-fine to fine texture (3 - 6% OM)
Early season control	162 mL		50 acre/jug	
Extended control	202 mL	243 mL	40 acre/jug	33 acre/jug

Medium soils	Medium-fine to fine soils
Loam, silt loam, silt	Sandy clay loam, sandy clay, silty clay loam, silty clay, clay loam, clay

Do not make more than 1 application per season. Do not apply Authority Supreme to:

- soils with more than 6% organic matter.
- peat or muck soils
- soils with a pH greater than 7.8
- coarse textured soils
- fields treated with Authority 480 or Authority Supreme or any product containing Sulfentrazone in the previous year
- DO NOT apply AUTHORITY® SUPREME Herbicide (or any other product containingpyroxasulfone) in the spring to fields that were treated with applications of FOCUS®Herbicide (or any other product containing pyroxasulfone) during the previous fall."

Weeds controlled

Control of the following weeds emerging from seed (not controlled if emerged at application).

barnyard grass
brome (downy, Japanese)
cleavers
common groundsel
common purslane
common waterhemp
cow cockle
Eastern black nightshade
foxtail (green, yellow, giant)
kochia
lamb's-quarter
large crabgrass
pigweed (green, redroot)
Powell pigweed
ragweed, common*
stinkweed
smooth crabgrass
wild buckwheat
wild mustard*
wild oats*
witchgrass
yellow woodsorrel

* Suppression only.

Registered tank mixes

Prior to all labelled crops: glyphosate (180 to 360 grams ae/acre). Authority Supreme Herbicide + Express SG + Glyphosate (180 - 360 g ae/acre) prior to soybean and field pea only. Injury to these crops may occur on coarse-textured soils, low in organic matter (<3%) or in fields with variable soils, gravelly soils, sandy areas or eroded knolls. Avoid planting these crops in soils >50% sand. FMC supports the following tank mixes that are not on the Authority Supreme label. Apply tank mixes according to the most restrictive use limitations for either label. Pre-seed to all registered crops: Aim EC herbicide, Aim EC + glyphosate (180 - 360 g ae/acre).

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Application tips

Ground application only. Do not apply by air. **Water volume:** Minimum of 40 L/acre. **Nozzles and pressure:** Use a combination of nozzles and pressure designed to deliver thorough, even coverage with **ASABE medium droplets**. Spray mix must be used immediately; do not store herbicide in spray tank overnight. Use continuous agitation.

Expected results

Moisture is necessary to activate both the sulfentrazone and pyroxasulfone components in soil for effective weed control. Dry weather following application may reduce effectiveness. Extremes in environmental conditions such as temperature, moisture, soil conditions and cultural practices may affect activity.

Restrictions

Rotational Crop	Replant Interval (months)
chickpea, field pea, soybean	0 months after
winter wheat	4 months after
barley, canola, mustard, oat, field corn, sunflower, spring and durum wheat	12 months after
lentil	24 months after
sugar beet	36 months after

Note: All other crops require a minimum of 36 months before seeding and a representative favorable bioassay of the field should be conducted with the rotational crop. If there is a lack of adequate or normal soil moisture due to drought conditions following an application of Authority® Supreme Herbicide, the minimum rotational crop interval listed in the table must be extended for one additional year that the drought has occurred and a representative bioassay of the field must be conducted with the potential rotational crop and adequate soil moisture to determine the crop sensitivity to Authority® Supreme Herbicide.

Rainfall: 12.5 mm or more of rainfall at once or irrigation is required to activate product. **Re-entry interval:** 12 hours. **Pre-harvest interval:** Not applicable. **Grazing:** No grazing restrictions.

Environmental precautions

Buffer zones: Use a 5-metre buffer for shallow water bodies (< 1 metre deep) and 3 metres for deeper water bodies (> 1 metre deep). Stay 10 metres back from sensitive terrestrial areas.

Toxicity

Oral (rat) LD_{50} = 3,129 mg/kg.

Storage

Store in original container in a cool, dry, well-ventilated location above 5°C to keep product from freezing.

Avadex MicroActiv/Avadex Liquid EC

Group 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Avadex MicroActiv (PCP# 16759)	Gowan Canada	Triallate: 10%	Granular	22.7 kg, 451.3 kg
Avadex Liquid EC (PCP# 16759)		Triallate: 480 g/L	Emulsifiable concentrate	10 L, 115 L

Crops, staging and rates

Pre-emergence application only.

barley
canarygrass
durum wheat
field pea
flax
mustard
rapeseed
spring wheat
sugar beet

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Avadex MicroActiv/Avadex Liquid EC (cont'd)

Note: Alfalfa, bird's-foot trefoil and clover may be underseeded (provided they are not harvested for green feed, hay or silage in the year of treatment). Do not underseed with grasses or legume grass mixture.

Weeds and staging

For pre-emergent control of wild oats.

Avadex Liquid rates:

Fall treatment – after October 1 and until soil freeze-up.

Crop	Rate (L/acre)			Acres treated per 115 L drum		
	Organic matter			Organic matter		
	< 2%	2 - 4 %	> 4%	< 2%	2 - 4%	> 4%
Spring and durum wheat, barley	1.01	1.17	1.41	116	98.3	81.5
Canola, flax, mustard, field pea	1.41	1.41	1.86	81.5	81.59	61.8

Spring treatment – before or after seeding.

Crop		Rate (L/acre)		Acres treated per 115 L drum	
		Organic matter		Organic matter	
		4% or less	Greater than 4%	4% or less	Greater than 4%
Spring and durum wheat	Before seeding	1.01	1.17	116	98.3
	After seeding	1.17	1.41	98.3	81.5
Barley	Before and after seeding	1.17	1.41	98.3	81.5
Canola, flax, mustard, sugar beet	Before seeding	1.41	1.86	81.5	61.8
Peas	Before seeding	1.41	1.41	81.5	81.5

Avadex MicroActiv Granular rates (kg/acre)

Fall treatment						
Crop	Rate (kg/acre)			Acres treated per 451.3 kg bag		
	<2*% OM	2 - 4% OM	>4% OM	<2% OM	<4% OM	>4% OM
Wheat, barley, canary seed	4.45	5.67	6.88	101	80	66
Canola, flax, mustard, field pea, sugar beet	5.67	6.88	8.9	80	66	51

* Fall treatments conducted under minimum tillage are not recommended on soils with less than 2% organic matter.

Spring treatment					
Crop	Application Timing	Rate (kg/acre)		Acres treated per 451.3 kg bag	
		<4% OM*	>4% OM	<4% OM*	>4% OM*
Wheat	Before seeding	4.45	5.67	101	80
	After seeding	5.67	6.88	80	66
Barley, canary seed	Before and after seeding (barley only)	5.67	6.88	80	66
Canola, flax, mustard, field pea, sugar beet	Before seeding	6.88	8.9	66	51

Registered tank mixes

Fertilizers: Avadex Liquid EC alone or tank mixed with liquid formulations of Treflan or Rival may be tank mixed in a minimum of 36 litres of sprayable fluid fertilizer carrier (such as 28-0-0) per acre as a broadcast treatment. Compatibility of herbicide and liquid fertilizer should be checked.

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Herbicides: Avadex Liquid EC can be tank mixed with Treflan or Rival herbicide for the control of both wild oats and wild millet (green and yellow foxtail). This tank mixture can be applied after seeding wheat and barley only.

How to apply

Avadex Liquid EC can only be applied by ground application. Granular formulations may be applied by air with attachments designed for applying low volumes of granules (Avadex MicroActiv).

Application information

Water volume: Minimum of 36 L/acre. **Pressure:** 200 kPa.

Application tips

Choice of formulation: Use liquid formulation on soil free of trash. Avadex MicroActiv herbicide may be applied in the fall or spring into standing stubble. If excessive crop residue exists at the time of application, a vigorous harrowing can be used to ensure that the herbicide granules make adequate contact with the soil.

Fall minimum tillage application: Fall minimum tillage applications should be made when the average soil temperature at the 5 cm depth is 4°C or less and within 3 weeks of soil freeze-up. This situation generally occurs by October 1. Incorporation by harrowing following application in the fall is recommended but can be performed in the spring before seeding. Do not use this treatment on soil with less than 2% organic matter. Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oats infestation, use the incorporated treatments only.

Spring minimum tillage application: Apply Avadex Liquid EC/MicroActiv granules in the spring when average soil temperature at the 5-cm depth is 4°C or less. Applications should be made to soil that has adequate trash cover to prevent soil erosion between application and seeding. Ensure that the time between application and incorporation is a minimum of 10 to 14 days. Do not apply more than 4 weeks before intended seeding. For optimum results with Avadex Liquid EC minimum tillage treatments, seed when wild oats growth is noticeable in the field. This will ensure that the soil is warm enough for activation of Avadex Liquid EC. Minimum tillage applications should not be made to fields covered with snow or excessive crop residue that will not allow granule contact with soil. If excessive crop residue exists at the time of application, a vigorous harrowing can be used to ensure that the herbicide granules make adequate contact with the soil. Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oats infestation, use the incorporated treatment only. Soil colour may not be a precise indicator of organic matter content. Ensure that the application rate chosen from the table is appropriate for your soil type.

Conventional tillage: Please refer to the product label for information on application and incorporation recommendations under conventional tillage systems.

Field preparation: Make sure the soil is in good working condition. Reduce trash to an acceptable level before application. If soil is excessively wet or lumpy, cultivate with suitable equipment to improve soil condition.

Seeding: Flax, mustard and rapeseed can be seeded in treated layers. Barley and wheat are more sensitive and should be planted 1.5 to 2.5 cm below the treated layer. Wheat must be seeded below the treated layer. After seeding, any deep ridges left by drills must be levelled by harrowing. Treflan/Rival Mixes: Drought conditions in the year of treatment may result in higher levels of Treflan/Rival carryover. To avoid wheat injury, seed 6 to 7.5 cm into warm, moist seedbed. A pre-seeding burn-off herbicide treatment is required to eliminate weed competition prior to crop emergence.

How it works

Absorbed by germinating wild oats shoots, usually resulting in death before emergence. Under dry conditions, wild oats may emerge before being killed.

Expected results

Wild oats: Usually kills wild oats before they emerge. Scraping away the soil 1 to 2 weeks following treatment will expose white to yellow wild oats shoots 2 to 2.5 cm in length with pinched tips. Plants that have emerged and absorbed a lethal dose will cease growth, leaves become brittle and bluish-green in colour. Under dry conditions, a rainfall of 1.5 cm or more when wild oats are emerging can cause post-emergent die-back of a high percentage of wild oats plants. **Crop:** Wheat seeded into the treatment zone under very dry soil conditions may be thinned and delayed when germinating and emerging just prior to a heavy rainfall.
Wheat must be seeded at least 1.5 cm below the treated layer of soil (e.g., 5 to 7.5 cm). Some wheat thinning may be noted on eroded knolls. Poor results may be expected if incomplete incorporation due to wet, cloddy soil or heavy trash, incorporation delayed, very dry soil conditions in spring or prolonged cool soil temperatures at time of germination. Ridges left by seeding may disrupt the treated layer and allow escapes.

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Restrictions

Rainfall: Moisture is required for activation. Rainfall of at least 1.5 cm within 2 weeks of application in the spring is required to ensure maximum performance. **Grazing restrictions:** Treated underseeded legumes cannot be harvested for green feed, silage or hay in year of seeding. Do not graze the treated crop or cut for hay; there are not sufficient data to support such use. **Re-cropping:** Oats should not be seeded into soil treated with Avadex Liquid EC/ MicroActiv in the previous year. **Re-entry interval:** 12 hours.

Environmental precautions

Do not apply directly to water or to areas where surface water is present. Avoid conditions that may lead to runoff or leaching. Chemical is mobile in water. Can volatilize so it is important to incorporate when applying and apply when soil temperature is 4°C or less.

Toxicity

Acute oral LD_{50} (rats) = 1,675 - 2,165 mg/kg.

Storage

Store above 0°C. If frozen, warm to 22°C and agitate to redissolve crystals.

Avenza

Group 1,2,4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Avenza A (PCP# 33455)	Corteva Agriscience	Florasulam: 5 g/L Fluroxypyr: 100 g/L	Emulsifiable concentrate	8.1 L, 64.8 L, 97.2 L
Avenza B (PCP# 33278)		Pinoxaden: 50 g/L		10 L, 80 L, 120 L

Crops, staging and rates

Crop	Staging	Rate
Spring wheat (excluding durum), winter wheat, barley	2 leaf expanded to just prior to flag leaf emergence	Avenza A: 405 mL/acre Avenza B: 500 mL/acre

Weeds, rates and staging

Grass weeds controlled (1- 6 leaf, prior to the 4th tiller).

barnyard grass	proso millet	volunteer oats	yellow foxtail
green foxtail	volunteer canary seed	wild oats	

Broadleaf weeds controlled when tank mixed with 187 - 234 mL/acre of MCPA Ester 600 (1 - 6 leaf).
Note: Avenza is not intended to be a stand-alone product but is meant to be mixed with MCPA.

burdock	kochia***	shepherd's-purse	wild buckwheat
Canada Thistle†	narrow-leaved	smartweed	wild mustard
cleavers**	hawk's-beard	stork's bill (1 - 8 leaf)	wild radish
cocklebur	plantain	stinkweed	wild sunflower (annual)
cow cockle	prickly lettuce	sowthistle, annual	
common chickweed	ragweed	sow thistle, perennial†	
dandelion	plantain	vetch	
flixweed	redroot pigweed	stork's-bill (1 - 8 leaf)	
hemp-nettle	round-leaved mallow	volunteer canola****	
lamb's-quarter	Russian thistle	volunteer flax	

**including Group 2 resistant biotypes. ***including ALS resistant biotypes. ****including herbicide tolerant canola varieties. † top growth control.

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Registered tank mixes

Avenza is not intended to be used without the addition of MCPA Ester 600. Add at the rate of 187 mL/acre for volunteer canola and lamb's-quarter control. Use 234 mL/acre MCPA for all other weeds. MCPA Ester 600 is not included in the Avenza package and must be purchased separately.

Application information

How to apply: Ground application only. **Water volume:** 20 - 40 L/acre.

Application tips

For optimum control, apply Avenza herbicide to actively growing weeds. Weed control may be reduced if applied under stress conditions or on wet foliage and/or heavy weed pressure. Optimum weed control will be obtained if application of Avenza herbicide is delayed until the stress conditions have ended and weeds are once again actively growing. Warm, moist growing conditions promote active weed growth and enhance the activity of Avenza by allowing maximum foliar uptake and activity.

How it works

Avenza A contains Group 2 and 4 mode of action broadleaf herbicides. The Group 2 mode of action inhibits the production of ALS enzyme in the plant. This enzyme is essential to produce amino acids required for plant growth. The Group 4 mode of action disrupts normal plant growth regulation resulting in the death of susceptible plants. Avenza B herbicide contains a Group 1 mode of action that is absorbed by the leaves and rapidly translocated to the growing points of the leaves and stems. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

Expected results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on several factors, leaves and growing points turn yellow within 1 to 3 weeks after application, followed by browning and control 3 to 5 weeks after application. Growth of susceptible broadleaf weeds stops rapidly. Symptoms may not be noticeable for 1 to 2 weeks depending on environment and species treated. Symptoms on broadleaf weeds include twisting, bending and yellowing; weeds will turn brown, resulting in plant mortality.

Restrictions

Rainfall: Rainfast within 1 hour of application. **Grazing:** Do not graze for 7 days or silage for 30 days following application. **Pre-Harvest interval:** Do not harvest the treated crop for grain within 60 days of application.
Re-cropping: Fields previously treated with Avenza herbicide can be seeded the following year to alfalfa, barley, canola, corn, dry common beans, faba bean, flax, lentils, mustard (brown, oriental, and/or yellow), oats, pea, potato (except seed potato), soybean, sunflower, wheat or field can be summerfallowed.
Re-entry interval: 12 hours.

Environmental precautions

Do not contaminate any body of water. Use a downwind buffer zone of 30 metres between boom edge and the closest edge of sensitive terrestrial habitat and a 15-metre buffer zone between the downwind edge of the boom and the closest edge of sensitive aquatic habitat.

Toxicity

Acute oral LD_{50} (rats) = >5,000 mg/kg.

Storage

Store in original containers in a secure, dry heated storage area. If product is frozen, bring to room temperature and agitate before use.

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Axial/Epic Herbicide/Brazen II/Trondus

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Axial (PCP# 30431)	Syngenta	Pinoxaden: 50 g/L	Emulsifiable concentrate	10 L, 80 L, 400 L
Epic Herbicide* (PCP# 33603)	Nufarm Agriculture Inc.	Pinoxaden: 100 g/L	Emulsifiable concentrate	9.72 L
Brazen II (PCP # 33551)	ADAMA Canada	Pinoxaden: 100 g/L	Emulsifiable concentrate	9.7 L + 11.3 L Cohere adjuvant
Trondus (PCP # 32448)	Syngenta	Pinoxaden: 100 g/L	Emulsifiable concentrate	9.7 L + 11.3 L Adigor 77.6 L + 90.4 L Adigor

*Carrier Adjuvant required and sold separately. Carrier adjuvant should be used at 0.5% v/v.

Crops, staging and rates

Rate: Axial – 500 mL/acre, no adjuvant required. Epic – 160 mL/acre for Persian darnel, 240 mL/acre for all other listed weeds. Use adjuvant at 0.5% v/v (Carrier adjuvant) Brazen ll: 160 mL/acre + Cohere adjuvant at 280 mL/acre for Persian darnel, 240 mL/acre + Cohere adjuvant at 280 mL/acre for all other listed weeds. Trondus – 240 mL/acre + Adigor adjuvant at 280 mL/acre.

Crop	Staging (Zadoks Growth Stage)
Spring wheat (excluding durum **) winter wheat* and barley	1-leaf to flag leaf stage (11, 20 - 37) Caution: Do not apply past flag leaf stage

*Only Axial is registered for use on winter wheat. **Epic is registered for use on durum wheat.

Weeds, rates and staging

1 - 6 leaf, prior to 4th tiller. (Zadok growth stage: 11, 16 to 20, 23).

barnyard grass	proso millet	volunteer canaryseed	yellow foxtail (wild millet)
green foxtail	volunteer oats	wild oats	

Registered tank mixes: Check individual product labels as not all pinoxaden herbicides are registered to be mixed with all the broadleaf products below.

Tank mix partner[1]	Product rate	Remarks
Buctril M[4]	0.4 L/acre	Temporary crop injury may occur with tank mixes under extreme weather conditions or when the crop is suffering from stress due to inadequate or abnormally high moisture levels or extreme temperatures
Curtail M[4]	0.6 - 0.81 L/acre	
MCPA ester[4]	0.34 - 0.45 L/acre	
Mextrol 450[4]	0.50 L/acre	
Prestige[4]	Prestige A: 0.24 - 0.33 L/acre + Prestige B: 0.6 - 0.8 L/acre	
Trophy[4]	Trophy A: 0.24 L/acre + Trophy B: 0.45 L/acre	
Frontline XL[3,4]	0.51 L/acre	
Infinity	0.335 L/acre	
Refine SG[2]	12 g/acre	
Refine SG + MCPA ester[3,4]	12 g/acre + 0.23 - 0.28 L/acre	
Stellar	405 mL/acre	
MCPA ester	340 - 445 mL/acre	
Tilt 250 E	101 - 202 mL/acre	

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Tank mix partner[1]	Product rate	Remarks
Brazen II Mixes only		
2,4-D ester (600)	400 mL/acre	
Thumper	400 mL/acre	

[1] Always consult the label of the broadleaf herbicide prior to use. [2] Addition of surfactants with Axial is not required. [3] Suppression only on green foxtail. [4] A reduction in barnyard grass control may be observed when Axial is tank mixed with these broadleaf herbicides. **Note:** Nufarm also supports Epic mixed with Enforcer M.

Application information

How to apply: Ground and aerial application.
Water volume: Ground – 20 - 40 L/acre minimum. Aerial – 12.1 L/acre minimum.

Mixing instructions

Use mixing instruction "c" on page 15.

Application tips

For optimum control, apply to actively growing weeds, ideally at the 2 to 3 leaf stage. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Axial herbicide will not be controlled. Weed control following application of Axial herbicide alone, or in combination with broadleaf weed herbicides, can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Do not apply to crop that is stressed as crop injury may result.

How it works

Axial herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control.

Expected results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within 1 to 3 weeks after application. Further colour changes and loss of vigour will be observed, followed by browning and control 3 to 5 weeks after application.

Restrictions

Rainfall: Rainfast in 1 hour. **Grazing:** Observe a minimum of 7 days before grazing livestock treated fields.
Pre-harvest interval: 60 days after treatment for grain and straw and 30 days after treatment for hay.
Re-cropping: For treated fields, no crop may be seeded until the following year. There are no crop rotation limitations the year following application. **Re-entry interval:** 12 hours.

Environmental precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Leave 1 metre between applied area and sensitive habitats.

Toxicity

Acute Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Heated storage not required. Store the product in closed, original container in a well ventilated room.

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Axial Xtreme

Group 1, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Axial Xtreme (PCP# 30391)	Syngenta	Pinoxaden: 50 g/L + Fluroxypyr: 87.5 g/L	Emulsifiable concentrate	10 L, 80 L, 400 L

Crops, staging and rates

Rate: 500 mL/acre

Crop	Staging (Zadoks growth stage)
Spring wheat (excluding durum) and barley	1 leaf to flag leaf stage (11, 20 to 37) Caution: Do not apply past flag leaf stage

Weeds and staging

1 - 6 leaf stage prior to 4th tiller unless otherwise noted

barnyard grass
cleavers (1 - 4 whorl)
green foxtail
kochia (2 - 8 leaf)
proso millet
stork's-bill[1]
volunteer canaryseed
volunteer oats
wild buckwheat (1 - 4 leaf)
wild oats
yellow foxtail

[1] Suppression only.

Tank Mixes

Tank mix partner[1]	Product rate
Refine SG[2]	12 g/acre
Refine SG + MCPA Ester [3,4]	12 g/acre + 0.19 - 0.24 L/acre
Buctril M[4]	0.4 L/acre
Curtail M[4]	0.6 - 0.81 L/acre
Mextrol 450[4]	0.5 L/acre
MCPA Ester	0.28 - 0.37 L/acre
Infinity[5]	0.335 L/acre
Frontline XL[5]	0.51 L/acre
TILT 250E	0.101 - 0.202 L/acre

[1] Always consult the label of the broadleaf herbicide prior to use. [2] Addition of surfactants is not required. [3] Suppression only of green foxtail. [4] A reduction in barnyard grass control may be observed when Axial Xtreme is tank mixed with these broadleaf herbicides. [5] A reduction in green foxtail control may be observed when Axial Xtreme is tank mixed with these broadleaf herbicides.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 20 - 40 L/acre.

Application tips

For optimum results, apply Axial Xtreme to actively growing weeds. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Axial Xtreme will not be controlled.

Weed control following application of Axial Xtreme alone, or in combination with broadleaf weed herbicides, can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Optimum weed control will be obtained if the application of Axial Xtreme is delayed until the stress conditions have ended and weeds are once again actively growing.

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How it works
Axial Xtreme is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems, affecting both exposed and underground plant tissue. Thorough coverage of the plants is essential for consistent control.

Expected results
Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within 1 to 3 weeks after application. Further colour changes and loss of vigour will be observed, followed by browning and control 3 to 5 weeks after application.

Restrictions
Rainfall: Axial Xtreme herbicide alone can be used 1 hour before rainfall. **Grazing:** Observe a minimum of 7 days before grazing livestock on crops treated with Axial Xtreme herbicide. **Pre-harvest intervals:** 60 days after treatment for grain and straw and 30 days after treatment for hay. **Re-cropping:** Fields previously treated with Axial Xtreme can be seeded the following year to barley, canola, flax, forage grasses, lentil, mustard, oats, pea, rye or wheat. **Re-entry interval:** 12 hours.

Environmental precautions
This product is toxic to aquatic organisms and non-target terrestrial plants. Leave 15 metres between sprayed area and sensitive habitat.

Toxicity
Acute Oral LD_{50} (rats) = > 5,000 mg/kg; Acute Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Heated storage not required. Store the product in closed, original container in a well ventilated room.

Axial Xtreme iPak

Group 1, 4, 6, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Axial Xtreme (PCP# 30431)	Syngenta	Pinoxiden: 50 g/L + Fluroxypyr: 87.5 g/L	Emulsifiable concentrate	10 L, 80 L
Infinity (PCP# 28738)	Bayer	Pyrasulfotole: 37.5 g/L Bromoxynil: 210 g/L	Emulsifiable concentrate	6.7 L, 53.6 L

Crops, staging and rates

Crop	Staging	Rate per acre	Specific comments
Spring wheat (excluding durum), winter wheat, and barley	1 - leaf to flag leaf (11, 20 to 37). Caution: do not apply past flag leaf stage	Axial Xtreme: 0.5 L/acre + Infinity: 0.33 L/acre	Addition of AMS to Axial Xtreme iPak is not required or supported

Weeds and staging
Grassy weeds controlled: 1 - 6 leaf unless otherwise noted.

barnyard grass
green foxtail
proso millet
volunteer canary seed
volunteer oats
wild oats
yellow foxtail (wild millet)

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Axial Xtreme iPak (cont'd)

Broadleaf weeds controlled: including ALS (group 2) resistant biotypes.

- annual sow thistle
- chickweed
- cleavers
- Canada thistle[1]
- common ragweed
- dandelion[1] (up to 10 cm tall and 25 cm in diameter)
- flixweed
- hemp-nettle
- kochia (up to 10 cm)
- lamb's-quarter
- pale smartweed
- perennial sow thistle[1]
- redroot pigweed
- round-leaved mallow
- Russian thistle (up to 10 cm)
- shepherd's-purse
- stinkweed
- volunteer canola (all types)
- wild buckwheat
- wild mustard
- stork's-bill[1]

[1]Suppression only. Axial Xtreme iPak is a co-pack of Axial Xtreme and Infinity herbicides.

Registered tank mixes

None registered

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 20 - 40 L/acre

Application tips

For optimal control, apply Axial Xtreme iPak herbicide to actively growing weeds, ideally at the 2 - 3 leaf stage. Weeds emerging after application of Axial Xtreme iPak herbicide will not be controlled. Weed control following application of Axial Xtreme iPak can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures.

Grassy weeds may regrow under stress conditions. Optimum weed control will be obtained if application of Axial Xtreme iPak is delayed until the stress conditions have ended and weeds are once again actively growing. Do not apply to crop that is stressed by conditions such as frost, low fertility, flooding, disease or insect damage as crop injury may result.

How it works

Axial Xtreme is absorbed by the leaves and is rapidly translocated to the growing points of the leaves and stems, affecting both exposed and underground plant tissue. Thorough coverage of plants is essential for consistent control so higher water volumes are advised.

Pyrasulfotole is absorbed through leaves and is translocated to meristematic regions where it inhibits the HPPD enzyme. Pyrasulfotole inhibits plant pigment biosynthesis and photosynthesis.

Expected results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points may turn yellow within 1 to 3 weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control 3 to 5 weeks after application

Restrictions

Rainfall: Axial Xtreme iPak herbicide can be used 1 hour before rainfall. **Pre-harvest intervals:** 60 days after treatment for grain and straw, and 30 days after treatment for hay. **Re-cropping:** Lentils should not be seeded for 22 months after the application of Axial Xtreme iPak herbicide. Do not plant field peas the year following an Axial Xtreme iPak herbicide application in the brown soil zone where organic matter content is below 2.5% and where soil pH is above 7.5. **Re-entry interval:** 24 hours.

Environmental precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Leave 15 metres between treated area and sensitive habitat.

Toxicity

Axial Xtreme: Acute oral LD_{50} (rats) = > 5,000mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.
Infinity: Acute oral LD_{50} (rats) = > 300 - < 2,000 mg/kg.

Storage

Heated storage required.

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Barricade II/Foxxy R/Foxxy RCK/Audible

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Barricade SG (PCP# 29544)	FMC of Canada Limited	Thifensulfuron-methyl: 25% + tribenuron-methyl: 25%	Soluble granules	486 g
Perimeter II (PCP# 30094)		Fluroxypyr: 333 g/L	Emulsifiable concentrate	12.8 L, 230 L
Foxxy R co-pack of: Foxxy (PCP# 32952) + Rumour SG (PCP# 33574)	NewAgco Inc.	Foxxy – Fluroxypyr: 180 g/L	Emulsifiable concentrate	6.4 L, 12.8 L, 77 L, 230 L
		Rumour – Thifensulfuron methyl: 25% + tribenuron methyl: 25%	Soluble granules	486 g
Foxxy RCK co-pack of: Foxxy Herbicide (PCP # 32952) + Rumour SG (PCP # 33574)	NewAgco Inc.	Fluroxypyr: 180 g/L	Emulsifiable concentrate	9.6 L, 230 L
		Thifensulfuron methyl: 25% + tribenuron methyl: 25%	Soluble granules	
Audible co-pack of: Draft (PCP # 31904) + Audible B (PCP # 33706)	Rotam North America	Thifensulfuron methyl: 50% + tribenuron methyl: 25%	Dry flowable	324 g
		Fluroxypyr: 333 g/L	Emulsifiable concentrate	5 L

Crops, staging and rates

Rate: Barricade II: Barricade SG – 12 g/acre; Perimeter – 85 mL/acre. Foxxy R: Rumour SG – 12 g/acre; Foxxy - 160 mL/acre. Foxxy RCK: Rumour SG – 12 g/acre; Foxxy – 240 mL/acre. Audible: Draft - 8 g/acre; Audible B - 125 mL/acre. For Audible add a recommended surfactant (Agral 90, AgSurf, Citowett Plus) at 0.2 L per 100 L spray solution.

Surfactant: Non-ionic surfactant (Agral 90, Ag-Surf, Liberate Adjuvant, Ag-Surf II, HiActivate, Super Spreader adjuvant, Enhance at 0.2 L/100 L of spray solution).

Crop	Staging
Spring and durum wheat, barley, oats*	2-leaf to flag leaf stage
Winter wheat*	3 tiller to flag leaf

* On oats only when tank mixed with MCPA Ester, 3-leaf to flag leaf stage. Foxxy R and Foxxy RCK not registered on oats or winter wheat.

Weeds and staging

Unless otherwise noted, apply to young and actively growing weeds that are less than 10 cm in height or width.

annual smartweed (green, lady's thumb)**
Canada thistle*
cleavers (1 - 6 whorl)
common chickweed
cow cockle
flixweed **
green smartweed
hemp-nettle
kochia (up to 10 cm)***
lady's-thumb
lamb's-quarter
narrow-leaved hawk's-beard **
night-flowering catchfly **
perennial sow thistle **
redroot pigweed
round-leaved mallow ** (1 - 5 leaf)
Russian thistle **
shepherd's-purse ** (to 20 cm)
stinkweed
stork's-bill ** (1 - 6 leaf)
volunteer canola (excluding Group 2 tolerant varieties)
volunteer flax ** (up to 12 cm)
wild buckwheat
wild mustard

* Suppression. ** Not listed on Foxxy R label. *** Group 2 resistant biotypes included on Foxxy RCK/Audible labels only.

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Registered tank mixes

Product	Rate	Additional weeds controlled
MCPA 500 ester	226 mL/acre	Dandelion (spring and fall rosettes, up to 15 cm in diameter), cleavers (1 - 9 whorl), hemp-nettle (up to 8 leaf), kochia (including Group 2 resistant biotypes; seedling to 10 cm), scentless chamomile (<10cm), volunteer canola, including Group 2 herbicide tolerant varieties (apply when volunteer canola is in the 2 - 4 leaf stage), white cockle (<10cm), tufted vetch (up to 15 cm), common ragweed (up to 10 cm)
MCPA 600 ester	190 mL/acre	
MCPA Ester 500 (600) + Horizon 240 EC + Score adjuvant	MCPA ester 500 (600): 226 mL (190 mL)/ acre + Horizon 240 EC: 93 mL/acre + Score adjuvant: 323 mL/acre	Same as MCPA plus wild oats
MCPA Ester 500 (600) + Simplicity + adjuvant	MCPA ester 500 (600): 226 mL (190 mL)/ acre + Simplicity: 200 mL/acre + non-ionic adjuvant: 2.5 L/1,000 L spray solution	Same as MCPA plus wild oats
MCPA Ester 500 (600) + Traxos	MCPA ester 500 (600): 226mL (190 mL)/ acre + Traxos: 500 mL/ac	Same as MCPA plus wild oats
Simplicity + non-ionic surfactant	202 mL/acre + 0.25%v/v (2.5 litres/1,000 L of spray solution	Above weeds plus weeds listed on the Simplicity label

FMC supports the following mixes that are not on the Barricade II label. Apply mixes according to the most restrictive use limitations for either product.

Herbicides: Everest 3.0 AG, clodinafop; Axial; Puma Advance; Simplicity/Simplicity GoDri, Traxos; Varro, Simplicity GoDRI, 2,4-D Ester, Epic, Sierra 3.0 AG **Fungicide:** Acapela.

AgraCity supports the following mixes that are not on the Foxxy R or Foxxy RCK labels. **Herbicides:** Aurora, Aurora Extreme, Axial, HellCat, Himalaya, Simplicity, Traxos, Varro.

Rotam North America supports the following tank mixes that are not on the Audible label. All registered crops - MCPA Ester (190 ml/acre). Spring wheat - Axial, clodinaflop, flucarbazone, fenoxaprop, Simplicity GoDRI, Varro. Barley - Axial, fenoxaprop.

Application information

With: Ground or aerial application. Audible: Ground application only. **Water volume:** 22 L/acre minimum. **Aerial:** 10 L/acre minimum.

Mixing instructions

Fill with water to ⅔ using continuous agitation; add Barricade SG or MP Rumour, agitate for 5 minutes, then add tank mix partner. If tank mix partner is an emulsifiable concentrate, reduce agitation to prevent invert emulsion. Complete filling tank and spray.

Application tips

Higher spray volumes needed with a dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Barricade/Rumour left in the tank for more than 24 hours might have reduced effectiveness. When crop is under stress, application may result in crop injury such as temporary crop colour lightening or a slight height reduction. Clean sprayer immediately after application and use ammonia.

Note: Activity is influenced by weather conditions. Optimum activity requires active crop and weed growth. The temperature range for optimum activity is 12°C to 24°C.
Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, for example drought, heat or cold stress, or if weeds have initiated flowering, or if heavy infestations exist.

How it works

Absorbed through foliage. Inhibits cell elongation. Causes stem elongation, leaf cupping or curling.

Expected results

Growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under drought stress.

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Restrictions

Rainfall: Rainfall within 1 hour of application may reduce weed control. **Grazing:** May not be grazed or fed to livestock within 7 days of application. **Pre-harvest intervals:** Allow 60 days between application and harvest. **Recropping:** Barley, canola, flax, forage grasses, lentil, alfalfa, field corn, dry bean, faba bean, potato, soybean, sugar beet, sunflower, mustard, oats, pea, rye or wheat can be seeded the following year after application, or field can be summerfallowed. **Re-entry interval:** 12 hours.

Environmental precautions

For ground application, use a 15-metre buffer between sprayed area and sensitive habitat. Use 100-metre buffer for rotary wing aircraft, 125-metre for fixed wing. Do not contaminate water when cleaning equipment.

Toxicity

Barricade SG: Oral LD_{50} (rats) = > 5,000 mg/kg. Perimeter II: Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, dry place. May be frozen. If frozen, bring to room temperature and agitate before use. Do not store near heat or open flame.

Basagran/Basagran Forte/Benta Super/ Boa/Broadloom/Berserk

Group 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Basagran (PCP# 12221)	BASF Canada	Bentazon: 480 g/L	Solution	Basagran 9 L
Basagran Forte (PCP# 22006)				Basagran Forte 10 L
Benta Super (PCP# 32827)	Sharda Cropchem Ltd.			9 L
Boa (PCP# 33011)	NewAgco Inc.			7.25 L, 348 L
Broadloom (PCP# 32661)	UPL AgroSolutions			9 L, 450 L
Berserk (PCP # 34190)	Nufarm Agriculture			10 L

Note: Basagran Forte has a built-in adjuvant. Using Basagran/Broadloom, Benta Super and Boa requires the use of a surfactant (not included in package).

Crops, staging and rates

Rate: 710 - 910 mL/acre

Crop	Stage	Stage of crop for optimum weed control
Basagran, Benta Super, Boa and Basagran Forte		
Corn (grain, silage, sweet, seed)	No stage restriction	1 - 5 leaf stage
Dry common bean*	After 1st trifoliate stage	1 - 3 trifoliate stage
Faba bean	After 2 - 3 leaf stage or crop is 10 cm high	Soon after 3 leaf stage
Flax (excluding low linolenic acid varieties with Basagran Forte)	When crop is 5 cm or higher	Soon after 5 cm height
Peas (field and processing)	After 3 pairs of leaves (or 3 nodes) are present	Soon after peas have 3 pairs of leaves form
Spring wheat (excluding durum)[1]	No stage restrictions	2 - 4 leaf stage

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Basagran/Basagran Forte/Benta Super/Boa/Broadloom/Berserk (cont'd)

Crop	Stage	Stage of crop for optimum weed control
Basagran, Benta Super, Boa and Basagran Forte		
Soybean	No stage restriction	Unifoliate - 2 expanded trifoliate
Forage grasses for seed production (bromegrass, creeping red fescue, crested wheatgrass, meadow foxtail, orchard grass, timothy)[1]	1 - 7 leaf stage	2 - 5 leaf stage of seedling forage grasses
Forage legumes (seedling) for seed production* (alfalfa, alsike clover, red clover, sainfoin)[1]	After the 3rd trifoliate leaf	
Forage legumes (established alfalfa and alsike clover for seed production)[1 3]	Prior to flowering	
Forage legumes (established sweet clover, red clover and sainfoin)[1]	7.5 - 25 cm high	After crop is 7.5 cm and before crop canopy closes
Forage millet and forage sorghum[2]	3 - 6 leaf, prior to canopy closure	

* Dry common bean varieties including but not limited to: white, kidney, black, pinto, great northern, pink, small red, cranberry, otebo and most snap common beans including snap bean. Not all dry bean varieties have been tested for tolerance to Basagran. Test a small area of new variety for tolerance prior to field scale use. [1]Only registered for use with Basagran/Benta Super/Boa /Broadloom.[2] Forage millet and forage sorghum registered only with Basagran and Basagran Forte. [3]Broadloom only registered for use on alsike clover at seedling stage, not established stands. NewAgco supports the following tank mixes: Assure/Quiz (dry bean only), Solo, Pinnacle, 2,4-D Amine, 2,4-D Ester.

Weeds, rates and staging

Annual weeds	0.71 L per acre		0.91 L per acre	
	Inches	Maximum leaf stage	Inches	Maximum leaf stage
Buttercup			2 - 4	6
Cleavers			1 - 3 whorl stage	
Cocklebur	3 - 7	6*	7 - 12	10
Common chickweed			1 - 3 weeks after emergence	
Common groundsel			2 - 4	
Common ragweed			1 - 2	6
Corn spurry			1 - 4	
Flower of an hour	1 - 2	6*	2 - 4	10
Giant ragweed			2 - 6	4
Hairy galinsoga			2 - 3	6
Hairy nightshade			0.2 - 0.8	6
Lady's-thumb (smartweed)	1 - 3	6*	3 - 8	10
Lamb's-quarter			0.5 - 1.0	8
Purslane			1 - 2	6
Redroot pigweed (suppression only)			0.5 - 1.5	4
Russian thistle (suppression only*)			1 - 3	4
Shepherd's-purse	Rosette - 4	6*	4 - 10	6
Stinkweed	Rosette - 2	6*	2 - 6	6
Stork's-bill			1.5 - 4	2 - 6 leaf stage
Volunteer canola	0.75 - 6	8	0.75 - 6	8
Wild mustard	1 - 5	6*	5 - 10	10

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Annual weeds	0.71 L per acre		0.91 L per acre	
	Inches	Maximum leaf stage	Inches	Maximum leaf stage
Wild radish			1 - 2	6
Perennial Weeds. Repeat application 7 to 15 days after first application (if necessary)				
Canada thistle	6 - 8			
Field bindweed	1 - 2.5			
Yellow nutsedge	6 - 8			

* Basagran Forte only.

Registered tank mixes

Tank mix partner	Crop	Basagran
2,4-D Amine or Ester (500 mL AI/L): 300 - 400 mL/acre*	Spring wheat	400 mL/acre
Assure II: 255 mL/acre	Pinto, pink, small red, great northern bean	710 - 910 mL/acre
Pinnacle (2.2 to 3.2 g/acre)*	Soybean	3.3 or 4.8 g/acre
Solo (11.7 g/acre) + 28- 0-0 UAN(0.8 L/acre	Dry bean only	Basagran Forte (505 mL/acre)
Viper ADV (404 mL/acre) + 28% UAN (809 mL/acre)	Dry bean	Basagran Forte (146 mL/acre)

* Also registered mix with Benta Super and Broadloom.

Application information

How to apply: Basagran/Benta Super/Boa/Broadloom: Ground and aerial application (soybeans and dry beans aerial application only). Basagran Forte can only be applied by ground equipment. **Water volume:** Ground: 40 - 160 L/acre. Aerial: 20 - 40 L/acre.

Application tips

Do not apply to crops that have been stressed as crop injury may result. Best results are when weeds are young and actively growing. Apply Basagran/Benta Super/Boa to stork's-bill at the 2 to 6 leaf stage and to cleavers at the 1 to 3 whorl stage.

How it works

Contact herbicide that interferes with photosynthesis. In resistant plants, bentazon metabolizes to a non-toxic material. Uptake into the plant occurs primarily through the leaves. Thorough coverage of foliage is important for consistent weed control.

Expected results

Weeds: Weeds turn yellow initially and then brown, usually within 2 weeks. **Crops:** Yellowing, bronzing, speckling or burning occurs sometimes. The crop usually outgrows the condition within 10 days. Poor results may be expected when weeds are beyond recommended growth stage, when spray coverage is poor or under poor growing conditions (cool weather conditions or drought).

Restrictions

Rainfall: Rainfall within 6 to 8 hours of application may reduce activity. **Grazing:** Do not graze treated fields or cut treated forage for silage or hay; sufficient data are not available to support such use. Basagran Forte: Do not apply within 30 days of harvest for forage sorghum and forage millet. Do not graze treated alfalfa or cut for hay within 20 days of application. **Re-cropping:** No restrictions the year after treatment. **Re-entry interval:** 12 hours.

Environmental precautions

Basagran/Basagran Forte/Benta Super/Boa is toxic to aquatic organisms, including fish. Do not apply this product directly or contaminate aquatic habitats or water sources. **Leaching:** The use of bentazon may result in contamination of groundwater, particularly in areas where soils are permeable. **Drift:** Avoid drift into non-target areas.

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Toxicity
Acute oral LD_{50} (rats) = 2,063 mg/kg.

Storage
Store in a heated place; freezing will not affect activity.

Batalium

Group 2, 4, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Batalium (PCP# 33372)	UPL Agro Solutions	Flucarbazone: 20.4 g/L Fluroxypyr: 90.5 g/L MCPA: 241 g/L Bromoxynil: 241 g/L	Suspension concentrate	9.4 L, 115 L

1 jug will treat 20 acres.

Crops, staging and rates
Rate: 470 mL/acre

Crop	Staging
Spring wheat, durum wheat, winter wheat	2 leaf to a maximum of 4 leaves on the main stem, plus 2 tillers (6 total leaves)

Caution: Do not apply to wheat underseeded to legumes.

Weeds, rate and staging
Grass weeds: 1 - 6 leaf stage unless stated otherwise.

barnyard grass (suppression)
green foxtail
Japanese brome (1 - 4 leaf)
tame oat (volunteer)
wild oats
yellow foxtail (suppression)

Broadleaf weeds controlled: Up to 4-leaf unless stated otherwise.

American nightshade
ball mustard (2 - 4 leaf)
bluebur
canola (volunteer: 2 - 6 leaf)
cleavers (1 - 4 whorl)
cocklebur
common buckwheat (up to 8 leaf)
common groundsel (up to 8 leaf)
common ragweed (up to 8 leaf)
cow cockle
flax (volunteer: 1 - 12 cm)
flixweed
green smartweed (2 - 6 leaf)
kochia[2] (up to 5 cm)
lady's-thumb
lamb's-quarter (up to 8 leaf)
night flowering catchfly
pale smartweed
prickly lettuce[1] (up to 12 leaf)
redroot pigweed (2 - 6 leaf)
Russian thistle
scentless chamomile
shepherd's-purse (2 - 6 leaf)
stinkweed (2 - 9 leaf)
sunflower (volunteer)
tartary buckwheat (up to 8 leaf)
velvet leaf[3]
wild buckwheat (up to 8 leaf)
wild mustard (2 - 6 leaf)
wild tomato
wormseed mustard (up to 8 leaf)

[1] Suppression only in winter wheat. [2] Including group 2, 4 and 9 resistant biotypes. [3] Before 8 cm.

Broadleaf weeds suppressed

Canada thistle (top growth)
perennial sow thistle (top growth)
stork's-bill (1 - 8 leaf)

Registered tank mixes

Tank mix partner	Tank mixture rate	Remarks
MCPA Ester	185 mL/acre MCPA Ester 600 (275g ae/ha)	Hemp-nettle (up to 4 leaf)

Note: Batalium must be applied with a non-ionic surfactant (such as Agral 90, Ag-Surf, Surf 92, Super Spreader, LI 700 at 0.25% v/v or 0.25 L per 100 L spray solution).

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Application information
Apply with: Ground and aerial application. **Water volume:** 20 - 40 L/acre ground application, >11 L/acre minimum aerial application.

Application tips
For best results, apply to wheat and weeds that are actively growing in the stages listed. Wheat exposed to water-logged or saturated soils or temperature extremes such as heat, cold, drought, low fertility or plant disease at application time could show unacceptable injury symptoms. Weed control also may be reduced by these same conditions, or if heavy weed infestations exist, or when applications are made outside the application recommendations.

How it works
Flucarbazone sodium is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing point of the plant. Fluroxypyr and MCPA are absorbed by the leaves and translocated to the target site. Bromoxynil is a contact herbicide and requires good coverage of foliage.

Expected results
Growth of susceptible plants stops soon after application. Symptoms include discolouration (yellowing, reddening and purpling) and complete control may take 1 to 2 weeks.

Restrictions
Rainfall: Do not apply if it is raining or rainfall is expected within 1 hour after application. **Grazing:** Do not graze treated fields or use green crop for feed. Wheat grain or straw from harvested treated fields may be fed to livestock. **Pre-harvest intervals:** Observe minimum interval to harvest of 80 days after treatment. **Re-cropping:** The following crops may be planted 11 months after an application of Batalium. Grey Wooded soils – spring wheat, barley, canola and field pea*. Dark Brown soils – spring wheat, barley, canola, field pea*, flax, durum wheat, soybean, sunflower. Black soils – same as Dark Brown soils + field bean. Dark brown soils – only spring wheat.
Re-entry interval: 12 hours.

*Field pea can be successfully grown the year following Batalium application providing the following 3 criteria are all met: 1. Soil pH must be below 7.5. 2. Organic matter content must be above 4%. 3. Precipitation must be equal to or above the 10-year average (minimum 100 mm within 60 days of application in year of application).

Environmental precautions
Do not allow this chemical to drift onto other crops, especially canola, tame oat or other non target crops.

Toxicity
Acute oral LD_{50} (rats) 550 mg/kg.

Storage
Heated storage is required.

Battlestar/Deathstar

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Battlestar/Deathstar co-pack of: Battlefront (PCP# 33003) + Foxxy (PCP# 32952)	NewAgco Inc	Florasulam: 50 g/L	Suspension	3.2 L, 6.4 L
		Fluroxypyr: 180 g/L	Emulsifiable concentrate	9.6 L, 12.8 L, 230 L

Note: MCPA 600 Ester must be added to either product, but is sold separately

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Battlestar/Deathstar (cont'd)

Crops, staging and rates

Crop	Stage	Rates
Spring wheat, durum wheat, barley	2-leaf stage until just prior to flag leaf emergence.	Battlestar: 40 mL/ac Battlefront + 160 mL/ acre Foxxy + 250 mL mL MCPA Ester 600
		Deathstar: 40 mL/ac Battlefront + 240 mL/ acre Foxxy + 250 mL mL MCPA Ester 600

Weeds, rates and staging

Weeds controlled

- annual sunflower[4,6]
- ball mustard[6]
- burdock[4,6]
- chickweed
- cleavers (1 - 4 whorl)[1]
- cocklebur[6]
- common ragweed[6]
- cow cockle
- flixweed[6] (spring rosettes only)
- hemp-nettle[3,6]
- kochia (2 - 8 leaf)[1*]
- lamb's-quarter[6]
- prickly lettuce[4,6]
- redroot pigweed[3,6]
- Russian pigweed[4,6]
- shepherd's-purse
- smartweed
- stinkweed
- vetch[6]
- volunteer canola[2]
- volunteer flax (1 - 12cm)*
- wild buckwheat
- wild mustard
- wild radish[6]

Weeds suppressed with the addition of 250 mL/acre MCPA 600 Ester

- annual sow thistle
- Canada Thistle[3]
- dandelion (seedlings and overwintered rosettes >15cm)
- narrow-leaved hawk's-beard
- perennial sow thistle
- plantain (top growth only)
- stork's bill[3]

*Control with Deathstar only. [1]Including group 2 resistant biotypes [2]Including all herbicide tolerant varieties [3]Optimum control can be achieved with the addition of 92 mL/ac of MCPA Ester 600 [4]Up to 4 leaf stage [5]Not including group 2 resistant biotypes [6]Requires additional 47 mL/ac of MCPA Ester 600 for control.

Registered tank mixes

NewAgco Inc. supports the following non-registered tank mixes: Himalaya, Axial, Simplicity/Simplicity GoDRI. Use the most restrictive use limitations for either product. Consult grass mixes for registrations.

Application information

Water volume: Ground application only. **Water volume:** 40 L/acre.

Mixing instructions

Half fill sprayer with water and agitate. If mixing with a WDG or dry formulation, add the dry formulation to the mixture first. Add Battlefront, followed by Foxxy and MCPA, followed by the grassy herbicide tank mix partner.

How it works

Battlestar/Deathstar is readily absorbed by weed foliage. The florasulam component inhibits the ALS enzyme in plants resulting in a rapid halt in plant growth followed by yellowing, most noticeable after 1 to 2 weeks. The fluroxypyr and MCPA components mimic plant growth regulators causing swelling and thickening and twisted weed growth followed by yellowing and browning, resulting in plant mortality.

Expected results

Weeds start to discolour and twist usually within 1 to 2 weeks after application. Plant growth will cease or become erratic followed by browning and plant mortality. Complete death will take 1 to 3 weeks depending on weed size and environmental conditions.

Restrictions

Rainfall: Rainfall within 2 hours after application may reduce efficacy. **Grazing:** Do not cut the treated crop for hay or graze treated crop within 7 days after application. **Re-cropping:** Grow all major crops the year after application.
Pre-harvest intervals: Mature crop may be harvested 60 days after application.
Re-entry interval: 12 hours.

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Environmental precautions
This product has the potential to leach. Do not apply excessive irrigation. Use a buffer zone of 30 metres between area applied and sensitive terrestrial and aquatic habitats.

Toxicity
Battlefront: Oral LD_{50} (Rat) = > 2,000 mg/kg. Foxxy: Oral LD_{50} (Rat) = >4640 mg/kg.

Storage
Store in a dry heated area; if product is frozen, bring to room temperature and agitate before use.

Beloukha Herbicide

Group 26

Formulation

Product	Company	Active ingredient	Formulation	Container size
Beloukha Herbicide (PCP#33685)	Belchim Crop Protection Canada	Pelargonic Acid: 500g/L	Emulsifiable concentrate	0.1L - Bulk
Beloukha Herbicide (PCP#33686)		Pelargonic Acid: 680g/L	Emulsifiable concentrate	0.1L - Bulk

Crops, staging and rates
Rate: 470 mL/acre

Crop	Staging	Rate per acre
Wheat, barley, oats	Use at onset of senescence for foliage desiccation and weed management prior to harvest	500 g/L formulation 4.5 - 8.9 L 680 g/L formulation 3.2 - 6.5 L
Potato	Use at onset of senescence for foliage desiccation	500 g/L formulation 6.5 - 8.9 L 680 g/L formulation 4.9 - 6.5 L

Weeds, rates and staging
Weeds controlled: Redroot pigweed, shepherd's purse, lamb's-quarter, common chickweed, mouse-eared chickweed, common groundsel, plantain, black nightshade, perennial sow thistle, purslane, black medic, henbit, cranesbill, fescue, perennial ryegrass. **Weeds suppressed:** Canada fleabane, annual sowthistle, dandelion, Dutch clover, prostrate knotweed, barnyard grass, meadow fescue, bluegrass.

Registered tank mixes
None registered.

Application information
How to apply: Ground equipment only. Do not apply by air. **Water volume:** Wheat, barley, oats – 80 - 121 L/acre. Potatoes – 121 L/acre.

Mixing instructions
This product mixes readily with water. Prior to application, prepare the spray mixture by filling the spray or mix tank with ¾ the required amount of water then add the proper amount of product. Fill remainder of tank with water to the total amount of spray solution needed.

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Beloukha Herbicide (cont'd)

Application tips
Apply spray solution in properly maintained and calibrated equipment capable of delivering desired volumes. Applications should be properly directed to avoid spraying or allowing drift to desirable plants. Do not apply to weeds when wet from dew, rain or irrigation.

How it works
Contact only. Pelargonic acid moves through the cuticle and cell membranes lowering the internal PH of plant cells causing collapse and desiccation of plant tissue.

Expected results
Fast-acting burndown herbicide. It will only burn those plant parts that are coated with the spray solution. The degree of burndown and longevity of control are less when the plants are inactive, mature, or biennial/perennial types. Repeat applications may be required to achieve desired weed control and for foliage desiccation and weed management prior to harvest in wheat, barley, oats and potatoes..

Restrictions
Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information. **Grazing:** Not specified on label. **Re-cropping:** Not specified on label.

Pre-harvest interval: 1 day. **Re-entry interval:** Do not enter until spray has dried.

Environmental precautions
Avoid spraying in situation where drift may occur. Leave a buffer zone of at least 1m for protection of terrestrial habitats.

Toxicity
Oral LD_{50} (rats) > 2,000 mg/kg.

Storage
Store above 5°C.

Betamix ß

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Betamix ß (PCP# 28650)	Bayer	Phenmedipham: 153 g/L + desmedipham:153 g/L	Emulsifiable concentrate	10 L

Crops, staging and rates
Apply to sugar beet past the second true leaf stage. **Rate:** Betamix β: 0.47 - 1.9 L/acre. Select rate based on formulation used as a broadcast equivalent in a maximum of 42 litres of water for each litre of Betamix. Use low rate on early cotyledon beets and high rate on beets with at least 4 fully expanded leaves. Repeat application for improved weed control.

Weeds and staging
Weeds controlled at cotyledons to 4-leaf stage.

green foxtail	mustard	redroot pigweed	wild buckwheat
kochia	nightshade	stinkweed	yellow foxtail
lamb's-quarter	ragweed		

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Registered tank mixes

Tank mix partner	Tank mixture rate	Remarks
Upbeet	Betamix ß: 0.36 L/acre Plus Upbeet: 14 - 28 g/acre	Do not add adjuvant. A second application should be made 5 - 10 days later or as weeds germinate

Application information

How to apply: Ground only. Do not apply by air. **Water volume:** 40 - 80 L/acre for Betamix β.

Application tips

Avoid spraying until mid-afternoon when daytime temperatures will exceed 22°C. High humidity increases efficacy. Best results are obtained with repeat applications of the lowest rate commencing when the first weeds emerge. Do not apply during periods of dead calm. Avoid application when winds are gusty.

How it works

Absorbed through leaves. Sharply inhibits rate of assimilation of CO_2 in treated plants within 6 hours. Resistant species (sugar beets) begin recovery in this time while susceptible species do not.

Expected results

Under warm conditions, weed kill is complete in 4 to 7 days. Cool conditions require longer periods of up to 2 weeks.

Restrictions

Rainfall: Rainfall within 6 hours of application may reduce weed kill. **Grazing:** Do not graze treated crops or use for livestock feed; sufficient data are not available to support such use. **Pre-harvest intervals:** Do not apply to sugar beet later than 60 days prior to harvest. **Recropping:** Recropping restrictions not specified on the label. **Re-entry interval:** 24 hours.

Environmental precautions

This product is toxic to non-target terrestrial and aquatic plants, fish and other aquatic organisms. Avoid contamination of aquatic habitats by use the recommended buffer zones.

Toxicity

Phenmedipham. Acute oral LD_{50} (rats) = > 8,000 mg/kg. Desmedipham: Acute oral LD_{50} (rats) = > 10,250 mg/kg.

Storage

Do not store below 0°C.

BlackHawk

Group 4, 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Blackhawk (PCP# 32111)	Nufarm Agriculture	Pyraflufen-ethyl: 6.1 g/L + 2,4-D ester: 473g ae/L	Emulsifiable concentrate	9 L, 96 L, 480 L

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Blackhawk (cont'd)

Crops, staging and rates

Crop	Staging
Wheat, barley, spring and winter rye, triticale, canaryseed, soybean, field corn	Pre-seed or prior to crop emergence – maximum of 3 days after seeding
Oats	Apply up to a minimum of 7 days prior to planting
Summerfallow/fall burndown	Applications can be made up until soil freeze in the fall with no spring re-cropping restrictions

Weeds, rates and staging

Up to 4-leaf unless otherwise stated. 300 mL/acre.

annual sow thistle
burdock
Canada fleabane
cleavers
cocklebur
cow cockle
daisy fleabane
dandelion (spring seedlings)
false flax
false ragweed
flixweed
giant ragweed
goat's-beard
kochia
lamb's-quarter
mallow
mustard (except dog and tansy)
narrow-leaved hawk's-beard (in fall and at 1 - 2 leaf in spring)
night flowering catchfly
plantain
ragweeds
redroot pigweed
Russian pigweed
Russian thistle
shepherd's-purse
stinging nettle
stinkweed
sweet clover (seedlings)
thyme-leaved spurge
volunteer canola
wild buckwheat*
wild mustard*
wild radish
wild sunflower

* Suppression.

Registered Tank Mixes

Tank mix partner	Tank mixture rate	Crop Stage
glyphosate	0.5 - 1 L/acre (360 ai/L)	Prior to emergence or most restrictive tank mix partner label
Valtera	56 - 85 g/acre	
Valtera EZ	60 - 90 mL/acre	
Fierce	85 g/acre	
Fierce EZ	178 mL/acre	

Application information

Apply with ground equipment only. **Water volume:** Minimum 40 L/acre.

Application tips

Good growing conditions promote weed growth and enhance the activity of BlackHawk. Weeds hardened off by cold weather or drought stress may not be controlled. Insufficient water volumes or coarse sprays may also reduce control levels.

How it works

BlackHawk Herbicide is designed for use as a contact and systemic herbicide for broadleaf weed control. Pyraflufen-ethyl, a member of the phenyl pyrazole class of herbicides, inhibits the protoporphyrinogen oxidase (PPO) enzyme, which results in cell membrane destruction and necrosis. 2,4-D ester, a member of the phenoxy class of herbicides, mimics the plant growth regulator indol-3-acetic acid (auxin), interfering with cell enlargement and division as well as development in susceptible plants.

Expected results

Symptoms appear very rapidly (a few hours under bright conditions). Leaves of weeds take on a water-soaked appearance, followed by wilting and necrosis. Susceptible plants become malformed before they die. Complete death occurs within a few days.

Restrictions

Rainfall: Rainfast in 1 hour. **Grazing:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest or cut treated crops for forage until 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Re-cropping:** All crops can be seeded 30 days after an application of Blackhawk herbicide. **Re-entry interval:** 12 hours.

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Environmental precautions

Runoff: Avoid application when heavy rain is forecast or to areas with steep slopes and/or compacted clay soils.

Toxicity

Acute oral LD_{50} (rats) = 565. Acute dermal LD_{50} (rats) = > 2000 mg/kg

Storage

Storage below 0°C will not impair the effectiveness of BlackHawk herbicide; however, if frozen, return to original state but allowing to warm to 10 to 20°C and agitate thoroughly before use.

Boa iQ

Group 1, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Boa iQ co-pack of: Boa (PCP# 33011) + Quiz (PCP# 33481)	NewAgco Inc	Bentazon 480 g/L	Solution	9.1 L, 455 L
		Quizalofop: 96 g/L	Emulsifiable concentrate	6 L, 150 L

Note: This product requires Assassin or Merge surfactant which is sold separately.

Crops, staging and rates

Crop	Staging	Rates
Dry beans	After the first trifoliate	Bentazon: 0.91 L/acre Quizalofop: 0.3 L/acre Assassin or Merge surfactant: 2 L/1000 L of water
Faba bean	A least 10 cm tall or after the 2 - 3 leaf stage	
Field peas	3 node to flowering	
Soybean	All stages	

Weeds, rates and staging

Broadleaf weed: 2 - 4 inches unless stated otherwise. Rate is 0.91 L/acre

- bird rape
- buttercup
- cleavers (1.5 - 3 inch)
- cocklebur (7 - 12 inch)
- chickweed (1 - 3 weeks post emergence)
- common groundsel
- common ragweed (1 - 2 inch)
- corn spurry
- giant ragweed (2 - 6 inch)
- jimsonweed (2 - 6 inch)
- lady's-thumb (3 - 8inch)
- lamb's-quarter (0.5 - 1 inch)
- low cudweed (1 - 2 inch)
- purslane (1 - 2 inch)
- redroot pigweed[1]
- Russian thistle (1 - 3 inch)
- shepherd's-purse (4 - 10 inch)
- stinkweed (2 - 6 inch)
- volunteer canola (1 - 6 inch)
- wild mustard (5 -10 inch)
- wild radish (1 - 2 inch)

Grassy weeds: 2 leaf to early tillering unless otherwise noted. Rate of Quiz - 0.3 L/acre

- barnyard grass
- green foxtail
- fall panicum
- foxtail barley (spring seedlings) maximum 3 - 4 leaf + 2 tillers)
- Japanese brome (spring seedlings 2 - 5 leaf)
- old witchgrass
- proso millet
- quackgrass (spring seedlings, 2 - 6 leaf)
- wild oats (1 - 5 leaf, up to 2 tillers)
- volunteer cereals
- volunteer corn (2 - 6 leaf)
- yellow foxtail

Note: Weeds must be small and actively growing to be controlled.
[1] Group 2 resistant grassy weeds will not be controlled.

Application information

Water volume: Minimum 10 gallons/acre (40 L/acre).

Application tips

Optimal control occurs when weeds are actively growing. Do not apply to crops that have been stressed as crop injury may result.

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Boa iQ (cont'd)

How it works
Bentazon component is a contact herbicide that interferes with photosynthesis, Quizalofop component is a systemic herbicide that is absorbed and translocates to the root system and growing points.

Expected results
Weeds initially discolour and turn brown within several weeks, depending on conditions.Temperatures below 5°C will prevent optimum herbicide performance. Poor broadleaf control can occur if weeds are past the 4-leaf stage or if spray coverage and/or crop competition is poor.

Restrictions
Rainfall: Rainfall within 6 hours may reduce activity. **Grazing:** Do not graze treated fields or cut treated forage for silage or hay. There is no data to support this use. **Re-cropping:** All crops may be grown the year following application.

Environmental precautions
Bentazon component is toxic to non-target terrestrial plants and to aquatic organisms, including fish. DO NOT apply directly to freshwater habitats. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Leave a 15-metre buffer between treated areas and sensitive habitats. **Leaching:** The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) or the water table is shallow. **Re-entry interval:** 12 hours

Toxicity
Bentazon: Acute oral LD_{50} (rats) = 2,063 mg/kg. Quizalofop: Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in heated storage; if product is frozen, warm to room temperature and agitate prior to use.

Broadband

Group 1, 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Broadband (PCP# 29138)	Syngenta	Pinoxaden: 92.7 g/L + florasulam: 7.7 g/L	Emulsifiable concentrate	10.53 L, 84.24 L
Adigor (adjuvant) (PCP# 28151)		48.8% rapeseed oil + 28.2% alcohol	Liquid	11.3 L, 90.4 L

Crops and staging
Apply to barley and spring wheat (excluding durum) from 1-leaf to flag leaf stage.

Weeds, rates and staging
Rate: Broadband: 263 mL/acre + Adigor adjuvant: 283 mL/acre.

Grassy weeds: 1 - 6 leaf stage prior to 4th tiller.

- barnyard grass
- green foxtail
- proso millet
- volunteer oats
- volunteer canarygrass
- wild oats
- yellow foxtail

Broadleaf weeds: 1 - 6 leaf stage.

- annual sow thistle (suppression)
- cleavers
- common chickweed
- hemp-nettle (suppression)
- lady's-thumb
- perennial sow thistle (suppression)*
- red-root pigweed (suppression)
- shepherd's-purse
- smartweed
- stinkweed
- wild buckwheat
- wild mustard
- volunteer canola (except Group 2 tolerant canola)

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MCPA Ester or Curtail M tank mix to Broadband will control Group 2 tolerant Canola. * Applications made at advanced leaf stages will reduce product effectiveness.

Registered tank mixes

Tank mix products	Crop	Rate of broadband	Notes and additional weeds controlled
MCPA ester 600: 236 mL/acre	Spring wheat (excluding durum) and barley	Broadband: 263 mL/acre	Lamb's-quarter, ball mustard, common ragweed, hemp-nettle, Canada thistle (top growth control), stork's-bill, flixweed, burdock, Russian thistle, prickly lettuce, dandelion (suppression)
Curtail M: 606 mL/acre			All of the above plus control of Canada thistle and annual and perennial sowthistle
Tilt: 250 - 500 mL/acre			

Application information

How to apply: Ground only. Do not apply by air. **Water volume:** 20 - 40 L/acre.

Application tips

For optimum results, apply Broadband herbicide to actively growing weeds. Weeds emerging after application of Broadband will not be controlled. Do not apply to crops stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it works

Broadband herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems of target weeds. It must be applied early post emergence to the main flush of actively growing annual broadleaf and grass weeds. Thorough coverage of the plants is essential for consistent control.

Expected results

Broadband is a systemic, post-emergence herbicide. Broadband herbicide stops growth of susceptible weeds rapidly. Actively growing, susceptible grass and broadleaf weeds stop growing within 48 hours of treatment.
However, typical symptoms (discolouration) of dying broadleaf weeds may not be noticeable for 1 to 2 weeks after application. Depending on species, growing conditions and crop competition, leaves and growing points of annual grass weeds turn yellow within 1 to 3 weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control 3 to 5 weeks after application.

Restrictions

Rainfall: Broadband alone can be used 1 hour before rainfall. **Grazing:** Wait a minimum of 7 days before grazing livestock on treated crops. **Pre-harvest intervals:** Observe minimum interval to harvest of 60 days after treatment for grain and straw and of 30 days after treatment for hay. **Re-cropping:** On fields sprayed with Broadband, no crop may be seeded until the following year. There are no crop rotation limitations the year following application of Broadband. **Re-entry interval:** 12 hours.

Environmental precautions

The active ingredient, pinoxaden, is non-toxic to birds and insects (bees) and slightly toxic to aquatic organisms. The active ingredient, florasulam, is practically non-toxic to insects (bees), aquatic invertebrates (water flea), fish, and is non-toxic to slightly toxic to birds. Avoid contamination of water supplies or aquatic habitats.

Toxicity

Acute oral: LD_{50} (rats) = 3,129 mg/kg.

Storage

Heated storage required. Store the product in closed, original container in a well ventilated room.

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Buctril®M Herbicide/Logic M/Mextrol 450/ Badge/Canuck

Group 4, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Buctril®M (PCP# 18022)	Bayer	Bromoxynil: 280 g/L + MCPA: 280 g/L	Emulsifiable concentrate	8 L, 128 L, 400 L
Logic M (PCP# 28109)	IPCO	Bromoxynil: 225 g/L + MCPA: 225 g/L		10 L, 115 L
Mextrol 450 (PCP# 26999)	Nufarm Agriculture	Bromoxynil: 225 g/L + MCPA: 225 g/L		10 L, 100 L, 500 L
Badge (PCP# 16164)	ADAMA Canada	Bromoxynil: 225 g/L + MCPA: 225 g/L	Emulsifiable concentrate	10 L, 120 L
Canuck (PCP # 34173)	NewAgco Inc	Bromoxynil: 280 g/L + MCPA: 280 g/L		8 L, 120 L, 384 L

Crops, staging and rates

Rates: Buctril M/Canuck: 0.4 L/acre. Logic M, Mextrol 450, Badge: 0.5 L/acre.

Crop	Staging
Field crops	
Barley, oats, spring wheat including durum	2-leaf to early flag leaf
Winter wheat - fall or spring applied	2 - 4 leaf stage in the fall or from the time growth commences to the early flag leaf stage in the spring
Fall rye	When growth commences to the early flag leaf stage in the spring
Perennial cereal rye*	Seedling: 2 - 4 leaf stage in the fall or from the time growth commences to the early flag leaf stage in the spring. Established: 2-leaf until early flag leaf stage
Canary seed	3 - 5 leaf stage
Flax (including low linolenic acid varieties)	5 cm high up to the early flower bud stage. Best tolerance occurs when flax is 5 - 10 cm high
Corn	4 - 6 leaf stage
Seedling forage grasses (seed production)	
Bromegrass, creeping red fescue, crested wheatgrass, intermediate wheatgrass meadow fescue, meadow foxtail, orchard grass, reed canarygrass, Russian wild rye, slender wheatgrass, tall fescue, tall wheatgrass, timothy, meadow bromegrass, streamback wheatgrass	2 - 4 leaf stage
Established grasses (not underseeded to legumes)	
Timothy (for seed or hay)	3 - 6 leaf stage

* Application onto perennial cereal rye registered with Buctril M only. Agracity supports the following tank mixes: Aurora/Horizon, HellCat/Puma, Everest, MPower RX, Axial, and Simplicity. Independence/Select on flax only.

Weeds, rates and staging

Seedling to 4-leaf.

American nightshade
ball mustard
bluebur
cocklebur
cow cockle*
flixweed
green smartweed
kochia**
jimsonweed
lady's-thumb
night flowering catchfly
pale smartweed
redroot pigweed
Russian thistle**
scentless chamomile***
shepherd's-purse
volunteer canola
volunteer sunflower

Seedling to 6-leaf.

wild tomato

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Seedling to 8-leaf.

common groundsel	common ragweed	stinkweed	wild buckwheat	wormseed mustard
common buckwheat	lamb's-quarter	tartary buckwheat	wild mustard	

Suppression

Canada thistle	perennial sow thistle	prickly lettuce†

* In normal conditions, cow cockle will be controlled up to the 4-leaf stage. Plants beyond this stage are unlikely to be controlled. ** Spray before plants are 5 cm high. *** Spring annuals only. † Prickly lettuce in winter wheat only, from the 2 - 12 leaf stage

Registered tank mixes

Not all tank mixes are registered with all products. Check labels for registered mixes.

Tank mix partners	Crop	Buctril M, Logic M, Mextrol 450, Badge	Crop stage/comments
MCPA amine, ester, K-salt (222 mL/acre at 500 g A.I./L formulation)	Spring wheat (including durum*), barley and oats	400 mL/acre Buctril M; 500 mL/acre Logic M, Mextrol 450, Badge	2 leaf until the early flag leaf stage
Achieve Liquid (200 mL/acre)+ Turbocharge 0.5% v/v / Nufarm Tralkoxydim (200 mL/acre) + Nufarm Tralkoxydim adjuvant 0.5% v/v or Bison 400L (200 mL/acre) + 0.5% v/v Addit	Spring wheat (including durum) and barley	Same rate for all mixes	2 leaf until the early flag leaf stage
Ally (3 g/acre) + non-ionic surfactant (0.5%v/v)			
Puma Advance (206 - 412 mL/acre) or Bengal: 156 - 312 mL/acre with Badge: 156 - 312 mL/acre with Buctril M or Mextrol	Spring wheat (including durum) and barley	Same rate for all mixes	Wheat: 2 - 6 leaf stage plus 3 tillers Barley: 2 - 5 leaf stage plus 2 tillers
Puma Advance (412 mL/acre) + Refine SG 4 g/acre	Spring wheat (including durum) and barley	Same rate for all mixes	Wheat: 2 - 6 leaf stage plus 3 tillers Barley: 2 - 6 leaf stage plus 3 tillers
Refine SG 4 g/acre + non-ionic surfactant at 0.2% v/v	Spring wheat (including durum) and barley	Same rate for all mixes	2 leaf - early flag for crop
Everest (17 g/acre) + non-ionic surfactant 0.25% v/v)	Spring wheat, durum	Same rate for all mixes	2 - 4 leaf stage plus 2 tillers
Horizon (93 mL/acre) + Score (0.8% v/v) or Signal (93 mL/acre) + Nufarm Enhance (0.25% v/v) or Ladder (93 mL/acre + 0.25% v/v MANA 80 adjuvant)	Spring wheat, durum	Same rate for all mixes	2 flag leaf stage
Varro (200 mL/acre)	Spring wheat, durum	Buctril M 400 mL/acre	2 - 6 leaf stage plus 3 tillers but prior to jointing (presence of first node)
Axial (243 mL/acre) + Adigor (283 mL/acre) or Axial (480 mL/acre)	Spring wheat and barley	Same rate for all mixes	2 - 6 leaf stage prior to 4th tiller
Atrazine (450 - 900 mL/acre)	Corn	Same rate for all mixes	4 - 6 leaf stage
Select or Centurion (76 mL/acre)+ Amigo (500 mL/acre) or Arrow 240 EC (76 - 152 mL/acre) + X-Act (0.5 - 1% v/v)	Flax	Same rate for all mixes	5 - 10 cm high

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Tank mix partners	Crop	Buctril M, Logic M, Mextrol 450, Badge	Crop stage/comments
Poast Ultra (130 - 190 mL/acre) + Merge adjuvant (1 L/acre)	Flax	Same rate for all mixes	5 - 10 cm high

Bayer also supports mixes containing Buctril M and Traxos or Tilt or Sevin XLR which are not on the Buctril M label. Apply mixes according to the most restrictive use limitations for either product.

Application Information

How to apply: Ground and air (for wheat, barley and oats only). **Water volume:** Ground – 20 L/acre or more. Corn – 80 - 120 L/acre. Seedling grasses – 60 L/acre. Established timothy – 60 L/acre. Air – 8 L/acre or more.

Application tips

Avoid spraying during a severe drought. Under conditions of high temperature and humidity, slight discolouration of cereals may occur but no effect on crop yields. Flax is less tolerant than cereals. Therefore, do not spray flax in hot, humid weather when daytime temperatures are over 25 to 29°C. Best results are achieved when weeds are sprayed in seedling stage, with good spray coverage. Corn: Buctril M at 400 mL/acre (or Mextrol/Badge/Logic M at 500 mL/acre) as an overall spray only up to 6-leaf stage. Buctril M + Atrazine (or Mextrol/Badge/Logic M + Atrazine) for a broader spectrum of weed control. Cultivation after application is not recommended.

How it works

Bromoxynil is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. MCPA is absorbed through leaves and is readily translocated in the plant.

Expected results

Small burnt spots on the leaf can appear within hours; death takes up to 2 weeks. Poor results may be expected if poor coverage. Poor penetration through dense crop canopy.

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce weed control. **Grazing:** Do not graze or harvest for greenfeed until 30 days after treatment. **Pre-harvest intervals:** Do not cut treated crops for forage until 30 days after application. **Re-cropping**: No restrictions. **Re-entry interval:** 24 hours.

Environmental precautions

Buctril M/Badge/Logic M/Mextrol 450 contains a petroleum distillate, which is moderately to highly toxic to aquatic organisms. Observe buffer zones specified on the label under directions for use.

Toxicity

Acute oral LD_{50} (rabbit) = > 505 mg/kg.

Storage

Store the product in closed, original container in a well ventilated room.

Calmix Pellets

Group 4, 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Calmix Pellets (PCP# 9342)	Nufarm Agriculture Inc.	Bromacil: 3% + 2,4-D: 5%	Granules	5 kg

Crops: Non-crop areas. Do not use in residential areas or on driveways.

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Weeds controlled, rates and timing

Weeds	Rate per 100 m^2	Timing
Annual weeds and perennial seedlings	2.5 kg	May be applied during growing season, but to prevent growth, apply in fall or early spring
Shallow-rooted perennials	3.75 kg	
Heavy perennial growth	4.5 kg	
Spot treatment	37.5 g/$metre^2$	
Spot treatment around power poles	Treat at 225 g for 1.25 m around each pole (approximately 5 $metres^2$)	

Application information
How to apply: With Calmix spreader or shaker. Do not apply by hand. Do not apply by air.

Application tips
Do not use near lawns or flower beds. Do not apply closer than 1.5 times the height of desirable trees, ornamentals or plants. Roots from large trees may extend well beyond the height of the tree and may extend beneath areas to be treated. Be cautious where trees are in close proximity to the treatment site. Do not apply on slopes where water erosion may carry chemical onto areas of desirable vegetation. Do not contaminate water used for irrigation or other domestic uses.

How it works
Systemic action, enters plant via roots.

Expected results
Vegetation turns brown and dies. No new growth will appear, resulting in bare ground. Rapidity and duration of control will depend on amount of chemical applied, soil type and environmental conditions. Poor results may be expected if inadequate application rates, soil erosion removes chemical from treated area when applied on slopes or insufficient rainfall to activate chemical.

Restrictions
Rainfall: Moisture will activate and carry the herbicide into the root zone. **Movement in soil:** Once fixed in the soil, there is very little lateral movement. Pellets and granular can be carried by erosion.

Environmental precautions
Toxic to small mammals, birds, aquatic organisms and terrestrial plants. This product will harm broadleaved and grass plants in the vicinity of the treatment area. Do not apply to exposed roots of trees and ornamentals.
Leaching: This product may leach in coarse textured soils or where there is a high water table.

Toxicity
Bromacil: Acute oral LD_{50} (rats) = 1,650 mg/kg. 2,4-D: Acute oral LD_{50} (rats) = 699 mg/kg.

Storage
Store in dry areas.

Casoron G-4

Group 20

Formulation

Product	Company	Active ingredient	Formulation	Container size
Casoron (PCP# 12533)	UPL AgroSolutions	Dichlobenil: 4%	Granules	22.7 kg

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Casoron G-4 (cont'd)

Crops, staging and rates

Rate: Annual weeds – 45 - 71 kg/acre. Quackgrass, artemisia in woody ornamentals – 60 kg/acre in fall; 60 kg/acre again in spring. Quackgrass, thistles, bindweed in woody ornamentals – 91 - 111 kg/acre. Saskatoon berries, raspberries – 45 - 71 kg/acre.

Shelterbelts, windbreaks and hedgerows consisting of the following.

arborvitae	elm	holly (Ilex spp. with	mock orange
ash	euonymus (burning bush)	exceptions)	poplars
barberry	fruit bearing trees (established:	juniper	rhododendron
birch (cutleaf-weeping)	at least 1 year old)	lilac	rose
boxwood	forsythia sp	linden	spirea
caragana	heather	locust	willow
cedar (eastern red, white)	honeysuckle	maple	yew
crabapple			

Note: Do not use on shelterbelts consisting of mugo pine, fir, hemlock and spruce. Do not use in or near greenhouses. Do not use on light sandy soil.

Weeds and staging

Annuals: Apply to well prepared, weed-free soil in early spring or late fall before annual weed seeds have germinated. If annual weeds have started to germinate before application, cultivate to remove them. Do not apply until 4 weeks after transplanting any crop.

annual bluegrass	foxtail	lamb's-quarter	rhododendron
artemisia*	groundsel	maple	shepherd's-purse
barberry	holly (Ilex spp. with	mustard	smartweeds
bindweed*	exceptions)	pigweed	sow thistle
Canada thistle*	horsetail	plantain	spurge
chickweed	knotweed	purple loosestrife	vetch*
dandelion*	kochia	purslane	wild buckwheat*
		quackgrass*	yew

* Controlled with higher rates with late fall application.

Perennials: Apply in fall (October 15 until soil freeze-up) on crops established for at least 1 year.

Note: Quackgrass and artemisia in established woody ornamentals: apply in fall and again in the early spring before May 1.

Raspberries: Apply in late fall but before soil freeze-up. Do not cultivate or work into the soil. Do not apply in spring as injury may occur.

Registered tank mixes

None.

Application information

Casoron can be spread on the soil surface by hand, using small hand-held or backpack equipment, or by larger and tractor-mounted spreaders. Do not apply by air.

Application tips

Do not apply until 4 weeks after transplanting any crop. Casoron should be applied when the soil temperature is cool. Air temperatures should be less than 15°C. Applying at higher temperatures may reduce its herbicidal activity. Casoron will stay in the upper 10 cm of soil and will not harm established plants with a well developed root system below this herbicide barrier. Do not use in seedbeds, transplant, or cutting beds or in greenhouses. Do not apply until 6 months after rooting of cuttings in the field.

How it works

Casoron inhibits cell growth at the growing points or meristematic tissues of the plant. Weed germination and growth initiation are strongly affected. Water is necessary to move the compound into the soil. Snowmelt or rain after the application moves Casoron into the soil. Casoron inhibits germination but acts primarily on growing points and root tips.

Expected results

Growth of emerging shoots of some perennials controlled. Tolerant crops are unaffected if roots do not come in contact with Casoron in the upper layers of the soil.

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Restrictions

Grazing: Do not graze livestock in treated areas or use treated crops for forage or fodder; sufficient data are not available to support such use. **Horticultural/nursery use:** Re-entry interval: 24 hours. **Re-cropping:** Do not plant vegetables or other sensitive crops the year following soil treatment. **Re-entry interval:** 12 hours.

Environmental precautions

Casoron is toxic to aquatic organisms and slightly toxic to fish. Avoid contamination of aquatic systems during application.

Toxicity

Acute oral LD_{50} (rats) = 2,000 mg/kg.

Storage

Dry storage - not affected by frost.

Certitude

Group 6, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Certitude A (PCP# 33908)	BASF Canada	Topramezone: 336 g/L	Suspension	291 mL
Certitude B (PCP# 33893)		Bromoxynil: 235 g/L	Emulsifiable Concentrate	9.71 L
Merge (PCP# 24702)		Surfactant blend: 50%		8.1 L

Crops, staging and rates

Crop	Stage	Rates	
		Certitude A	Certitude B
Canola	Pre-seed	7 mL/acre	243 mL/acre

Merge (included in the case) is required at 200 mL/acre with Certitude.

Weeds and staging

Broadleaf weeds (up to 4-leaf except where indicated):

- chickweed[1]
- cleavers[1]
- flixweed[1]
- hempnettle[1]
- kochia[2] (up to 10 cm in height)
- lady's-thumb[1]
- lamb's-quarter[1] (up to 15 cm in height)
- narrow-leaved hawk's-beard[1]
- redroot pigweed[1]
- Russian thistle[1]
- stinkweed[1]
- volunteer canola[3] (cotyledon to 6-leaf)
- volunteer flax[1]
- wild buckwheat[1]
- wild mustard[1]

Grassy weeds (up to 4-leaf):

- barnyard grass[1]
- downy brome[1]
- green foxtail[1]
- volunteer barley[1]
- volunteer wheat[1]
- wild oats[1]

[1]When tank mixed with glyphosate. [2]Controls all resistant biotypes; [3]Controls all herbicide tolerant biotypes.

Registered tank mixes

Certitude must be tank mixed with glyphosate at 0.5 - 1 L/acre of 360 g/L equivalent.

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Certitude (cont'd)

Application information
How to apply: Ground application only. Do not apply by air. **Water volume:** 20 - 40 L/acre.

Mixing Instructions
Add products to the spray tank in the following order: Certitude A, Certitude B, Glyphosate, Merge.

Application Tips
Do not spray if temperatures of 5ºC or lower are forecast within 3 days of application. Apply during warm weather when weeds are actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of some weeds may be reduced.

How it works
Topramezone is absorbed through foliage and is translocated to the meristematic regions. It inhibits the HPPD enzyme causing bleaching of leaves. Bromoxynil inhibits respiration and photosynthesis causing plant death.

Expected results
Rapid bleaching and necrosis of leaves within days. Plant death will occur up to 14 days after application.

Restrictions
Rainfall: Rainfall within 1 hour will reduce control. **Grazing:** Do not feed treated canola grain to livestock. **Re-cropping:** Winter wheat can be seeded 4 months after application. Alfalfa, barley, canola, field corn, field pea, lentils, navy (white) bean, potato, soybean, spring wheat (including durum) can be seeded 1 year after application. **Pre-harvest intervals:** There is no required pre-harvest interval between a pre-seed application of Certitude and the harvest of canola. **Re-entry interval:** 24 hours.

Environmental precautions
Avoid spraying in situations where drift may occur. Bromoxynil is moderately to highly toxic to aquatic organisms and non-target terrestrial plants. Avoid contamination of aquatic systems during application.

Toxicity
Topramezone: Acute oral LD_{50} (rats) >2,000 mg/kg. Bromoxynil: Acute oral LD_{50} (rats) = 368 mg/kg.

Storage
Store in a cool, dry place. Certitude B formulations will solidify at temperatures below -20ºC, but will be usable again at temperatures above 0ºC.

Cirpreme XC

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cirpreme A (PCP# 34180)	Corteva Agriscience	Halauxifen: 20% Florasulam: 20%	Wettable granule	0.8 kg
Lontrel XC (PCP# 32795)		Clopyralid: 600 g/L	Solution	4.1 L

Crops, staging and rates

Crop	Stage	Rates
Wheat (including durum), winter wheat and barley	3-leaf stage to just prior to flag	Cirpreme XC: Paradigm: 10 g/acre + Lontrel XC: 51 mL/acre

1 case treats 80 acres.

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Weeds and staging

Weeds controlled from the 1 - 8 leaf stage unless otherwise specified by the Cirpreme label. Weeds controlled or suppressed by Cirpreme XC + MCPA Ester 600 at 234 mL/acre from the 1 - 8 leaf, unless otherwise specified.

alfalfa, volunteer (up to 25 cm in height)
American dragonhead
barnyardgrass (up to 5-leaf)
wild buckwheat
burdock
volunteer canola
chickweed*
cleavers (1 - 9 whorl stage)
cocklebur
cow cockle
dandelion (seedlings, overwintered rosettes and mature plants)
field horsetail*
volunteer flax
Canada fleabane (up to 15 cm high)****
flixweed
hemp-nettle
henbit
kochia (light to moderate infestations)*
lamb's-quarter
ball mustard***
wild mustard***
narrow-leaved hawk's-beard (up to the bud stage)
night-flowering catchfly (to bolting and 15 cm high)*
pigweed, redroot
plantain (top growth)
prickly lettuce
wild radish
common ragweed (up to 6-leaf stage)****
round-leaved mallow (up to 6-leaf stage)
scentless chamomile* (up to bud)
shepherd's-purse (up to bolting and 20 cm high)
annual smartweed (green smartweed, lady's thumb)
annual sow thistle (up to 4-leaf stage)
perrenial sow thistle* (up to the bolting stage and 20 cm high)
stinkweed***
stork's-bill (up to the 8-leaf stage)
annual sunflower
volunteer sunflower
Canada thistle* (up to the bud stage)
vetch
white cockle* (spring seedlings and overwintered plants up to the bud stage)

* Suppressed. ** Light to moderate infestations (up to 150 plants/m2; up to 15 cm high), including Group 2 resistant biotypes.
*** Best results are obtained when applied to actively growing weeds in the 1 - 4 leaf (seedling) stage. **** Including Group 2 and 9 resistant biotypes.

Registered tank mixes

The use of MCPA Ester at 189 - 234 mL/acre is recommended with Cirpreme.

Tank mix partners	Crop	Rate	Adjuvant and rate	Additional weeds controlled
MCPA Ester 600	Spring wheat, durum wheat, winter wheat, barley	189 - 234 mL/acre		Group 2 tolerant canola, common broadleaf weeds listed on the MCPA label at corresponding rate
Simplicity GoDri	Spring wheat, durum wheat, winter wheat	28 g/acre	Agral 90 at 0.25% v/v or another recommended surfactant required. When adding MCPA or 2,4-D ester as a tank mix partner, replace Agral 90 with Bindem at 60 ml/acre	Wild oats, barnyard grass, Japanese brome, yellow foxtail, hemp-nettle, flixweed (up to 10 cm high), green foxtail, downy brome, night-flowering catchfly, white cockle (spring seedlings and overwintered plants up to the bud stage)
Simplicity	Spring wheat, durum wheat, winter wheat	200 mL/acre	Agral 90 at 0.25% v/v or recommended non-ionic surfactant. Agral 90 or Bindem is not required when adding MCPA or 2,4-D as a tank mix with Cirpreme XC	Wild oats, barnyard grass, Japanese brome, yellow foxtail, hemp-nettle, flixweed, green foxtail, downy brome
Axial	Spring wheat, spring barley	485 mL/acre	Do not exceed 189 mL/acre MCPA tank mix with Axial	Wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed, proso millet
Sierra	Spring wheat, durum wheat	14.6 - 29.1 mL/acre	Ag-Surf or Agral 90 at 0.25% v/v	Wild oats, green foxtail, volunteer tame oats

Corteva Agriscience supports Cirpreme XC with Axial Xtreme. If adding MCPA Ester 600, do not exceed 189 mL/acre. Apply according to the most restrictive use limitation for either product.

Application information

How to apply: Ground application only. **Water volume:** 40 L/acre.

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Cirpreme XC (cont'd)

Apply when weeds are actively growing. Only weeds emerged at the time of treatment will be controlled. Best results are obtained from applications made to seedling weeds. Read and observe all label directions when applied as a tank mix combination. Cirpreme is a selective post-emergent herbicide for control of hard-to-kill annual broadleaf weeds and selected perennial weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of Cirpreme by allowing for maximum foliar uptake and systemic movement of the herbicide.

How it works

Cirpreme is a mixture of a systemic auxin herbicide (Group 4) and an ALS enzyme inhibitor herbicide (Group 2). The product controls weeds by disrupting normal plant growth patterns and/or by inhibiting the production of the enzymes essential for the production of certain amino acids for plant growth.

Expected results

Weeds start to twist between 2 to 20 days after spraying, depending on weather conditions, rate of growth, moisture and the weeds being targeted by this herbicide application. Symptoms include twisting, bending and yellowing, with weeds turning brown, resulting in plant mortality.

Restrictions

Rainfall: Avoid application if rainfall is forecast with 4 hours. **Grazing:** Livestock may be grazed on treated crops 7 days following application. **Re-entry interval:** 12 hours. **Pre-harvest intervals:** Do not harvest the treated crop for 60 days after application. **Re-cropping:** Fields previously treated with Cirpreme after a period of 10 months can be seeded to wheat, spring barley, canola, flax, mustard, field pea*, or fields can be summerfallowed. *Field pea is at risk of injury under severe dry conditions (<175 mm of rain over year). Do not seed to crops other than those listed above in the calendar year following treatment. Consult manufacturer for rotations on crops not listed.
Re-entry interval: 12 hours.

Environmental precautions

A 1 metre buffer zone is required between treated area, terrestrial and water habits. Do not allow spray drift to come in contact with sensitive broadleaf crops. Spray when the wind velocity is 15 km/hr or less.

Toxicity

Paradigm: Acute oral LD_{50} > 5,000 mg/kg. Lontrel: Acute oral LD_{50} = > 2000 mg/kg. LD_{50} > 2,000 mg/kg.

Storage

Store in the original containers in secure, dry, well ventilated storage. Store in heated storage. If product is frozen, bring to room temperature and agitate before use.

Cirray™ Herbicide

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cirray (PCP # 34306)	Bayer	Pinoxaden: 50 g/L Fenoxaprop-p-ethyl: 50 g/L	Emulsifiable concentrate	6.48 L, 103.6 L

Crops, staging and rates

Crop	Stage	Rate per acre
Spring Wheat	1 leaf to 6 leaves on the main stem plus 3 tillers	323 mL
Spring Barley	1 leaf to 6 leaves on the main stem plus 3 tillers	323 mL

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Weeds controlled

barnyard grass
green foxtail
persian darnel
wild oats
yellow foxtail

Registered tank mixes

See label for tank-mix partner prior to mixing.

Herbicides :
Post-Emergent:

2,4-D Ester LV 700
Ally®
Buctril® M[1] (2 to 6 leaf stage plus 1 to 3 tillers)
Dyvel
Dyvel DSP Liquid
Infinity® Herbicide[3] (1 leaf to 6 leaf plus 1 to 3 tillers)
Lontrel 360
Lontrel 360 + MCPA Ester 5009
MCPA Amine 500
MCPA Ester1
Mecoprop®-P (150 g ae/L)[4]
Mextrol 450[1]
Pixxaro™ A Herbicide
Pixxaro™ A Herbicide + MCPA Ester
Prestige XC
Refine SG Herbicide
Refine SG Herbicide + Buctril M
Refine SG Herbicide + MCPA Ester[1,2]
Refine SG Toss-n-GO® Herbicide
Refine SG Toss-n-Go Herbicide + MCPA Ester[1,2]
Spectrum™ Herbicide Tank Mix[1,2]
StellarTM A Herbicide
Stellar A + Stellar B (2 to 6 leaf stage)
Thumper®
TILT® 250E Fungicide
Trophy®[1]

[1] A reduction in barnyard grass control may be observed with this tank mix. [2] Suppression only of green foxtail. [3] For control of common ragweed and suppression of round-leaved mallow. [4] A reduction in wild oat control may be observed when applied in a tank mixture with Mecoprop.

Application information

How to apply: Ground or aerial application. **Water volume:** Ground – 20 L/acre. Air – 12 L/acre.

Mixing instructions

Fill spray tank half-way. Start agitation or bypass system. If a broadleaf herbicide is to be used, add it first and agitate for 2 to 3 minutes then add Cirray Herbicide and agitate again for 2 to 3 minutes. Add the remaining amount of water and maintain constant agitation. After any break in spraying operations, agitate thoroughly before spraying again. Use the spray suspension as soon as it is prepared.

Application tips

Should be applied to actively growing weeds. An early application will maximize crop yields by reducing weed competition. Thorough coverage of the plants is essential for consistent control. Do not apply to crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it works

Cirray Herbicide is a systemic, post-emergence herbicide which is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems.

Expected results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within one to three weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and control three to five weeks after application. Weeds emerging after application will not be controlled. Weed control can be reduced or delayed under stress conditions such as drought, heat, or insufficient fertility, flooding, or prolonged cool temperatures. Grass escapes or re-tillering may occur if application is made during prolonged stress conditions. Optimum weed control will be obtained if application is delayed until the stress conditions have ended and weeds are once again actively growing.

Restrictions

Rainfall: Rainfast in 1 hour. **Grazing:** Observe a minimum of 30 days before grazing livestock. **Re-cropping:** There are no crop rotation limitations the year following application. **Pre-harvest Intervals:** 65 days. **Re-entry interval:** 12 hours.

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Cirray™ Herbicide (cont'd)

Environmental precautions

Toxic to non-target terrestrial plants and aquatic organisms. Observe spray buffer zones on label. Minimize spray drift to reduce harmful effects on beneficial arthropods in habitats next to application site such as hedgerows and woodland. Avoid runoff risk under conditions of heavy rainfall, moderate to steep slope, bare soil, poorly draining soil. The use of this chemical may result in groundwater contamination, particularly in areas where soils are permeable and/or the depth to the water table is shallow. Avoid application when heavy rain is forecast.

Toxicity

Oral LD_{50} (female Rat) = >5,000 mg/kg. Dermal LD_{50} = > 5,000 mg/kg.

Storage

Store this product away from food or feed in a cool, dry, well ventilated area. Keep away from fire or open flame, or other sources of heat. If frozen, allow to thaw and agitate thoroughly prior to use.

Clever/Ingenious/Facet L

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Clever (PCP# 31365)	Farmer's Business Network	Quinclorac: 75%	Dry flowable	1 kg
Ingenious (PCP# 32213)	United Agri Products	Quinclorac 75%	Dry flowable	1 kg
Facet L* (PCP# 31539)	BASF Canada	Quinclorac: 180 g/L	Solution	9.07 L

* Facet L must be applied with Merge (0.5% v/v) or Amigo (0.5% v/v) when applied alone or mixed with Centurion.

Crops, staging and rates

Crop	Stage	Rates – Clever, Ingenious (Facet L in brackets)
Wheat (spring and durum)	1 - 5 leaf	54.6 - 66.8 g/acre (227 - 279 mL/acre)
Barley* **	1 - 4 leaf, prior to tillering	54.6 - 66.8* g/acre (227 mL/acre)
Canary seed**	3 - 5 leaf	54.6 - 66.8 g/acre (227 - 279 mL/acre)
Canola (conventional, Liberty Link, Roundup Ready, Clearfield)	Preseed/pre-emerge – **Facet L only**	(227 - 279 mL/acre)
	2 – 6 leaf (Facet L – emerge – 6 leaf)	54.6 g/acre (113 - 227 mL/acre)
Group 2 tolerant canola quality *Brassica juncea*	2 - 6 leaf	54.6 g/acre (Facet L not registered for use on *Brassica juncea* or brown and oriental mustard)
Brown and oriental tame mustard	2 - 6 leaf	

* Use only 54.6 g/acre rate on barley. ** Canary seed treated with Clever DF is not to be used for human consumption or fed to livestock. ***Barley treated with Clever DF is not to be used for human consumption.

Weeds, rates and staging

Weeds	Leaf stage	Rate per acre
Green foxtail	1 - 5 leaf (max 2 tillers)	54.6 - 66.8* g/acre
Volunteer flax	1 - 8 cm	54.6 - 66.8 g/acre
Cleavers	1 - 3 whorls (1 - 6 whorls Facet L + Liberty)	54.6 - 66.8 g/acre
Barnyard grass	1 - 5 leaf	54.6 - 66.8 g/acre
Annual sow thistle**	2 - 6 leaf	54.6 g/acre
Perennial sow thistle**	2 - 6 leaf	54.6 g/acre

* Use the 54.6 g/acre rate for lighter infestations of green foxtail. Use the higher rate of 66.8 g/acre Clever, Ingenious, 227 mL/acre of Facet L for control of heavier infestations of green foxtail. ** Suppression.

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Registered tank mixes (Clever, Ingenious)

Tank mix partner	Tank mix partner rate	Remarks
Buctril M	400 mL/acre	Spring wheat, durum: 2 - 5 leaf stage
2,4-D Amine (assume 500 series)	340 - 445 mL/acre	Spring wheat, durum: 3 - 5 leaf stage
2,4-D Ester (assume 500 series)	340 - 445 mL/acre	Spring wheat, durum: 4 - 5 leaf stage
MCPA Amine (assume 500 series)	340 - 445 mL/acre	Spring wheat, durum: 3 - 5 leaf stage
MCPA Ester (assume 500 series)	340 - 445 mL/acre	Spring wheat, durum: 3 - 5 leaf stage
Refine Extra	8 g/acre	Spring wheat, durum: 2 - 5 leaf stage
Express Pack (Express + 2,4-D)	4 g/acre + 253 mL/acre	Spring wheat, durum: 3 - 5 leaf stage
Canola Mixes Facet L only		
Liberty 150 SN + Centurion (Liberty link canola only)	Facet L: 113 mL/acre + Liberty: 1.35 L/acre + Centurion: 50 - 75 mL/acre	Cleavers control 1 - 6 whorl. See Liberty and Centurion labels
Glyphosate (glyphosate tolerant canola only)	Facet L: 170 - 226 mL/acre + glyphosate: 0.5 - 1 L/acre (360 g/L equivalent)	See glyphosate label
Ares SN (Group 2 tolerant canola only)	Facet L: 170 - 226 mL/acre + Ares SN: 244 mL/acre	See Ares SN label

Improved cleaver control (1 - 3 whorls) in canola can be achieved with a rate of 25 g/acre of quinclorac mixed with Liberty 150 SN on Liberty Link canola or with glyphosate products on Roundup Ready canola.. Check label for details.

Application information

Water volume: Minimum 41 L/acre. **How to apply:** Ground application only. Use sprayers equipped with standard flat fan pesticide nozzles with a spray volume of 41 L/acre at a constant pressure of 275 to 425 kPa.
Tilt spray nozzles 45 degrees forward to ensure better coverage. The use of 50 mesh strainers and screens is recommended. Always use Merge adjuvant at 0.5% v/v for optimum performance.

Mixing instructions: Use mixing instructions "b" on page 15.

Application tips

Apply Clever/ngenious/Facet L when weeds are small and actively growing. Early treatment of weeds with Clever/Ingenious/Facet L is important to maximize crop yield potential through elimination of early weed competition. Some initial crop injury may be observed after application, but this injury is usually outgrown and should not affect crop yield

How it works

Uptake into the plant occurs through both the foliage and root system as the herbicide is mainly systemic. Visual symptoms of weed control may take up to 2 weeks following application to develop. These symptoms include initial twisting to stunting, reddening and chlorosis about 14 days followed by necrosis and death about 21 days after application as characteristic auxin-like symptoms in broadleaf species.

Expected results

DO NOT apply to crop that is under stress from conditions such as frost, hail, flooding, drought or extremes in temperature. Cool weather or drought may delay weed control and if prolonged may result in poor weed control.

Restrictions

Rainfall: Rainfall within 6 hours may reduce control. DO NOT apply Clever/Ingenious/Facet L to any field more often than every second year. This practice must be respected to avoid potential injury to future rotational crops, to minimize the potential for carryover and accumulation of soil residues and to reduce the selection pressure that could contribute to the development of resistant biotypes. **Pre-harvest intervals:** Pre-harvest canola and Group 2 tolerant canola quality Brassica juncea and tame mustard (brown and oriental) 60 days. Pre-harvest wheat, canaryseed and durum – 77 days. Barley – 80 days.

Re-cropping: Barley, canola and wheat, including durum, can be re-planted in the same season as quinclorac is used. Oat (Facet L only), field pea, sunflower, flax and lentil – 10-month re-cropping interval and may be grown the

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year after application. Oat (Clever, Quiclorac, Ingenious) – 12-month re-cropping interval. On lighter soils with low organic matter or under dry conditions, some crop injury may occur, particularly in flax and lentil, but will not reduce yield. Under these conditions, the minimum re-cropping interval for flax and lentil should be extended by 22 months. In case of crop failure, only barley, canola or spring wheat (including durum) may be re-seeded the same year. The company recommends that a field bioassay be conducted the year before growing any crops other than those listed.
Re-entry interval: 12 hours.

Environmental precautions

Do not apply quinclorac when weather conditions may cause spray drift from treated areas to adjacent crops. Certain crops such as alfalfa, clover species, faba bean, flax, lentil, ornamentals, potato and vegetables will be injured by spray drift.

Toxicity

Acute oral LD_{50} > 2,000 mg/kg.

Storage

May be frozen. Should product freeze, warm to room temperature before using.

Command 360 ME/Command Charge Herbicide/IPCO Clomazone

Group 13 / 13, 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Command 360 ME (PCP# 27827)	FMC of Canada Limited	Clomazone: 360 g/L	Micro-encapsulated suspension	5.4 L
Command Charge Herbicide co-pack of: Command Charge A (PCP# 33538) + Command Charge B (PCP# 33535)	FMC of Canada Limited	Clomazone: 360 g/L	Micro-encapsulated suspension	2 x 5.4 L
		Carfentrazone-ethyl: 240 g/L	Emulsifiable concentrate	2 x 1.2 L
IPCO Clomazone (PCP # 33910)	IPCO	Clomazone: 360 g/L	Micro-encapsulated suspension	10 L

Crops, staging and rates

Crop	Product	Staging	Rate
Herbicide-tolerant canola	**Command 360 ME/ IPCO Clomazone**	Prior to seeding	135 ml/acre for extended control of cleavers and suppression of common chickweed
	Command Charge Herbicide	Prior to seeding	Command Charge A - 135 ml/acre for extended control of cleavers and suppression of common chickweed Command Charge B - 30 ml/acre for burnoff control of labelled emerged weeds listed below
Mustard/camelina	**Command 360 ME**	Prior to seeding	101 mL/acre for early season suppression of cleavers and common chickweed
Mustard	**Command Charge**	Prior to seeding	Command Charge A - 101 mL/acre for early season suppression of cleavers and common chickweed Command Charge B - 30 ml/acre for burnoff control of labelled emerged weeds listed below

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Weeds, rates and staging

carpetweed
cocklebur
cleavers
Eastern black nightshade
flixweed
hairy nightshade
jimsonweed
kochia
lamb's-quarter
morning glory
pigweeds (prostrate, redroot, smooth, tumble)
Pennsylvania smartweed (seedling)
purslane
round-leaved mallow
Russian thistle (up to 5 cm)
shepherd's-purse
stinkweed
tansy mustard
velvetleaf
volunteer canola
waterhemp (tall, common)

Registered tank mixes

Tank mix partner	Product rate	Weeds Controlled
AIM EC Herbicide[1,2] (when tank mixed with Command 360 ME)	14.8 mL/acre - 47.4 mL/acre	Refer to Aim EC page for weeds controlled
glyphosate[3]	glyphosate acid equivalent at 0.5 -1.0 L/acre (360 g ae/L)	Refer to glyphosate label for additional weeds controlled

FMC supports the following tank mixes not on the Command label: Use most restrictive use limitations for either label. Preseed to all registered crops: Aim + IPCO Octagon Herbicide, Pardner® Herbicide, Nufarm Koril® 235 Liquid Herbicide, IPCO Brotex® 240 Liquid Herbicide, Bromotril 240 EC Herbicide, Bromotril II 240 EC Herbicide, IPCO Brotex® 480 Liquid Herbicide or IPCO Brotex® 4AT+ glyphosate. [1] When used as directed, tank mix will control listed weeds up to 10 cm high or as noted. [2] Tank mix of Command 360 ME with Aim (without glyphosate) must include Agral 90 or AgSurf at 0.25% v/v or Merge at 1% v/v. [3] If Command and Aim are mixed with glyphosate, no adjuvant is required.

For Command Charge, glyphosate is registered as a tank mix at 0.5 - 1 L/acre (360 g/L active equivalent). Weeds controlled are all the weeds above for Command Charge A & B plus those on the glyphosate label. No adjuvant is required for Command/Command Charge when mixed with glyphosate.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 40 L/acre.

Mixing instructions:

Use mixing instructions "a" on page 11.

Application tips

Temporary whitening and/or yellowing of the crop may occur when it emerges from treated soil. Do not make more than 1 application per season. Apply prior to seeding canola. Do not apply to sandy soils, soils with greater than 10% organic matter or fields receiving applications of solid manure unless it has been throughly incorporated to a depth of 10 - 15 cm. Do not exceed label recommended rates. Avoid overlaps or excessive application, which could cause crop and/or rotational injury. It is essential to get good plant coverage with Command Charge B. Command 360ME and Command Charge can only be applied once in a growing season

How it works

Clomazone is absorbed by roots and emerging shoots and transported in the xylem to foliage. It interferes with a specific energy pathway in the synthesis of chlorophyll. For Command Charge, the Command Charge B is rapidly absorbed by foliage and inhibits the PPO enzyme, which is involved in chlorophyll and heme synthesis. Cell membranes leak and rapid browning and death occurs.

Expected results

Moisture is necessary to activate the active ingredient clomazone in soil for weed control. Temporary whitening and/or yellowing of the crop may occur when it emerges from the treated soil.

Restrictions

Rotational Crop	Replant Interval (months)
Herbicide tolerant canola	0 months after
Winter wheat	4 months after application
Soybean, beans (white, kidney, snap), corn (field, sweet), pea, potato, canola, spring wheat, durum wheat, barley, oats, lentils	12 months after application
All other crops	16 months

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Carryover injury to rotational crops can occur under the following circumstances: exceeding label rates, over-application, soil with pH< or = 5.9, extreme dryness or drought conditions or choice of rotational crop hybrid. Do not apply when temperatures exceed 25ºC due to vapour drift risk. **Rainfall:** 5 to 10 mm of moisture is required at one time within 7 to 10 days for activation of herbicide for weed control in soil. Heavy rains after application may dilute active herbicide layer and reduce weed control. Dry conditions after application may reduce control. **Grazing:** Do not graze the treated crop or cut for feed. **Re-entry interval:** 12 hours.

Environmental precautions

Runoff: Low mobility in soils. **Leaching:** Leaching is not a problem. Broken down by soil bacteria. Use 90-metre buffers between sprayed area and sensitive terrestrial habitats. Do not spray within 370 metres of residential areas of towns/subdivisions or areas of established vegetable production, fruit production, commercial nurseries or greenhouses.

Toxicity

Acute oral LD_{50} (rats) > 5,000 mg/kg. Command Charge B: acute oral LD_{50} = 4077 mg/kg.

Storage

Keep in a dry, cool, well ventilated place. Store above 5˚C to prevent freezing.

Conquer II

Groups 14, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Conquer II (PCP# 32528)	Nufarm Agriculture	Pyraflufen-ethyl: 15 g/L Bromoxynil: 467 g/L	Emulsifiable concentrate	9.7 L, 77.7 L

Crops, Staging and Rates

Crop	Staging	Rate
Canola	Apply to emerged weeds pre-seed or post-seed, but prior to crop emergence. Applications can be made up to a maximum of 3 days after seeding*	121 - 242 mL/acre
Spring wheat, including durum, winter wheat, barley, fall rye, oats, triticale, corn, canaryseed		
Fallow land	Apply to small, actively growing weeds	

* Conquer II herbicide can be safely applied after seeding labelled crops. Do not apply if any crop has emerged as injury will result.

Weeds, rates and staging

Weeds controlled or suppressed with Conquer II alone

- annual sow thistle*
- cleavers
- cow cockle*
- dandelion*
- flixweed*
- kochia (including Group 2, 4, 5 and 9 resistant kochia)
- lamb's-quarter (including Group 2 and 5 resistant biotypes)
- narrow-leaved hawk's-beard*
- night-flowering catchfly (seedling)
- redroot pigweed - (including Group 2 and 5 resistant)
- stinkweed*
- volunteer canola – (including glyphosate, Liberty Link and Group 2 tolerant varieties.)
- wild buckwheat*
- wild mustard*

* Suppression only, control when mixed with the appropriate rate of glyphosate. Refer to the glyphosate label for rate recommendation.

Use up to 242 mL/acre to control volunteer canola beyond the 3-leaf stage.

Weeds controlled or suppressed with Conquer II in a tank mix with glyphosate

Grassy weeds: up to 8 cm in height unless otherwise noted

- downy brome[2] (up to 15 cm high)
- green foxtail[1]
- giant foxtail[1] (up to 15 cm high)
- Persian darnel[2] (up to 15 cm high)
- volunteer barley[1]
- volunteer wheat[1]
- wild oats[1]

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Broadleaf weeds: Up to 8 cm high unless otherwise noted

- annual sow thistle[2] (up to 15 cm tall)
- Canada fleabane[2]
- cleavers[2]
- common ragweed[2]
- eastern nightshade (up to 3-leaf)
- flixweed[3] (up to 15 cm tall)
- hempnettle[2] (up to 15 cm tall)
- kochia[2] (up to 15 cm tall)
- lady's-thumb[1]
- lamb's-quarter (up to 7.5 cm tall)
- morning glory (up to 3-leaf)
- narrow-leaved hawk's-beard[2]
- prickly lettuce[3] (up to 15 cm tall)
- redroot pigweed (up to 3-leaf)
- Russian thistle[2] (up to 15 cm tall)
- shepherd's-purse[3] (up to 15 cm tall)
- stinkweed[1]
- tall waterhemp (up to 5 cm)
- volunteer canola (all types cotyledon to 4-leaf)
- volunteer flax[2] (up to 15 cm tall)
- wild buckwheat[2] (1 - 4 leaf)
- wild mustard[1]

[1] Controlled with 180 g ae glyphosate. [2] Controlled with 180-275 g ae glyphosate. [3] Controlled with 325 g ae glyphosate.

Registered tank mixes

Glyphosate.

Application information

How to apply: Ground equipment only. Do not apply by air. **Water volume:** 40 L/acre.

Application tips

Conquer II is a contact type herbicide. Good coverage is essential for performance.

How it works

Conquer II is primarily a contact herbicide with no residual. As such, good coverage is essential for activity. Conquer II works on 2 separate pathways within broadleaf weed species, photosystem II and the chlorophyll biosynthesis pathway. Conquer II contains 2 separate modes of action that work by inhibiting the movement of electrons in photosystem II and halting the production of chlorophyll. Both modes of action result in the generation of singlet oxygen, which causes the oxidation of cell membranes. This outcome results in fast chlorosis and death of affected plant tissue.

Expected results

Susceptible weeds will develop water-soaked lesions within hours of application. Tissue will turn chlorotic then necrotic. Necrotic tissue will become dry and crispy. Good growing conditions and sunlight will increase the speed and overall level of control.

Restrictions

Rainfall: Product is rainfast in 1 hour. **Grazing:** Do not graze treated fields or cut for livestock feed for 30 days after application. **Re-cropping:** Labelled crops can be seeded immediately after application. Any crops not listed can be seeded 30 days after an application of Conquer II. **Re-entry interval:** 24 hours.

Environmental precautions

This product is toxic to aquatic organisms, small wild mammals and birds, certain insects and non-target terrestrial plants. Observe buffer zones found on the Conquer II label. **Runoff, leaching:** Observe buffer zones found on the Conquer II label.

Toxicity

Oral LD_{50} (rats) = > 50 - < 300 mg/kg. Dermal LD_{50} (rats) = > 2000 mg/kg.

Storage

Store in a cool, dry, secure place. Do not freeze. Heated storage required - storage temperature must be above 3ºC.

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Conquer (Co-pack)/Revenge B /Emphasis/ IPCO Octagon/Co-op Octagon

Group 14, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Conquer (Co-pack): Aim EC (PCP # 28573) + Koril (PCP # 25341)	FMC of Canada Limited distributed by Nufarm Agriculture Nufarm Agriculture	Carfentrazone-ethyl: 240 g/L Bromoxynil: 235 g/L	Emulsifiable concentrate	600 mL
Revenge B co-pack of: Revenge (PCP # 33716) + Buck (PCP # 33399)	NewAgco Inc.	Carfentrazone-ethyl: 240 g/L Bromoxynil: 280 g/L	Emulsifiable concentrate	9.71 L
Emphasis co-pack of: Emphasis A (PCP # 33987) + Bromotril 240 (PCP # 28276)	FMC of Canada Limited ADAMA Canada	Carfentrazone-ethyl: 240 g/L Bromoxynil: 240 g/L	Emulsifiable concentrate	1.2 L 8.1 L
IPCO Octagon co-pack of: IPCO C-Zone (33580) + IPCO Brotex 4AT (PCP # 33554)	IPCO IPCO	Carfentrazone-ethyl: 240 g/L Bromoxynil: 480 g/L	Emulsifiable concentrate	600 mL
Co-op Octagon co-pack of: IPCO C-Zone (33580) + Co-op Brotex 4AT (PCP # 33828)	IPCO Federated Cooperatives Ltd	Carfentrazone-ethyl: 240 g/L Bromoxynil: 480 g/L	Emulsifiable concentrate	9.7 L

Crops, staging and rates

Crop	Staging
Canola	Prior to seeding

Weeds, rates and staging

Conquer/Revenge B should be mixed with glyphosate at a rate of 180 - 360 g ae/acre. See glyphosate page for product rates to control. Rates - Aim or Revenge at 15 mL/acre and Koril at 235 - 243 mL/acre. Emphasis - Emphasis A at 15 mL/acre and Bromotril 240 at 235 mL/acre. Buck - 202 mL/acre.

Grassy weeds: up to 8 cm in height unless otherwise noted

- downy brome[2] (up to 15 cm high)
- giant foxtail[1] (up to 15 cm high)
- Persian darnel[2] (up to 15 cm high)
- volunteer barley[1]
- volunteer wheat[1]
- green foxtail[1]
- wild oats[1]

Broadleaf weeds: Up to 8 cm high unless otherwise noted

- annual sow thistle[2] (up to 15 cm tall)
- Canada fleabane[2]
- cleavers[2]
- common ragweed[2]
- eastern nightshade (up to 3-leaf)
- flixweed[3] (up to 15 cm tall)
- hempnettle[2] (up to 15 cm tall)
- kochia[2] (up to 15 cm tall)
- lady's-thumb[1]
- lamb's-quarter (up to 7.5 cm tall)
- morning glory (up to 3-leaf)
- narrow-leaved hawk's-beard[2]
- prickly lettuce[3] (up to 15 cm tall)
- redroot pigweed (up to 3-leaf)
- Russian thistle[2] (up to 15 cm tall)
- shepherd's-purse[3] (up to 15 cm tall)
- stinkweed[1]
- tall waterhemp (up to 5 cm)
- volunteer canola (all types cotyledon to 4-leaf)
- volunteer flax[2] (up to 15 cm tall)
- wild buckwheat[2] (1 - 4 leaf)
- wild mustard[1]

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[1] Controlled with 180 g ae glyphosate. [2] Controlled with 180 - 275 g ae glyphosate. [3] Controlled with 325 g ae glyphosate.

Crop	Staging
Wheat, barley, oats	Prior to seeding

Weeds, Rates and Staging

Rates: Emphasis A at 30 mL/acre and Bromotril 240 at 472 mL/acre.

Weeds controlled at these rates of Emphasis when tank mixed with glyphosate include the weeds listed in the above table and the weeds listed below.

American nightshade	common waterhemp	hairy nightshade	jimsonweed
common purslanetansy mustard	tartary buckwheat	tumble pigweed	common groundsel
blue bur	carpetweed	common buckwheat	pale smartweed

Registered tank mixes

Tank mix partner	Product rates
glyphosate	180 - 360 g ae/acre

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 40 L/acre minimum.

How it works

Conquer/Revenge B/Emphasis are primarily contact herbicides; as such, good coverage is essential for activity. Koril/Buck/Bromotril 240 are a limited systemic herbicides that inhibits respiration and photosynthesis. Aim/ Revenge/Emphasis A inhibit the PPO enzyme involved in chlorophyll and heme synthesis. This action results in leaky cell membranes and rapid browning and death.

Expected results

Initial symptoms are browning, and plant death occurs in a few days.

Restrictions

Rainfall: Rainfall within 2 hours after application may reduce weed control. **Grazing:** Do not graze the treated crop or cut for feed. **Pre-harvest intervals:** 3 days. **Re-cropping:** No rotational restrictions 12 months after application. **Re-entry interval:** 24 hours.

Environmental precautions

Bromoxynil is moderately to highly toxic to aquatic organisms.

Toxicity

Bromoxynil: Acute oral LD_{50} (rats) = 368 mg/kg. Carfentrazone-ethyl:oral LD_{50}(rats) > 5,143 mg/kg.

Storage

Store in a cool, dry place and avoid excess heat.

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Curtail M/Clobber M/Certain

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Curtail M (PCP# 30914)	Nufarm Agriculture	Clopyralid: 50 g/L + MCPA ester: 280 g/L	Emulsifiable concentrate	8 L, 112 L, 960 L
Clobber M (PCP # 34157)	NewAgco Inc	Clopyralid: 50 g/L		12 L, 96 L, 576 L
		MPCA Ester: 280 g/L		
Certain (PCP # 34356)	Sharda CropChem Ltd	Clopyralid: 50 g/L + MCPA ester: 280 g/L		8 L, 112 L

Crops, staging and rates

Rate: Low rate 610 mL/acre, high rate 810 mL/acre.

Crop	Staging
Wheat, spring and durum, barley, oats	3-leaf to just before flag leaf
Timothy for seed production	3-leaf to flag leaf stage
Canaryseed	3-leaf to prior to flag leaf
Flax	5 - 15 cm in height
Timothy for hay or forage (not to be used on export hay to Japan)	Established

Weeds, rates and staging

For best results, apply to actively growing weeds in the 1 - 4 leaf (seedling) stage and when Canada thistle is between 10 cm and up to but not including the early bud stage. Poor weed control may result under cool or dry conditions.

Low rate

- burdock
- Canada thistle* (low infestations)
- cocklebur
- field horsetail[1]**
- flixweed*** (2 - 4 leaf)
- lamb's-quarter
- plantain**
- prickly lettuce
- ragweed
- shepherd's-purse*** (2 - 4 leaf)
- stinkweed*** (2 - 4 leaf)
- annual sunflower
- volunteer sunflower
- wild mustard
- wild radish

High rate

- annual sow thistle[1]
- Canada thistle (medium to high infestations)
- common groundsel
- dandelion***
- kochia[1] (suppression) (2 - 4 leaf)
- perennial sow thistle**
- red root pigweed
- Russian pigweed
- scentless chamomile (2 - 4 leaf)
- smartweed[1]
- tartary buckwheat
- wild buckwheat
- vetch
- volunteer canola

* Season-long control, some growth may occur in the fall. ** Top growth control. *** Spring rosettes only.

[1] Curtail M only.

Registered tank mixes

Tank mix partner	Crop	Curtail M
In spring wheat (including durum) and barley		
Achieve Liquid/Bison/Marengo/Nufarm Tralkoxydim	Achieve Liquid etc: 200 mL/acre + Turbocharge/ Nufarm Tralkoxydim adjuvant: 0.5% v/v	Spring wheat, durum, and barley
Axial	Axial: 500 mL/acre	Spring wheat and barley
Bengal or Puma Advance/Bengal WB	Puma Advance: 412 mL/acre	Spring wheat, durum, and barley

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Tank mix partner	Crop	Curtail M
Horizon NG/NextStep NG or Foothills/Signal/ Ladder/Legend	Horizon NG/NextStep NG: 376 - 473 mL/acre OR Foothills/Signal/Ladder/Legend: 93 - 117 mL/acre	Spring wheat and durum wheat
Deploy or Refine SG + non-ionic surfactant (for all products)	Deploy: 8 g/acre or Refine SG: 12 g/acre + non-ionic surfactant: 0.2% v/v.	

Application Information

How to apply: Ground equipment only. Do not apply by air. **Water volume:** 40 - 60 L/acre.

Mixing instructions

Use mixing instructions "a" on page 15.

Application tips

When weeds are under extreme drought stress or showing effects of excessive moisture, control can be reduced or delayed. Weed escapes may occur under prolonged stress conditions or low fertility. Do not apply to weeds stressed for more than 20 days due to lack of moisture as unsatisfactory control can result. Ensure uniform spray coverage over the entire area of target weeds.

How it works

Clopyralid is a growth regulator type of herbicide. It is primarily absorbed through the foliage and is translocated to all parts of the plant causing leaf and stem twisting and yellowing and then death. MCPA is a systemic herbicide for broadleaf weeds, which is translocated throughout the plant causing rapid undifferentiated growth, which usually results in the death of susceptible weeds.

Expected results

Weeds start to twist after spraying; then, plants turn brown and die. Difficult to control weeds such as Canada thistle and wild buckwheat stop growing, change colour to dark green and then turn yellow before they die. Death may not occur for 14 to 21 days after application. Some weak Canada thistle regrowth may occur by end of season.

Restrictions

Rainfall: Do not apply if rain is expected in 6 hours. **Grazing:** Do not cut or graze treated fields of wheat, barley, oats or flax within 7 days after application. **Pre-harvest intervals:** Do not harvest wheat, barley, oats or flax within 60 days after application or within 7 days after application when harvesting for forage. Withdraw meat animals from treated fields at least 3 days before slaughter. **Re-cropping:** Fields previously treated with Curtail M herbicide can be seeded to wheat, barley, oats and rye (not under-seeded to forage legumes), canola, corn, field peas, flax, forage grasses, mustard, sugar beets or can be summer-fallowed in the following year. Do not seed to field peas for at least 10 months following treatment.
Very dry soil conditions following application can result in a risk of injury to field pea grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application, delay seeding field peas an additional 12 months (total 22 months following application). **Re-entry interval:** 12 hours.

Environmental precautions

Curtail M contains a petroleum distillate that is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application and cleanup. Observe buffer zones specified under directions for use on the label.

Toxicity

Clopyralid: Acute oral LD_{50} (rats) = > 2,000 mg/kg. MCPA: Acute oral LD_{50} (rats) = technical 700 - 880 mg/kg.

Storage

Store in cool (above 5°C) dry area.

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Denali CM

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulations	Container size
Denali CM co-pack of: Himalaya (PCP# 33370) + Foxxy (PCP# 32952) + Clobber M (PCP# 34157)	NewAgco Inc.	Flucarbazone	Water dispersible granules	284 g
		Fluroxypyr: 180 g/L	Emulsifiable concentrate	4.8 L, 230 L
		Clopyralid: 50 g ae/L MCPA Ester: 280 g ae/L	Emulsifiable concentrate	12 L, 583 L

A non-ionic surfactant such as Agral 90 or Ag-Surf must be added at a rate of 0.25% (2.5 L per 1000 L of spray solution) but is sold separately.

Crops, stage and rates

Crop	Stage	Rate
Spring wheat, durum wheat	3 - 4 leaf stage, up to 2 tillers	Himalaya: 14.2 g/acre Foxxy: 240 mL/acre Clobber M: 600 mL/acre

Weeds controlled

Grass weeds controlled at the 1 - 4 leaf, 2 tiller stage. Broadleaf weeds controlled at the 1 - 4 leaf stage unless listed otherwise

- burdock
- Canada thistle (low infestations)[2]
- cleavers[3] (1 - 4 whorls)
- cocklebur
- flixweed
- green foxtail[1]
- green smartweed
- kochia[3]
- lamb's-quarter
- plantain[4]
- prickly lettuce
- ragweed
- redroot pigweed
- shepherd's-purse
- stinkweed
- stork's-bill*
- sunflower (annual)
- vetch
- volunteer flax (1 - 12 cm)
- volunteer canola[5]
- volunteer tame oats
- wild mustard
- wild oats[1]
- wild radish

*Suppression only. [1] Including group 1 resistant biotypes. [2]Season long control, with some regrowth in the fall. [3]Including Group 2 resistant biotypes. [4]Top growth control only. [5]Not including Clearfield varieties.

Registered tank mixes

None registered.

Application information

How to apply: Ground application only. Do not apply by air. **Water Volume:** Ground: 20 - 40 L/acre.

Mixing instructions

Fill the tank ½ full of water and start agitation. Add the required amount of Himalaya and agitate until fully dissolved. Add the required amount of Foxxy, then Clobber M. Add the required amount of surfactant, fill tank with remaining water.

Application tips

When spraying under the conditions of waterlogged or saturated soils, temperature extremes, drought, low fertility or plant disease, wheat can show unacceptable injury symptoms. Weed control may also be reduced by these same conditions. Optimum weed control occurs at 12 - 24ºC. Reduced activity will occur when temperatures are below 8ºC or above 27ºC. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance.

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How it works

On broadleaf weeds, the components move within the plant to control exposed and underground plant tissue. The herbicide mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes. On grass weeds, flucarbazone is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing point of the plant.

Expected results

Growth of susceptible plants stops soon after application. Symptoms on grasses include discolouration (yellowing, reddening, and purpling), and complete control may take 2 weeks. Broadleaf weeds start to twist shortly after being sprayed. After twisting and bending, plants stop growing, turn brown, and die.

Restrictions

Rainfall: Rainfall within 4 hours of application may reduce efficacy. **Grazing:** Do not graze treated fields or use green crop for feed. Wheat grain or straw from harvested treated fields may be fed to livestock.
Pre-harvest Intervals: Mature crop may be harvested 80 days after application. **Re-entry interval:** 12 hours.
Re-cropping: See the following chart below.

Re-Cropping options by soil zone

Grey wooded	Black	Dark brown	Brown
Spring wheat Barley Canola Field peas*	Spring wheat Barley Canola Field peas* Field bean* Flax Durum wheat	Spring wheat Barley Canola Field peas* Flax Durum wheat	Spring wheat

*Field peas and beans can be successfully grown the year after application of Denali CM provided the following three criteria are met:

1. Soil pH must be below 7.5 2. Organic matter content must be above 4% 3. Precipitation in the year of application must be equal to or above the 10-year average (minimum 100 mm within 60 days of application), total rainfall from June 1 to August 31 must be greater than 140 mm (5.5 inches) and annual rainfall must be greater than 175 mm. (6.9 inches).

Environmental precautions

Do not allow this chemical to drift onto other crops, especially canola, tame oats, or other non target crops. This product is highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application or cleaning. Observe buffer zones specified on the label.

Toxicity

Flucarbazone: Oral LD_{50} (rats) = >5,000 mg/kg. Fluroxypyr: Oral LD_{50} (rats) = >2,000 mg/kg.
Clopyralid: Oral LD_{50} (rats) = >2,000 mg/kg. MCPA: Oral LD_{50} (rats) = technical 700 – 800 mg/kg.

Storage

Store in a dry heated area. If product is frozen, bring to room temperature and agitate before use

Distinct

Group 4, 19

Formulation

Product	Company	Active ingredient	Formulations	Container size
Distinct (PCP# 25811)	BASF Canada	Dicamba: 50% Diflufenzopyr: 20%	Wettable granule	2.3 kg

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Distinct (cont'd)

Crops, stage and rates

Crop	Rate
Chemfallow and post harvest	57.5 g/acre - 115 g/acre
Field corn (2 - 6 leaf)	115 g/acre + non-ionic surfactant (0.25% v/v) + liquid urea ammonium nitrate (UAN)(1.25% v/v)

Note: Chemfallow and post harvest – Distinct + glyphosate must be applied with Merge (200mL/acre). The surfactant is not included in the package.

Weeds and staging

Broadleaf: Apply up to the 8-leaf stage unless otherwise specified.

Broadleaf weeds controlled (58 g/ac) Perennial weeds

dandelion*	kochia*	round-leaved mallow
narrow-leaved hawk's-beard	lamb's-quarter	wild buckwheat
spiny annual sowthistle	redroot pigweed	

* Only 115 g/acre rate controls glyphosate resistant kochia.

Broadleaf weeds controlled (115 g/ac) (above weeds plus)

biennial wormwood (2 - 8 leaf)	common ragweed	perennial sowthistle	tall water hemp
Canada thistle*	lady's-thumb	(suppression 2 - 10 leaf)	velvet leaf
common cocklebur	lamb's quarter	redroot pigweed	volunteer canola (up to 4-leaf)

* Top growth control

Registered tank mixes

Distinct should always be tank mixed with glyphosate 0.5 - 1 L/acre of 360 g/l equivalent for chemfallow and post-harvest applications. Merge (200 mL/acre) is always required regardless of the glyphosate formulation used. In field corn, if Distinct is applied alone, should use 1.25% non-ionic surfactant + 1.25 of 28% UAN. Do not use either UAN or a non-ionic surfactant if mixed with glyphosate.

Application information

How to apply: Ground equipment only. **Water volume:** 20 - 40 L/acre. Use higher water volume (40 L/acre) for dense weed stands or larger weeds and if applying on glyphosate resistant kochia.

Application tips

Good growing conditions promote weed growth and enhance the activity of Distinct. Weeds hardened off by cold weather or drought stress may not be controlled. Insufficient water volumes or coarse sprays may also reduce control levels.

How it works

Absorbed through roots and leaves and translocated in phloem and xylem causing a disruption in cell metabolism.

Restrictions

Rainfall: Rainfall within 4 hours of application may reduce activity. **Grazing:** Do not graze treated fields for 75 days after corn application. **Re-cropping:** Apply only the low rate between September 1 to 30 to re-crop to canola, lentil, field pea, soybean or cereal crop the following spring. Applications at a higher rate after September 1 can only re-crop to cereals the followoing spring. Contact maunufacturer for a full list of approved crops the followingseason for all use pattern and rates. **Re-entry interval:** 12 hours.

Toxicity

Acute oral LD_{50} (rats) 1,600 mg/kg.

Storage

Store in a cool, dry place.

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Draft CT

Group 2,4

Formulation

Product	Company	Active ingredient	Formulations	Container size
Draft CT copack of Draft (PCP # 31904), CT Mix 360 (PCP # 33387)	Rotam North America	Thifensulfuron methyl: 50 % Tribenuron methyl: 25%	Water dispersible granule	324 g
		Clopyralid: 360 g/L	Solution	6.74 L

Crops, stage and rates

Crop	Stage	Rate per acre
Barley, spring wheat (not including durum)	3 leaf to flag emergence	Draft: 8 g CT Mix 360: 85 mL Add surfactant (Agral 90, AgSurf, Citowett Plus) at 0.2 L/100 L of spray solution.
Sulfonyurea (SU) tolerant canola	2 - 5 leaf and prior to bolting	

Weeds and staging

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10cm) in height or width.

Weeds Controlled:

annual smartweed (green, lady's-thumb)
ball mustard
Canada thistle*
chickweed (1 - 6 leaf)
corn spurry
flixweed
hemp-nettle
redroot pigweed
Russian thistle
shepherd's-purse
tartary buckwheat
volunteer canola**
wild buckwheat
wild mustard

Weeds Suppressed:

cleavers (1 - 3 whorls)
scentless chamomile
sow thistle
round-leaved mallow (2 - 6 leaf)
stork's bill (1 - 6 leaf)
toadflax (less than 15cm tall)

*Less than 15 cm tall and prior to bud stage. ** Will not control Clearfield or SU varieties.

Registered tank mixes

Rotam North America supports the following tank mixes. Spring wheat - Axial, clodinafop, flucarbazone, fenoxaprop, Simplicity GoDRI. Barley – Axial, fenoxaprop. Sulfonlyurea (SU) tolerant canola – Arrow, Yuma.

Application information

How to apply: Ground application only. Do not apply by air. **Water Volume:** 40 L/acre minimum.

Mixing instructions

Use mixing instructions "b" on page 15.

Application tips

Thifensulfuron and tribenuron may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing. Maximum of one application per year of this or other products containing thifensulfuron and tribenuron.

How it works

Thifensulfuron and tribenuron are absorbed through foliage and move to plant growth areas and inhibit cell elongation. Clopyralid is a systemic herbicide that Is absorbed by leaves and stem surfaces and is readily translocated.

Expected results

Thifensulfuron and tribenuron cause weed growth to stop immediately. Discolouration of weeds may take 1 - 3 weeks to be noticeable depending on weed species and growing conditions. Clopyralid symptoms include swollen growing points and roots, leaf cupping and twisted and distorted stems and leaves.

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Draft CT (cont'd)

Restrictions

Rainfall: Rainfall within 8 hours of application may reduce efficacy. **Grazing:** Treated crop must not be grazed or fed to livestock for 7 days after treatment. **Re-cropping:** Wheat, barley, canola, flax, forage grasses, mustard, oats, rye, soybeans, sugar beets, sunflowers, can be planted the year after application. Do not under-seed crops to forage legumes the year after treatment. Do not seed to field peas for at least 10 months following treatment.
Pre-harvest Intervals: 60 days. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to plants, aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the label. To reduce runoff into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Thifensulfuron methyl: Oral LD_{50} (rats) = > 5,000 mg/kg. Tribenuron methyl: Oral LD_{50} (rats) = > 5,000 mg/kg. Clopyralid: Oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool (above 5ºC), dry place. Avoid freezing. If frozen, bring to room temperature and agitate before use.

Dual II Magnum/Komodo/Metallica/ Stallion

Group 15

Formulation

Product	Company	Active ingredient	Formulations	Container size
Dual II Magnum (PCP#25729)	Syngenta	S-Metolachlor and R-enantiomer: 915 g/L	Solution	10 L, 450 L
Komodo (PCP#33599)	UPL AgroSolutions	Metolachlor: 915 g/L	Solution	10 L
Metallica (PCP # 34054)	Sharda Cropchem Ltd.	S-Metolachlor and R-enantiomer: 915 g/L	Emulsifiable concentrate	10 L
Stallion (PCP # 34334)	NewAgco Inc.	S-Metolachlor and R-enantiomer: 915 g/L	Emulsifiable concentrate	10 L

Crops, staging and rates

Pre-plant incorporated or irrigated within 10 days if applied pre-emergent Rate: Apply at 0.51 - 0.71 L/acre.

Field crops			
corn (hybrid, field, sweet, silage)	dry common bean	lima bean	field pepper
pea (grown for processing)	potato	soybean	sugar beet
sweet white lupins	carrot	pumpkin and winter squash	red beet*
Shelterbelts consisting of trees in their second year or older			
black spruce	jack pine	Norway spruce	poplar*
red pine	white pine	white spruce	
Fruits and vegetables			
fruit trees (bearing and non-bearing)	newly planted strawberries	cantaloupe, cucumber	

* Dual II Magnum only.

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Weeds, rates and staging

Pre-emergent, if irrigated within 10 days or pre-plant incorporated.

- American nightshade
- barnyard grass
- crabgrass (hairy and smooth)
- eastern black nightshade
- fall panicum
- green foxtail
- old witch grass
- redroot pigweed (suppression)
- yellow foxtail
- yellow nutsedge (preplant incorporation only)

Registered tank mixes

Apply pre-plant incorporated or pre-emergence with irrigation.

Tank mix partner	Tank mix rate
Aatrex 480 (Corn only)	Dual II Magnium/Komodo: 0.51 - 0.71 L/acre/Stallion: 0.51 - 0.71 L/acre + Aatrex 480: 0.85 - 1.25 L/acre + non-ionic surfactant: 0.1% v/v

Note: Refer to label for complete list of tank mix options for registered crops.

Application information

How to apply: Apply with ground equipment: band or overall spray. **Water volume:** 60 L/acre minimum.

Incorporation: Incorporate to 5 cm if using power driven cultivator or Mulch Master. Do not exceed this depth since product dilution can occur. If using tandem discs, set to cut to a depth of 10 cm operated at 6 to 9 km/h. If using vibrating shank cultivators with overlapping sweeps, set 10 cm deep and operate at 10 to 13 km/h. Spike tooth or diamond tooth harrows are good incorporation equipment. Immediate incorporation is not necessary although desirable.

Application tips

For band treatments, use a press wheel ahead of the nozzle to level the band.

How it works

Inhibits germination, particularly grasses.

Expected results

Annual grasses do not germinate or under dry conditions, may die back soon after emergence.

Restrictions

Rainfall: Moisture required to move chemical to area of germination but an excess may move it below this area. **Grazing:** Do not graze treated immature crops or cut for hay. Sufficient data are not available to support such use. In the case of corn, immature means before ear emergence. **Pre-harvest interval:** Corn – 80 days. Sweet corn – 45 days (Dual ll/Stallion), 80 days (Komodo). Asparagus – 16 days. Sugar beet – 120 days. **Re-entry interval:** 12 hours.

Environmental precautions

Dual II Magnum is moderately to highly toxic to aquatic organisms. Leave a buffer zone of 29 metres between the sprayed area and the edge of any sensitive habitats.

Toxicity

Acute oral LD_{50} (rats) = 2149 mg/kg (Dual ll). Komodo = 1063-1936 mg/kg.

Storage

Heated storage required.

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Eclipse XC/Clobber G

Group 4, 9

Formulation

Product	Company	Active ingredient	Formulations	Container size
Eclipse XC A (PCP# 32883)	Corteva Agriscience	Clopyralid: 600 g/L	Solution	2.67 L
Eclipse XC B (PCP# 32852)		glyphosate: 480 g/L DMA		7.5 L
Clobber (PCP# 33114)	NewAgco Inc	Clopyralid:360 g/L		8.9 L
Disruptor (PCP# 29290)		glyphosate: 360 g/L		500 L

Crops, stage and rates

Crop	Stage	Rate per acre
glyphosate tolerant canola and field corn varieties* (i.e., Roundup Ready canola)**	canola: 2 - 6 leaf, corn: emergence to V6	Eclipse XC A: 69 mL/acre + Eclipse XC B: 375 mL/acre OR Clobber: 113 mL/acre + Disruptor: 500 mL/acre

* Some short-term, visual yellowing may occur when Eclipse XC tank mix is applied at the late application 4 - 6 leaf stage of the crop. This effect is temporary and will not influence crop growth, maturity or yield. ** Only Eclipse XC is registered for use on glyphosate tolerant, field corn.

1 case will treat 40 acres.

Weeds controlled

Annual grasses

green foxtail	volunteer barley	volunteer wheat	wild oats

Annual broad-leaved weeds

chickweed	kochia*	redroot pigweed	volunteer canola (non-glyphosate tolerant)
cleavers	lady's-thumb	Russian thistle	
corn spurry	lamb's-quarter	shepherd's-purse	wild buckwheat
cow cockle	night-flowering catchfly	smartweed	wild mustard
hemp-nettle		stinkweed	wild tomato

Perennial weeds

Canada thistle, quackgrass	perennial sow thistle (season-long top growth control)	dandelion <15 cm diameter (top growth)	dandelion >15 cm diameter (suppression)

* Eclipse will not control kochia biotypes resistant to glyphosate (Group 9).

Application information

How to apply: Apply with ground equipment only. Do not apply by air. **Note:** Do not use galvanized steel or unlined steel tanks as a combustible gas may be formed. **Water volume:** 40 L/acre.

Application tips

Ensure that the crop has not advanced beyond the recommended leaf stage for application. Treat crops during warm weather when weeds are actively growing. Best results are obtained when Canada thistle is actively growing and soil moisture is adequate for rapid growth. Do not treat weeds under poor growing conditions. Reduced results may occur when treating weeds heavily covered with dust. Reduced results may occur if water-containing soil is used, such as water from ponds and unlined ditches.

How it works

Eclipse/Clobber G tank mix is readily absorbed by foliage and roots. Clopyralid is a systemic, hormone-type herbicide absorbed by leaf, stem surfaces and roots and translocated upwards and downward. Glyphosate is a non-selective, systemic herbicide that moves from the foliage into the roots and kills the entire plant. Maximum efficacy results from foliar application to young, actively growing plants.

Expected results

Under good growing conditions, wilting and yellowing of annuals occurs within 2 to 4 days. Herbicide symptoms on affected annual and perennial weeds may also include swollen growing points and roots, cupping of leaves,

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twisted and distorted stems and leaves. Cool or cloudy weather may slow activity. Affected weeds turn yellow before turning brown as they die. Death of weeds may not occur until 14 to 21 days after application. Browning of above ground growth and deterioration of roots occurs.

Restrictions

Rainfall: Do not apply if rainfall is forecast for the time of application. **Grazing:** Allow 3 to 5 days before grazing treated areas. **Re-cropping:** Fields previously treated with Eclipse Clobber G tank mix can be seeded the following year to wheat, oats, barley, rye (not underseeded with legumes, clover or alfalfa), forage grasses, flax, canola, mustard, field pea, soybean, sugar beet or they can be summerfallowed. Seed only those crops listed above in the year following treatment. Do not seed to field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application, delay seeding field pea an additional 12 months (total 22 months following application). **Manure and straw:** Residues of the herbicide tank mix occurring in the straw may be harmful to susceptible plants.
Do not use straw or crop residue from treated crops for composting or mulching susceptible broadleaved crops. If the straw or crop residue is used for animal bedding or feed, return the manure to fields to be planted to clopyralid tolerant crops such as wheat, barley, oats, rye, forage grasses, canola or flax. Do not grow susceptible crops such as pea, bean, lentil, potato, sunflower or other sensitive crops on land that has been mulched with straw containing clopyralid residues within the last 12 months. **Re-entry interval:** 12 hours.

Environmental precautions

Avoid contamination of non-target land, water or irrigation ditches. Do not use Eclipse III tank mix where it can enter water bodies.

Toxicity

Eclipse A/Clobber: Acute oral LD_{50} (rats) = > 5,000 mg/kg.
Eclipse B/Disruptor: Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in heated storage. If products are frozen, bring to room temperature and agitate before use.

Edge MicroActiv

Group 3

Formulation

Product	Company	Active ingredient	Formulations	Container size
Edge (PCP# 32904)	Gowan Company	Ethalfluralin: 10%	Granules	454 kg

Crops, staging and rates

Fall pre-plant incorporated: Apply between September 1 and soil freeze-up. **Spring:** Cultivate to destroy weeds, Apply prior to seeding and incorporate.

Rate: 3.4 - 5.7 kg/acre

alfalfa establishment (seed production only)	caraway	dry bean (white or kidney only)	lentil (fall application only)	safflower
camelina*	chickpea*	faba bean	mustard (yellow only)	soybean
canola	coriander	industrial hemp*	peas	sunflower

* Minor use registration. Gowan Canada assumes no responsibility with respect to performance and/or crop tolerance.

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Edge MicroActiv (cont'd)

Weeds controlled

Annual grasses				
barnyard grass	green foxtail	volunteer barley*	wild oats*	
crabgrass	fall pancium	volunteer wheat*	yellow foxtail	
Broadleaved weeds				
chickweed	cow cockle	lady's-thumb*	prostrate pigweed	Russian thistle*
cleavers*	hemp-nettle*	lamb's-quarter	purslane	wild buckwheat
corn spurry	kochia	nightshade*	redroot pigweed	

* Suppression

Rate

Organic matter	Spring: sand to sandy loam (kg/acre)	Spring: loams to clay (kg/acre)	Fall: loam to clay (kg/acre)
2 - 4% (Dark Brown soils)	3.4	4.5	4.5
4 - 6% (Black soils)	3.4	4.5	5.7
6 - 15% (Deep Black soils)	4.5	4.5 - 5.7*	5.7

* For improved results on medium-heavy texture soils with 6 to 15% organic matter, use the higher rate in fields with high populations of weeds.

Application information

Directions for use – direct-seeding systems: Direct seeding is defined as seed placement into standing stubble (including chemical fallow) with minimum soil disturbance and maximum surface residue retention. Edge for weed control in direct-seeding systems is intended for use on soils that have been in a low disturbance, direct-seeding system with < 30% soil disturbance for at least 2 consecutive years. In the year of seeding, a one pass, direct-seeding operation with minimal soil disturbance (<30%) is recommended. Edge applied to the soil surface provides long-lasting control of susceptible weeds within the top 2.5 cm of the soil surface Edge in direct-seeding systems is adsorbed to the soil surface and will not control weeds that germinate from a deeper depth (> 2.5 cm) or pre-emerged weeds.

Land preparation – crop residue management: At harvest, chopping, spreading and even distribution of straw and chaff residues is an effective method of straw management. Poor crop residues may create plugging or hair pinning during the seeding operation. Poor and uneven crop emergence, cold wet soils, soil nutrient tie-up and delayed and uneven maturity may also be a result of inadequate trash management. **Preseeding (burn off) weed control:**
A preseeding burn-off herbicide treatment is required to eliminate weed competition prior to crop emergence.

Application instructions: Apply Edge MicroActiv uniformly with a properly calibrated granular herbicide applicator. Avoid concentration of the herbicide in narrow bands. A single harrow operation assists in managing straw residue to ensure good herbicide soil contact. Avoid excessive soil disturbance.

Seeding instructions: Use direct-seeding equipment seeding at a uniform depth to ensure seed-soil contact and rapid crop emergence. Minimum soil disturbance ensures a uniform herbicide layer at the soil surface.

Fall application: Edge for weed control in direct-seeding systems may be applied in the fall between October 1 and prior to soil freeze-up for weed control the following year. Apply Edge at the fall rates listed above using a harrow operation to manage crop residue and ensure herbicide soil contact.

Spring application: Edge for weed control in direct-seeding systems may be applied in the spring. These applications should be made at the spring application rates listed above and applied as early as field conditions permit and at least 10 days prior to seeding. The shallow harrow incorporation should be performed within 24 hours of application.

Application tips

To avoid concentrating wild oats and volunteer cereal seeds below the treated layer, do not plow the land prior to Edge application. Do not apply to fields spread with manure during the past 12 months.
Do not apply to soils subject to prolonged periods of flooding or soils in poor working condition. Edge MicroActiv can be used where trash is heavier or on standing weeds provided they do not interfere with distribution of the granules and do not limit incorporation. Do not apply on soils with less than 2% organic matter. Application on eroded knolls or Grey Wooded soils with highly variable texture and organic matter may result in a reduced crop stand, delayed development or reduced yield in either treated crop or rotational crop.

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How it works

A pre-emergence herbicide that kills seedlings as they germinate. Inhibits cell division in the actively growing points of the root and shoot. Does not control established weeds.

Expected results

Weeds: Most die before emerging. Weeds will exhibit swelling of the coleoptile region, stubby, thick primary root development and lack of secondary roots. Plants die from lack of ability to obtain moisture.

Restrictions

Grazing: Do not graze the treated crops or cut for hay. There are not sufficient data available to support such use. **Re-cropping:** Do not grow oats, sugar beet and small-seeded grasses such as timothy, canaryseed grass and creeping red fescue in rotation following a crop treated with Edge herbicide. If ethalfluralin and/or trifluralin have been used at the oilseed and special crop rate for 2 consecutive years, wheat should not be seeded. Do not direct seed (zero till) a rotational crop into standing stubble on land that has been treated with trifluralin or ethalfluralin for the previous crop. Cultivation prior to seeding of the rotational crop is strongly recommended to help aerate the soil and promote seedbed conditions, which will enhance seed germination. **Re-entry interval:** 12 hours.

Caution: The persistence of Edge herbicide is influenced by soil moisture and the majority of breakdown occurs during the growing season. If drought or extended dry periods were present in the previous year, higher levels of Edge herbicide may be present in the soil. To reduce the possibility of injury to rotational crops, seed shallow into a warm, moist seedbed using recommended agronomic practices and seeding depths. As an additional safety precaution, seeding rate may be increased slightly (10%).

Environmental precautions

Contamination of any body of water with this product may kill fish.

Toxicity

Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in areas not exposed to high temperatures or prolonged, direct sunlight. Also, do not let product remain standing in applicators under these conditions. After filling the granular applicator, close the lid immediately to avoid prolonged exposure to direct sunlight.

Embutox/Caliber/Cobutox

Group 4

Formulation

Product	Company	Active ingredient	Formulations	Container size
Caliber 625 (PCP# 27910)	Loveland Products	2,4-D B: 625 g/L	Emulsifiable concentrate	10 L
Cobutox 625 (PCP# 27911)	IPCO			
Embutox 625 (PCP# 27912)	Nufarm Agriculture			

Crops, staging and rates

Crop	Stage	Rate per acre
Cereals		
Wheat (including durum), barley, oats	After the crop has 5 fully expanded leaves but before the early flag leaf (shot-blade or boot) stage	0.71 - 0.91 L
Corn, field	After the crop is 40 cm high but before the beginning of tasseling. Use drop nozzles	0.71 - 1.1 L

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Crop	Stage	Rate per acre
Forages		
Seedling alfalfa, bird's-foot trefoil	From the first to the 4th trifoliate leaf stage	0.71 - 0.91 L
Seedling clovers (alsike*, red***, Dutch) but not sweet clover**	As soon as possible after the first trifoliate leaf stage	0.71 - 0.91 L
Pasture containing forage legumes	After cutting or grazing preferably when regrowth is not above 7.5 cm high	0.71 - 1.1 L
Seedling grasses for forage**	2 - 4 leaf stage of seedling grasses	0.71 - 0.91 L

Weeds controlled

Weeds controlled at 0.71 L/acre (1 - 2 leaf stage)

ball mustard
lamb's-quarter
ragweed,
redroot pigweed
shepherd's-purse
stinkweed
wild mustard (up to 4-leaf stage)
wormseed mustard

Weeds controlled at 0.91 L/acre (1 - 2 leaf stage)

bull thistle (rosette to early bud stage)
Canada thistle (15 cm to early bud)[1]
chicory (rosette stage)
curled dock (early growth stage)
dandelion (prior to bud stage)[1]
field bindweed (late summer)[1]
green smartweed (at 1.1 L rate)
horsetail (10 to 15 cm high)[1]
lady's-thumb (at 1.1 L rate)
narrow-leaved hawk's-beard (fall rosette stage, after alfalfa has gone dormant)
oak-leaved goosefoot
perennial sow thistle (rosette stage)[1]
wild buckwheat
wild radish
yellow rocket (late September to mid-October)

* Oats may be damaged if treated before the recommended growth stage. ** Smooth bromegrass, creeping red fescue, meadow fescue, tall fescue, orchard grass, timothy, crested wheatgrass, intermediate wheatgrass, streambank wheatgrass, tall wheatgrass. *** Red and Alsike clover may be damaged by 2, 4-D B application. [1] Suppression.

Registered tank mixes

Tank mix partner	2,4-D B + tank mix partner rate	Additional weeds controlled
In seedling alfalfa and bird's-foot trefoil		
MCPA amine	2,4-D B: 0.51 L/acre **Plus** MCPA amine 500: 28 mL/acre or 23.6 mL/acre of MCPA amine 600	Improve control of wild mustard and narrow-leaved hawk's-beard in alfalfa and bird's-foot trefoil

Application information

How to apply: Ground equipment. Do not apply by air. **Water volume:** 60 - 80 L/acre.

Application tips

Do not exceed recommended rate and apply at appropriate growth stage for each crop. Apply product in warm weather. Do not apply under drought conditions. Application must be made before the crop shields the weeds.

How it works

Susceptible plants convert 2,4-DB to 2,4-D. Certain legumes do not convert it. 2,4-DB is translocated to actively growing parts.

Expected results

Weeds should die within 2 to 3 weeks of treatment. Smartweeds seedlings only stunted.

Restrictions

Rainfall: Rainfall before the foliage has dried from the spraying may decrease activity. **Grazing:** Do not use treated crops for grazing of livestock or green feed until 30 days after application. **Re-entry interval:** Scouting in wheat, barley, oats: 3 days. All other activities and registered crops 12 hours.

Environmental precautions

2,4-D B formulations contain a petroleum distillate, which is moderately to highly toxic to aquatic organisms.

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Toxicity
Acute oral LD_{50} (rats) = 1,603 mg/kg.

Storage
Heated storage is not required. If frozen, warm between 20 and 22°C and agitate thoroughly.

Enforcer D

Group 4, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Enforcer D (PCP# 30690)	Nufarm Agriculture	Fluroxypyr: 80 g/L + bromoxynil: 190 g/L + 2,4-D ester: 240 g/L	Emulsifiable concentrate	10 L, 120 L, 480 L

Crops, staging and rates

Crop	Rate/acre	Specific comments
Barley	243 - 486 mL/acre	4 leaf to early flag leaf
Wheat (spring, durum)		

Weeds and staging

243 mL/acre		486 mL/acre: previous weeds plus	
broadleaf plantain cleavers (up to 8-whorl) common groundsel hemp-nettle knotweed kochia (up to 5 cm) lady's-thumb	lamb's-quarter night-flowering catchfly shepherd's-purse stinkweed stork's-bill volunteer canola wild mustard	Canada thistle (suppression) dandelion field horsetail redroot pigweed round-leaved mallow Russian thistle	volunteer flax wild buckwheat

Registered tank mixes

Tank mix partners	Crop	Enforcer D rate	Crop stage/comments
Achieve, Nufarm Tralkoxydim or other tralkoxydim herbicides	Barley and wheat (spring, durum and winter)	0.243 - 0.486 L/ acre	4-leaf to early flag. Follow the tank mix partners recommended crop stage as well
Puma Advance or other fenoxaprop-ethyl herbicide	Barley and wheat (spring, durum and winter)		4-leaf to early flag. Follow the tank mix partners recommended crop stage as well
Everest	Wheat (spring, durum and winter)		4-leaf to early flag. Follow the tank mix partners recommended crop stage as well
Signal or other clodinafop herbicide	Wheat (spring, durum and winter)		4-leaf to early flag. Follow the tank mix partners recommended crop stage as well
Varro	Spring, and durum wheat		4-leaf to early flag
Boost	Spring and durum wheat, barley		4-leaf to before flag leaf. Improved suppression of narrow-leaved hawk's beard
Simplicity	Spring and durum wheat		4-leaf to early flag leaf
Epic Herbicide	Spring and durum wheat, barley		4-leaf to early flag leaf

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Enforcer D (cont'd)

Application information

Rate: 0.243* - 0.486 L/acre.

Water: 40 L/acre. Ground application only.

* Use the 0.243 L/acre rate only when the weeds are smaller and the fields have light infestation of weeds.

How it works

Bromoxynil is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. Fluroxypyr and 2,4-D ester herbicides are selective for broad leaf control in grassy crops. The components of these products move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected results

Small burnt spots on the leaf can appear within hours, while death takes up to 2 weeks. Poor results may be expected if poor coverage, poor penetration through dense crop canopy. Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Grazing:** Do not use treated crops for grazing livestock or green feed until 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.
Pre-harvest interval: Do not harvest the treated crop within 60 days after application.
Re-entry interval: 24 hours.

Toxicity

Acute oral LD_{50} (rats) = 1,030 mg/kg.

Storage

Store in original containers in a secure, dry, heated storage.

Enforcer M/ForceFighter M/Foxxy Canuck /Pierce

Group 4, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Enforcer M (PCP# 30691)	Nufarm Agriculture	Fluroxypyr: 80 g/L+ bromoxynil: 200 g/L + MCPA ester: 200 g/L	Emulsifiable concentrate	10 L, 120 L, 480 L
ForceFighter M co-pack of: Badge (PCP# 16164) +	ADAMA Canada	Bromoxynil: 225 g/L + MCPA: 225 g/L +	Emulsifiable concentrate	2 x 10 L or 2 x 120 L Badge plus 9.6 L or 115.2 L Fluroxypyr 180
Fluroxypyr 180 EC (PCP# 30815)		Fluroxypyr: 180 g/L		
Foxxy Canuck co-pack of: Canuck (PCP# 34173)	NewAgco Inc	Bromoxynil: 280 g/L + MCPA: 280 g/L	Emulsifiable concentrate	2 x 8 L Canuck + 9.6 L Foxxy
+ Foxxy (PCP# 32952)		Fluroxypyr: 180 g/L		
Pierce (PCP # 34328)	Sharda CropChem Ltd	Fluroxypyr: 80 g/L + bromoxynil: 200 g/L+ MCPA ester: 200 g/L	Emulsifiable concentrate	10 L, 120 L, 480 L

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Crops, staging and rates

Crop	Rate/acre	Specific comments
Barley	Enforcer M: 253 - 500 mL/acre. ForceFighter M: Badge 500 mL/acre + Fluroxypyr 180: 240 mL/acre. Foxxy Canuck: Canuck 400 mL/acre + Foxxy: 240 mL/acre	2-leaf to early flag leaf
Wheat (spring, durum, winter)		
Canaryseed*	253 - 500 mL/acre	3 - 5 leaf

* Enforcer M only

Weeds and staging

Seedlings up to 4-leaf stage unless otherwise noted.

253 mL/acre	500 mL/acre (all previous weeds plus those below)	
kochia (up to 5 cm tall) lamb's-quarter (up to 6-leaf) wild mustard (up to 6-leaf) wild buckwheat (suppression)	American nightshade (up to 4-leaf) ball mustard (up to 4-leaf) bluebur Canada thistle (top growth control) chickweed (up to 6-leaf) cleavers (up to 6-whorl) cocklebur (up to 4-leaf) cow cockle (up to 4-leaf) common groundsel (up to 6-leaf) common ragweed (up to 6-leaf) flixweed green, pale smartweed/lady's-thumb hemp nettle (up to 6-leaf)	night-flowering catchfly perennial sow thistle (top growth) redroot pigweed (suppression) Russian thistle (up to 4-leaf, < 5 cm tall) scentless chamomile shepherd's-purse stinkweed (up to 6-leaf) stork'sbill (suppression) tartary buckwheat (up to 6-leaf) volunteer canola volunteer flax volunteer sunflower wild buckwheat (up to 6-leaf) wormseed mustard (up to 6-leaf)

Registered tank mixes

These tank mixes are for Enforcer M only. ForceFighter M/Foxxy Canuck can be tank mixed with a wide range of graminicides for broad spectrum grassy and broadleaf control. Can be tank mixed with thifensulfuron/tribenuron for suppression of narrow-leaved hawk's-beard. Apply mixes according to the most restrictive crop or use limitations for all products.

Tank mix partners (Enforcer M)	Crop	Enforcer M rate	Crop stage/comments
Achieve, Nufarm Tralkoxydim or other tralkoxydim herbicides	Barley and wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Puma Advance or other fenoxaprop-ethyl herbicide	Barley and wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Signal or other clodinafop herbicide	Wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Simplicity	Wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Varro	Wheat (spring, durum and winter)	0.253 - 0.500 L/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Axial/Epic	Barley and wheat (spring, durum and winter)	Axial: 0.253 - 0.500 L/acre Epic: 160 - 240 mL/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well
Boost	Barley and wheat (spring and durum)	8 g/acre	2 leaf to early flag. Follow the tank mix partners recommended crop stage as well

Application information

Rate: 0.253* - 0.500 L/acre.

* Use the 0.253 L/acre rate only when the weeds are smaller and the fields have light infestation of weeds.

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Mixing instructions
Half fill the tank with clean water. Add the required amount of Enforcer M and agitate thoroughly. Add any tank mix partners. Fill the tank and agitate again before use.

Application information
Optimum activity requires active crop and weed growth. The temperature range for optimum activity is 12 to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance.

How it works
Bromoxynil is a contact-type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. Fluroxypyr and MCPA ester herbicides are selective and non-residual. The components of these products move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected results
Small burnt spots on the leaf can appear within hours. Death takes up to 2 weeks. Poor results may be expected if poor coverage, poor penetration through dense crop canopy. Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.

Restrictions
Rainfall: Avoid application when heavy rain is forecast. **Re-entry interval:** 24 hours. **Re-cropping:** Fields can be seeded the following year to barley, canola, flax, forage grasses, lentil, mustard, oats, pea, rye and wheat, or fields can be summerfallowed. **Grazing:** Do not use treated crops for grazing livestock or green feed until 30 days after application. Do not harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Pre-harvest interval:** Do not harvest the treated crop within 60 days after application.

Environmental precautions
A 15-metre buffer zone is required between freshwater, marine and terrestrial habitats and the treated crop areas.

Toxicity
Acute oral LD_{50} (rats) > 700 mg/kg.

Storage
Store in original containers in a secure, dry, heated storage.

Engenia/Oracle Dicamba/Ammo

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Engenia (PCP# 32220)	BASF Canada	Dicamba: 600 g/L	Solution	8.09 L
Oracle Dicamba (PCP# 26722)	Gharda distributed by UAP	Dicamba: 480 g/L	Solution	9.46 L
Ammo (PCP # 34024)	NewAgco Inc.	Dicamba: 480 g/L	Solution	10 L

Note: Not to be mixed with any glyphosate product that is in the ammonium salt form (480 g active ingredient/litre).

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Crops, staging and rates

Crop	Stage	Rate: Engenia	Rate: Oracle Dicamba/Ammo
Barley*	2 - 5 leaf	74 - 94 mL/acre Do not use Engenia on durum wheat	93 - 117 mL/acre
Spring wheat, including durum*			
Winter wheat*			
Oats*			
Spring rye*	2 - 3 leaf	74 - 94 mL/acre	
Field corn	Emergence to 5 leaf up to 20 cm. Use 20 - 50 cm use drop nozzles	194 mL/acre	242 mL/acre
Canaryseed*	3 - 5 leaf	94 mL/acre	117 mL/acre
Seedling grasses**	2 - 4 leaf	74 - 94 mL/acre	93 - 117 mL/acre
Red fescue	Seedlings: up to 5 cm. Established: up to flag leaf	194 mL/acre	243 mL/acre
Pasture	Established: actively growing	0.680 L - 1.185 L/acre	0.85 - 1.48 L/acre
Rangeland			
Pre-seed weed burndown (cereals) Engenia + glyphosate (360 formulation)	Apply according to leaf stage	Engenia: 102 mL/acre + glyphosate: 0.38 L/acre + surfactant	Oracle/Ammo: 127 mL/acre + glyphosate: 0.38L/acre + surfactant (0.5% v/v)
Chemfallow (+ glyphosate)	2 - 4 leaf stage of weeds	Engenia: 94 - 195 mL/acre + glyphosate: 0.38 L/acre + surfactant (0.5% V/V)	Oracle/Ammo: 117 - 243 mL/acre + glyphosate: 0.38 L/acre + surfactant (0.5% v/v)
Chemfallow (+ 2,4-D)	Apply according to leaf stage	Engenia: 74 - 102 mL/acre + 2,4-D amine 500: 0.45 L/acre	Oracle/Ammo: 93 - 127 mL/acre + 2,4-D amine 500: 0.45 L/acre
Fall stubble	Apply according to leaf stage	0.8 L/acre	1.0 L/acre
Fall stubble (+ glyphosate)	Apply according to leaf stage	Engenia: 0.4 L/acre + glyphosate: 0.38 L/acre	Oracle/Ammo: 0.5 L/acre + glyphosate: 0.38 L/acre
Brush control: alder, poplar, cherry, prickly rose, western snow berry, wolf willow, wild rose	Apply in spring or early summer, when brush species are under 2 metres tall	0.67 - 1.18 L/acre	0.84 - 1.47 L/acre
Roundup Ready 2 Xtend Soybeans	Pre-plant or pre-emergent to the crop, or post-emergent, once or twice prior to early flower	Engenia: 194 - 400 mL/acre	

* Should be tank mixed with 2,4-D or MCPA or any other registered tank mixed partner for broad-spectrum weed control. ** Seedling grasses includes creeping red fescue, crested wheatgrass, intermediate wheatgrass, meadow fescue, meadow foxtail, orchard grass, pubescent wheat grass, slender wheatgrass, smooth bromegrass, streambank wheatgrass, tall fescue, tall wheatgrass, timothy.

Weeds controlled

Engenia alone: 74 to 94 mL/acre, Oracle/Ammo alone: 93 to 117 mL/acre

Canada thistle (top growth only)
cleavers (high rate only)
corn spurry
cow cockle
green smartweed
lady's-thumb
perennial sow thistle (top growth only)
tartary buckwheat
wild buckwheat

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Engenia/Oracle Dicamba/Ammo (cont'd)

Registered Tank Mixes

Tank mix partner	Tank mix rate	Additional weeds controlled including the above mentioned
Barley, spring wheat, winter wheat, rye (only registered with 2,4-D), oats (only MCPA), seedling grasses (only 2,4-D)		
2,4-D Amine 500 or MCPA Amine 500	Engenia: 74 mL/acre + OR Oracle/Ammo: 93 mL/acre 2,4-D Amine: 340 mL/acre or MCPA Amine: 340 mL/acre	2 - 5 leaf stage, burdock, Canada thistle, cocklebur, flixweed, green smartweed, hemp nettle, kochia,redroot pigweed, Russian pigweed, Russian thistle, shepherd's-purse, volunteer canola (1 - 4 leaf) wild radish
Barley spring and winter wheat, oats		
MCPA K-salt	Engenia: 74 mL/acre OR Oracle/Ammo: 93 mL/acre + MCPA-K salt: 440 mL/acre	2 - 5 leaf stage, all of the above weeds
Barley and spring wheat		
Ally	Engenia: 74 mL/acre OR Oracle/Ammo: 93 mL/acre + Ally: 2 g/acre	2 - 5 leaf stage. All of the above weeds plus volunteer canola
Prior to seeding in cereals (wheat, barley, rye, oats and corn only)		
glyphosate*	Engenia: 102 mL/acre OR Oracle/Ammo: 127 mL/acre + glyphosate: 378 mL/acre + surfactant: 0.5% v/v	Weeds as listed on the glyphosate label plus the Engenia label

*DO NOT mix Engenia with any glyphosate product that is present as an ammonium salt.

Application information

How to apply: With ground equipment only. **Water volume:** Ground – cereals, seed grasses – 45 L/acre. Corn – 90 - 140 L/acre. Summerfallow/stubble (thistles) – 45 - 90 L/acre. Reduced tillage: 20 - 45 L/acre. Pastures, Rangeland frasses – 45 - 90 L/acre. Prior to seeding cereal (pre-seeding weed burndown) – 20 - 45 L/acre. Roundup Ready 2 Xtend Soybean: minimum of 40 L/acre, ground application only. Engenia can be applied up to a maximum of 793 mL/acre in a single growing season.

Application tips

Canada thistle and perennial sow thistle control in summerfallow and stubble: Apply before thistles reach early bud stage (15 to 25 cm tall). For the most effective control of Canada thistle, follow a long-term approach that includes in crop, post-harvest and summerfallow treatments, in conjunction with tillage operations. If application is made after September 1, or if soil moisture levels are extremely low after application, crop injury may occur in the spring following application. **Perennial rosette control in summerfallow:** For Canada thistle and/or perennial sow thistle only, perform the final tillage operation the last week of July or first week of August. Allow thistles to regrow for a minimum of 4 weeks and apply when the majority of thistles have emerged. Apply before thistles reach early bud stage (15 to 25 cm tall) and at least 2 weeks prior to killing frost.

Engenia applied to Roundup Ready 2 Xtend Soybeans must be applied using nozzles delivering extremely coarse to ultra-coarse droplets.

Best when crop is under good growing conditions and air temperature 10 to 25°C. Avoid application when crop is under stress from adverse environmental conditions. Do not spray if risk of frost or severe drop in night temperature is forecast. Do not use on bentgrass. Apply only at recommended crop stage, otherwise, crop damage can occur.

How it works

Absorbed through roots and leaves and translocated in phloem and xylem, disrupting the metabolism.

Expected results

Weeds: Results may take 10 to 14 days to appear. Proliferation of tissues in plant causes twisting, bending of stem and leaf petioles; cupping of leaves; increase in root size; increase in fibrous roots. **Crops:** Shortening of straw may occur in treated crops without adverse affects on yield. If applied at other than recommended crop stage, head and stem deformities may occur. Crops under stress from adverse environmental conditions may suffer a further setback. Crop injury may be offset by weed control obtained.

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Restrictions

Rainfall: Rainfall within 4 hours of application may reduce activity. **Re-cropping:** When Engenia/Oracle/Ammo is applied at 1 L/acre on fallow or stubble, grow only beans (white), cereals, corn (field, sweet) or soybeans the next year. After Engenia/Oracle/Ammo (510 mL/acre) + Roundup (690 mL/acre) for thistle control, grow the above crops or canola. If application is after September 1 or if soil is dry subsequent to application, crop injury may occur next spring. **Grazing restrictions:** Canaryseed – use seed only as bird seed. **Cereals, seedling grasses:** follow as per grazing and haying restrictions. **Corn:** Do not graze or harvest for silage until 7 days after Engenia/Oracle/Ammo alone or Engenia/Oracle/Ammo + 2,4-D Amine; at least 12 weeks after other tank mixes.
Pastures, rangeland, non-crop area (meat animals): If treated vegetation has been consumed by meat animals within 30 days of Engenia/Oracle/Ammo application, feed the animal with untreated diet for 30 days before slaughter. Meat animals may graze or feed on treated pasture 30 days after Engenia/Oracle/Ammo application without restrictions on slaughter. **Grazing and hay restrictions (dairy cattle):** (Days = time between treatment and grazing or cutting.) Up to 500 mL/acre – zero days; 501 - 930 mL/acre: – 7 days; 931 mL/acre - 1.86 L/acre – 14 days; 1.87 - 2.87 L/acre – 30 days. **Re-entry interval:** 12 hours.

Environmental precautions

Engenia/Oracle/Ammo may cause injury to desirable trees and plants, particularly soybean, flowers, fruit trees, ornamentals, pea, potato, tomato and other broadleaf plants especially in their developmental and growing stage. Leave an adequate buffer zone between treatment areas and sensitive plants.

Toxicity

Acute oral LD_{50} (rats) = formulated 2,629 mg/kg.

Storage

If frozen, shake thoroughly before use. No activity is lost if completely resuspended.

Eptam Liquid EC

Group 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Eptam Liquid EC (PCP# 11284)	Gowan Canada	EPTC: 800 g/L	Emulsifiable concentrate	10 L

Crop, staging and rates

Crop	Rate/acre	Specific comments
Alfalfa, bird's-foot trefoil (new seedlings)	1.7 L	Apply prior to planting and incorporate. Do not use if seeding a grain or grass nurse crop
Cicer milkvetch, sweet clover (for seed production)	1.7 L	
Dry common beans	1.7 - 2.2 L	Apply prior to planting and incorporate. Do not use on cow, Adzuki, soy or lima bean
Flax, excluding low linolenic acid varieties*	Fall: 1.7 - 2.2 L Spring: 1.4 - 1.7 L	Fall pre-plant incorporated. Apply before soil freeze-up. Spring pre-plant incorporated. Do use on soils with < 3% OM. Seed shallow, less than 3 cm, into a firm seedbed
Potatoes	Fall: 2.2 - 3.4 L Spring: 1.7 - 3.4 L	Fall or spring pre-plant incorporated. Can also be metered in to sprinkler irrigation equipments. See label for details
Sunflower	Fall: 1.7 - 2.2 L Spring: 1.7 L	Fall and spring pre-plant incorporated. Do use on soils with < 3% OM.
Sugarbeet: fall pre-plant incorporated	2.2 L	Fall treatment: in the late fall before the ground freezes
Sugarbeet: sprinkler irrigation water	1.1 - 1.7 L	

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Eptam Liquid EC (cont'd)

Weeds and staging

Must be applied prior to emergence of the weeds. Emerged weeds will not be controlled.

annual bluegrass	hairy nightshade	purslane	volunteer oats
barnyard grass*	henbit	quackgrass	volunteer wheat
common chickweed	italian ryegrass	redroot pigweed*	wild oats
corn spurry	lamb's-quarter*	tumble pigweed*	
green foxtail*	prostrate pigweed*	volunteer barley	

* In dry bean, improved control can be obtained by tank mixing with Treflan or Rival.

Registered tank mixes

Tank mix partners	Products rate	Specific comments
Common dry beans (snap and red kidney only)		
Rival EC or Treflan EC	Eptam: 1.2 L + Rival 500 EC: 0.45 L or Treflan 545 EC:0.486 L	Under extreme weather conditions, such as cold temperatures and wet soils or higher temperatures and dry soils, stunting may occur
Flax (Do not use on low linolenic acid varieties) - spring treatment:		
Rival EC or Treflan EC	Eptam: 1.2 L + Rival 500 EC: 0.45 L or Treflan 545 EC:0.486 L	May result in reduced crop stand and/or crop damage; however, yield should not be affected
Potatoes		
Metribuzin	Light soils: Eptam: 1.7 - 2.2 L + Squadron/ Tricor: 0.3 L Heavy soils: Eptam: 1.8 - 2.2 L + Squadron/ Tricor: 0.3 L	Do not use on sandy or coarse textured soils with less than 2% organic matter as crop injury may result

Application information

How to apply: Apply with ground equipment or irrigation water. Do not apply by air. **Water volume:** 45 L/acre minimum. **Incorporation:** Incorporate immediately. Second incorporation must be at right angles to the first. Apply evenly and mix with a minimum of the top 7.5 cm of soil thoroughly.

Application tips

For use on mineral soils only. When applying Eptam 8-E with granular fertilizer, a minimum of 81 kg/acre and a maximum of 324 kg/acre of fertilizer is required. See product label for further instructions.

How it works

Taken up by the roots and shoots of a germinating weed where it disrupts and stops further shoot growth.

Expected results

Weeds: Absorbed by the weed shoot; therefore, most affected weeds will not emerge. Numerous chlorotic and bleached shoots may be visible by removing the top few inches of treated soil. Provides effective weed control for approximately 6 to 8 weeks. **Crops:** If crop seedlings are weak, some injury may occur.

Restrictions

Rainfall: Soluble in water, may leach under wet conditions. **Grazing:** Do not graze or harvest for livestock feed in year of treatment. **Pre-harvest intervals:** Do not apply within 45 days of harvest. **Re-cropping:** No restrictions. **Re-entry interval:** 24 hours.

Environmental precautions

Eptam 8-E is toxic to fish and wild mammals.

Toxicity

Acute oral LD_{50} (rats) = 1,600 mg/kg.

Storage

Heated storage not required.

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Erebus Xtreme

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Erebus Xtreme (PCP# 34353)	Syngenta	Pyroxsulam: 12.8 g/L Fluroxypyr: 113.5 g/L	Suspension	9.46 L
Erebus Xtreme B Utility Modifier				3.88 L

Crops, staging and rates

Crop	Stage	Rates
Spring wheat (including durum) and winter wheat	3-leaf up to and including stem elongation	Erebus Xtreme at 360mL – 470mL/acre + Erebus Xtreme B Utility Modifier at 95mL/ac

Weeds, rates and staging

Weeds controlled or Supressed by Erebus Xtreme Herbicide at 360mL/ac

Weeds controlled	Weeds supressed
cleavers (1-8 whorls) flax, volunteer (1-12cm) oats, wild (<75 plants/m2, up to 4 leaf, 2 tiller) wild buckwheat (1-4 leaf)	kochia** (2-8 leaf) stork's-bill (1-8 leaf)

** Including biotypes resistant to Group 9 (glyphosate) and Group 2 (ALS inhibiting) herbicides

Weeds controlled or supressed by Erebus Xtreme Herbicide at 470mL/ac

Weeds controlled	Weeds supressed
barnyard grass (1-5 leaf) brome, Japanese (1-6 leaf) canola, volunteer (1-6 leaf) chickweed, common (up to 10 cm) cleavers (1-8 whorls) corn spurry (up to 2 whorl stage, <10 cm) cow cockle (up to 8 leaf) flax, volunteer (1-12 cm) flixweed (up to 10 cm) foxtail, yellow (1-5 leaf) hemp nettle (1-8 leaf) kochia** (2-8 leaf) oats, wild (up to 4 leaf, 2 tiller) pigweed, red-root (1-8 leaf) round-leaved mallow (up to 6 leaf stage, <10 cm) shepherd's purse (up to 30 cm tall) smartweed (lady's-thumb, 1-5 leaf) stinkweed (up to 30 cm tall) wild buckwheat (1-4 leaf)	brome, downy (2-6 leaf, 4 tillers) dandelion (seedlings and over-wintered rosettes less than or equal to 20 cm) foxtail, green (1-5 leaf) stork's-bill (1-8 leaf) thistle, Canada (up to 30 cm tall, prebud) thistle, Russian (up to 10 cm tall)

** Including biotypes resistant to Group 9 (glyphosate) and Group 2 (ALS inhibiting) herbicides

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Erebus Xtreme (cont'd)

Registered tank mixes

Tank mix partners	Tank Mix Partner Rate
2,4-D Ester 700	214 - 241mL/acre

Application information

How to apply: Ground or aerial application. **Water volume:** Ground – 20 - 40 L/acre. Air – 12 - 20 L/acre.

Application tips

Erebus Xtreme must be applied early postemergence, to the main flush of actively growing weeds. Conditions favouring active weed growth enhance herbicide activity allowing maximum foliar uptake and contact activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. For best results, ensure thorough spray coverage of target weeds. Degree of control and duration of effect are dependent on weed sensitivity, weed size, crop competition, growing conditions at and following treatment, and spray coverage.

How it works

Erebus Xtreme contains pyroxsulam which inhibits the production of the ALS enzyme in plants. This enzyme is essential for the production of certain amino acids which are essential for plant growth. Erebus Xtreme also contains a systemic auxin-type herbicide and moves within the plant for control of exposed and underground plant tissues. The product controls weeds by disrupting normal plant growth patterns.

Expected results

Actively growing susceptible weeds stop growing. Depending on species, growing conditions and crop competition, leaf discoloration occurs within 1-3 weeks after application.

Restrictions

Rainfall: Rainfast in 1 hour. **Grazing:** Livestock may be grazed on treated crops 7 days following application. **Re-cropping:** Fields treated can be seeded the following year to barley, canola, corn, dry beans (of the species Phaseolus vulgaris), flax, lentils, yellow and brown, mustard, oats, peas, potatoes, soybeans, sunflower, or spring wheat; or fields can be summerfallowed. **Pre-harvest Intervals:** Do not harvest the treated crop within 60 days after application. **Re-entry interval:** 12 hours.

Toxicity

Oral LD_{50} (rat, female) = > 5,000 mg/kg. Dermal LD_{50} (rat, male and female) = > 5,000 mg/kg.

Storage

Store in original container in a secure, dry, heated storage.

Escort® Herbicide

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Escort® (PCP# 23005)	Bayer	Metsulfuron methyl: 60%	Dry flowable	0.25 kg.

Crops, staging and rates

Pasture, rough turf, rangeland, non-crop areas. **Rate:** 8 - 60 g/acre.

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Weeds, rates and staging

Annual weeds (seedling): Young and actively growing (less than 10 cm tall or across).

Established annual weeds; biennial and perennial weeds: Up to the early bud stage.

Woody species: Mid-June to mid-August after weed species has leafed out but before fall colouration begins.

Rough turf, pasture, rangeland and non-crop areas:		
Weeds controlled or suppressed at 8 grams per acre**		
Canada thistle*	kochia[1] (except Group 2 resistant kochia)	sow thistle*
common tansy	perennial pepperweed	sweet clover
dandelion*	Russian thistle	
field scabious	scentless chamomile	
Weeds controlled at 10 grams per acre. Above weeds plus western snowberry**		
Weeds controlled at 12 grams per acre. Above weed species plus wild rose and dandelion**		
Rangeland and non crop areas only: Woody species controlled at 40 grams per acre. All of the above weeds plus following**		
balsam poplar	willow	
Woody species controlled at 57 grams per acre, All of the above weeds plus		
pine, jack	pine, red	western and eastern white pine
Woody species controlled at 60 grams per acre. All of the above weeds plus following**		
cherry	trembling aspen	

[1] **Note:** Prairie-wide surveys of kochia field have found approximately 90% of kochia populations are Group 2 herbicide resistant. Assume kochia in your field is resistant and it will not be controlled by this product alone. * Suppression only. ** At rates, add Agral 90, Ag-Surf or Citowett at 0.2 L per 100 L of spray solution.

Registered tank mixes

Tank mix partners	Products rate/acre	Specific comments
2,4-D amine or ester 500	Escort: 8 - 12 g + 2, 4-D: 790 mL + Agral 90, or Ag-Surf: 0.2% v/v of spray solution	Apply as a full coverage spray to foliage and stems using equipment that will assure uniform coverage

Application information

How to apply: Ground equipment. Do not apply by air. **Water volume:** 40 - 90 L/acre.

Application tips

Add surfactant when tank mixing. Apply as a full coverage spray to foliage and stems using equipment that will assure uniform coverage. Use spray preparation within 48 hours or product degradation may occur. If spray preparation is left standing without agitation, thoroughly agitate before spraying. Avoid overspray or drift to non-target species and aquatic and wildlife habitats.

How it works

Absorbed by foliage. Inhibits cell elongation.

Expected results

Escort rapidly stops growth of susceptible species, however, typical symptoms (discolouration) may not be noticeable for several weeks after application, depending on growing conditions and weed susceptibility. Warm, moist conditions following treatment promote the activity of Escort while cold, dry conditions may reduce or delay activity. Brush and weeds hardened off by cold weather or drought stress may not be controlled. Degree of control and duration of effect are dependent on the rate used, sensitivity and size of target species, as well as soil moisture and soil temperature.

Restrictions

Rainfall: No rain-free period is specified on the label. **Grazing:** Cattle may graze the treated areas on the day of treatment. **Re-entry interval:** 12 hours.

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Escort® Herbicide (cont'd)

Environmental precautions
Escort is toxic to aquatic organisms and non-target terrestrial plants. Leave a 10-metre buffer zone between sprayed area and sensitive habitats.

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in a cool, dry place. Non-corrosive, non-flammable, non-volatile and does not freeze.

Esplanade® SC Herbicide

Group 29

Formulation

Product	Company	Active ingredient	Formulation	Container size
Esplanade® SC (PCP #31333)	Bayer	Indaziflam: 200 g/L	Suspension	1 L, 10 L

Crops, staging and rates

Crop	Stage	Rate per acre
Non-residential, non-crop areas such as: railroad and rail yards, managed roadsides, well sites, storage tank yards, fence rows, utilities, hardscapes, industrial military bases, municipal and government sites, and around farm buildings, including grazed or hayed areas within these sites. Do not apply to cropland.	Pre-emergence. Apply to target surface in a uniform broadcast or band before weeds germinate. Avoid disturbing soil after application.	151 mL Only apply once per season.

Weeds and staging

Broadleaf weeds:

bittercress (including Hairy)
black medic
carpetweed
mouse-eared chickweed
white clover*
corn speedwell
cudweed
curly dock
dog fennel
field bindweed
hairy fleabane
common groundsel
smooth hawksbeard
henbit
kochia*
lamb's-quarter
little mallow
London rocket*
morning glory
black mustard
wild mustard
American black nightshade
prostrate pigweed
redroot pigweed*
prostrate knotweed
buckthorn plantain
prickly lettuce*
common purslane
spotted spurge
shepherd's-purse
annual sowthistle
St John's wort
yellow starthistle
stork's-bill
common sunflower
white sweetclover
purple vetch
yellow woodsorrel

Grass weeds:

annual bluegrass
annual brome grasses including downy brome, ripgut brome, and cheatcommon chickweed
barnyardgrass
bluestem broomsedge
cheatgrass
crabgrass (large, smooth and hairy)
giant foxtail
green foxtail
yellow foxtail
Goosegrass
Italian ryegrass
medusa head
annual ryegrass
tumble pigweed*
perennial ryegrass
globe sedge**
stinkgrass
tufted lovefrass
volunteer common rye
wild barley
wild oats
wild proso millet
witchgrass

* suppression only **only controls globe sedge emerging from seed

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Registered tank mixes
Roundup WeatherMAX, VisionMax, Roundup Ultra2, IPCO Factor 540, R/T 540 Liquid, Roundup Transorb HC, Milestone, Payload. Navius herbicide with the addition of a non-ionic adjuvant or merge or crop oil concentrate

Application information
How to apply: Ground application only. Do not apply by air. **Water Volume:** 40 - 400 L/acre.

Mixing instructions
If ESPLANADE SC Herbicide is to be applied in a tank mixture with other pesticides, add the appropriate amounts of the tank mix partners in the following order: (a) products in water-soluble packaging (WSP's), (b) wettable powder (WP's), (c) wettable granules (WG's) or other dry flowables, (d) fertilizers, (e) ESPLANADE SC Herbicide, (f) other aqueous suspension products (SC's), (g) liquid flowables, (h) emulsifiable concentrates and other organic-solvent based formulations. Continue to fill the tank with water to the desired volume while agitating. Maintain sufficient agitation during application to ensure a uniform spray mixture.

Application tips
For best results use flat fan nozzles or comparable nozzles to achieve uniform spray distribution. Do not apply with application equipment that does not provide uniform coverage. Excessive plant debris present on the soil surface at time of application may prevent uniform product distribution reaching the soil and reduce weed control. Performance may be improved by removing excessive debris prior to product application. Avoid disturbing treated soil after application of Esplanade SC Herbicide.

How it works
Esplanade SC Herbicide controls weeds by reducing the emergence of seedlings through inhibition of cellulose biosynthesis (CB Inhibitor). Necrosis or yellowing may also be observed if the herbicide is applied to herbaceous tissue such as leaves and green stems of susceptible plants.

Expected results
Weed seeds and seedlings must come into contact with Esplanade SC Herbicide prior to emergence to be controlled. Esplanade SC Herbicide applied alone will not control weeds that are already emerged. If weeds have emerged, a foliar active post emergent herbicide must be added. If sufficient moisture is present, some weeds may germinate and emerge from below the treated layer

Restrictions
Rainfall: Not specified. **Grazing:** There are no grazing or haying restrictions for non-lactating or lactating animals (including cattle, horses, sheep and goats) when using Esplanade SC herbicide alone as directed. Consult label of tank mix partners and follow the most restrictive interval. **Re-cropping:** Not specified. **Re-entry interval:** Do not enter into treated areas until sprays have dried.

Environmental precautions
Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on label.

Toxicity
Oral LD_{50} = > 5,000 mg/kg. Dermal LD_{50} > 2,000 mg/kg.

Storage
Cannot be stored at temperatures below freezing. Keep in original container during storage. To prevent contamination, store this product away from food or feed.

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Estaprop XT/IPCO Dichlorprop DX

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Estaprop XT (PCP# 29660)	Nufarm Agriculture	Dichlorprop: 210 g/L + 2,4-D: 400 g/L	Emulsifiable concentrate	9.7 L, 97.1 L
IPCO Dichlorprop DX (PCP# 29664)	IPCO	Dichlorprop: 210 g/L + 2,4-D: 400 g/L		10 L, 115 L

Note: Desormone is registered for non-crop use only.

Crops, staging and rates

Rate: 0.486 L/acre EstapropXT/Dichlorprop DX to 3.2 L/acre Estaprop XT/Dichlorprop DX

Crop	Stage
Barley (not underseeded with legumes), spring wheat, including durum (not underseeded with legumes)	4-leaf until early flag leaf
Winter wheat	In spring, from full tillering to the early flag leaf
Non-crop areas: roadsides, utility lines, railway rights-of-way	Apply during the month of May or in early fall

Weeds, rates and staging

Agricultural uses: Apply when weeds are young and actively growing, unless otherwise noted.
Industrial uses: Apply during the month of May or in early fall.

Agricultural use: Field crops: Weeds controlled by Estaprop XT/Dichlorprop DX at 0.486 L/acre		
annual sow thistle	kochia (apply before plants are 5 cm high)	shepherd's-purse
ball mustard	lady's-thumb (apply before the 4-leaf stage)	smartweed (apply before the 4-leaf stage)
bluebur	lamb's-quarter	stinkweed
burdock	night-flowering catchfly (spring annuals only)	stork's-bill
Canada thistle (top growth control only)	oak-leaved goosefoot	tartary buckwheat
cocklebur	perennial sow thistle (top growth only)	tumble mustard
curled dock (top growth control only)	prickly lettuce *** (2 - 12 leaf stage)	volunteer canola
dandelion (season-long control)	ragweed	volunteer sunflower
dog mustard	redroot pigweed	wild buckwheat
flixweed	round-leaved mallow	wild mustard
hare's-ear mustard	Russian pigweed	wormseed mustard
Indian mustard	Russian thistle (before plants are 5 cm high)	
Industrial uses: Roadsides, utility lines, railway rights-of-way. Weeds controlled at 1.6 L/acre with Estaprop XT/Dichlorprop DX (in addition to above agricultural weeds)		
alfalfa	dogbane	sweet clover
bull thistle	goat's-beard	tansy
Industrial uses: Roadsides, utility lines, railway rights-of-way. Weeds controlled at 1.6 L/acre with Estaprop XT/Dichlorprop DX (in addition to above agricultural weeds)		
burdock	goldenrod	teasel
buttercup	hawkweed	toadflax
Canada thistle	horsetail (partial control)	vetch
chicory	milkweed (top kill)	wild carrot
cinquefoil	mullein	yellow rocket

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curled dock	perennial sow thistle	
dandelion	plantain	
Brush control		
Brush control at 2.4 L/acre with Estaprop XT/DichlorpropDX		
hawthorn	sugar maple	wild plum
poplar	white cedar	wild raspberry
scots pine	wild cherry	
Brush control at 3.2 L/acre with Estaprop XT/Dichlorprop DX		
alder	ground juniper	rose (some regrowth)
aspen	hardhack	silver maple
balsam fir	hazel	sugar maple
basswood	hickory	sumac
birch	honeysuckle	tamarack
Brush control at 3.2 L/acre with Estaprop XT/Dichlorprop DX		
blueberry	manitoba maple	white oak
bur oak	poison ivy	wild apple
elderberry	raspberry	willow
elm	red pine	

* Estaprop registered for dandelion control on fall and winter wheat. ** Only Estaprop registered for prickly lettuce control in winter wheat.
*** Only for Estaprop XT. Post-emergence application, between full tillering and early flag leaf stage of winter wheat only, of prickly lettuce.

Registered tank mixes

Agricultural Field Crops: All 2, 4-D + dichlorprop formulations may be recommended in tank mix with other products. Consult the label of the tank mix partner product, and follow the most stringent set of precautions, restrictions and directions for use.

Industrial uses

Tank mix partner	2,4-D + dichlorprop plus tank mix partner	Additional weeds controlled
Vanquish	Estaprop XT/Dichlorprop DX: 5.7 L +Vanquish: 6.25 L/1000 L spray mix	Improve control of aspen, poplar and white birch

Application information

Agricultural uses: Apply with ground or by air. **Water volume:** Ground – 20 - 80 L/acre. Air – 12 L/acre.

Industrial uses

Apply with power equipment, knapsack sprayer or by air. Note: Do not apply by air on roadsides.

Water volume: Broadleaf weeds – 80 - 220 L/acre. Brush control – 300 - 500 L/acre.

When to apply: Broadleaf weeds – apply during the month of May or in early fall. Some species may require a second treatment. Spray weed infested areas with an even spray pattern, making sure weeds shielded by high grass are thoroughly wetted. Spray tall weeds to runoff. Brush control – apply on foliage and stems just before or just after brush is in full leaf in late spring or early fall. Many species may require re-treatment the following year.

Basal treatment (not ash or basswood) – any time of year. Frill treatment – standing trees more than 13 to 15 cm in diameter. Stump treatment: immediately after cutting.

Application tips

Crops under stress from adverse environmental conditions such as excess moisture, drought, disease, etc. may suffer a further setback when Dichlorprop + 2,4-D is applied, however, the crop injury that may occur is usually offset by the benefits of enhanced weed control. Apply in warm weather when the crop and weeds are growing well and the weeds are at a susceptible stage. Avoid application during drought conditions or during exceptionally hot weather.

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Estaprop XT/IPCO DIchlorprop DX (cont'd)

How it works
A systemic herbicide absorbed by leaf and stem.

Expected results
Twisting and curling of weeds will commence 2 to 10 days after application. Growth ceases; eventually plants turn brown and die. Poor results may be expected if poor coverage or low relative humidity during and after spraying.

Restrictions
Pre-harvest intervals: 40 days. **Rainfall***:* Rain within 3 to 4 hours of application may reduce control. **Grazing**: Do not graze or cut treated crops for forage until 40 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Re-entry interval:** 12 hours.

Environmental precautions
2,4-D + dichlorprop formulations are moderately to highly toxic to aquatic organisms. These formulations are also toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the label.

Toxicity
Acute oral LD_{50} (rats) = 2, 4-D, 300 - 1,000 mg/kg, dichlorprop = 800 mg/kg.

Storage
May be stored at any temperature. Shake well after storing for 1 year or longer.

Everest 3.0 AG/Sierra 3.0 AG/Himalaya

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Everest 3.0 AG (PCP# 33258)	UPL AgroSolutions	Flucarbazone: 200 g/L	Suspension concentrate	3.88 L
Sierra 3.0 AG (PCP # 33538)	Syngenta			
Himalaya (PCP # 33370)	NewAgco Inc.	Flucarbazone: 66%	Water dispersable granule	567 g

Note: For Himalaya a non-ionic surfactant (Ag-Surf, Agral 90 or others) is required at 0.25% v/v. Surfactant sold separately.

Crops, staging and rates
Rate: Everest 3.0 AG/Sierra 3.0 AG: 29 - 58 mL/acre. Himalaya: 8.7 - 17.4 g/acre.

Crop	Stage
Spring wheat (including durum) and winter wheat*	1 leaf to a maximum of 4 leaves on the main stem, plus 2 tillers (6 total leaves)

Caution: Do not apply to spring wheat underseeded to legumes. * Sierra and Everest only

Weeds, rates and staging

Weeds	Staging	Everest 3.0 AG/Sierra 3.0 AG rate per acre	Himalaya rate per acre
Green foxtail only	1 - 4 leaf plus 2 tillers	29 mL	8.7 g
Wild oats (population < 100 plants/m^2), green foxtail and volunteer oats	1 - 4 leaf plus 2 tillers	39 mL	11.5 g

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Weeds	Staging	Everest 3.0 AG/Sierra 3.0 AG rate per acre	Himalaya rate per acre
Green smartweed, redroot pigweed, shepherd's-purse, volunteer canola*, wild mustard	Broadleaves: 2 - 6 leaf	39 mL	11.5 g
Stinkweed	2 - 9 leaf	39 mL	11.5 g
Weeds listed above plus wild oat (> 100 plants/m^2) under ideal growing conditions and Japanese brome, wild buckwheat[1], barnyard grass[1], yellow foxtail[1]	Grasses: 1 - 4 leaf plus 2 tillers Broadleaves (except stinkweed): 2 - 6 leaf Stinkweed: 2 - 9 leaf	48 mL	14.2 g
Weeds listed above plus wild oats (> 100 plants/m^2) and Japanese brome, wild buckwheat[1], barnyard grass[1], yellow foxtail[1]	Grasses: 1 - 4 leaf plus 2 tillers Broadleaves (except stinkweed): 2 - 6 leaf Stinkweed: 2 - 9 leaf	58 mL**	17.4 g

* Will not control volunteer Group 2 tolerant canola varieties.
[1] Suppression. Controlled when mixed with Inferno.

** Apply at this rate when wild oat, yellow foxtail, barnyard grass and Japanese bromegrass are not actively growing due to poor environmental conditions.

Registered tank mixes

Tank mix partner	Tank mix partner rate	Everest 3.0 AG/Sierra 3.0 AG rate per acre	Himalaya rate per acre
In spring wheat (excluding durum)			
2, 4-D (Amine 600/Ester 700)	Up to 0.40 L/acre Amine, 0.34 L/acre Ester	29 - 58 mL	11.5 - 17.4 g
Ally + 2,4-D Amine 600 or Ester 700**	Ally: 2 - 3 g/acre. 2,4-D: up to 0.40 L/acre Amine, 0.34 L/acre Ester		
Attain XC	Attain XC A: 0.096 - 0.13 L/acre. Attain XC B: 0.26 - 0.34 L/acre		
Buctril M/Logic M	Buctril M: 0.4 L/acre. Logic M: 0.5 L/acre		
Curtail M	0.6 - 0.8 L/acre		
Enforcer M	0.243 - 0.5 L/acre		
Frontline 2,4-D XC	Frontline 2,4-D XC A: 40 mL/acre. Frontline 2,4-D XC B: 340 mL/acre		
Frontline XL***	0.506 L/acre		
Inferno WDG	4 g/acre		
MCPA (Amine/Ester 600)	Up to 0.38 L/acre		
OcTTain XL***	0.45 L/acre		
Paradigm	10 g/acre		
Paradigm + MCPA ester	10 g/acre + 232 mL/acre		
Paradigm + Curtail M	10 g/acre + 600 mL/acre		
Pardner/Brotex 240	Pardner: 0.4 L/acre. Brotex: 0.49 L/acre		
Prestige XC	Prestige XC A: 0.17 L/acre. Prestige XC B: 0.8 L/acre		

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Everest 3.0 AG/Sierra 3.0 AG/Himalaya (cont'd)

Tank mix partner	Tank mix partner rate	Everest 3.0 AG/Sierra 3.0 AG rate per acre	Himalaya rate per acre
Pixxaro A	Pixxaro A: 0.125 L/acre		
Pixxaro A+ MCPA Ester	Pixxaro A: 0.125 L/acre + MCPA Ester (Pixxaro B): 0.235 L/acre		
Pixxaro A+ Curtail M	Pixxaro A: 0.125 L/acre + Curtail M: 0.60 L/acre		
Refine SG	Refine SG: 12 g/acre.		
Refine SG+ 2, 4-D amine/ester 500	Refine SG: 12 g/acre. 2,4-D: up to 0.45 L/acre or equivalent		
Stellar A	0.4 L/acre		
Target*	0.4 - 0.6 L/acre		
Thumper/Leader	Thumper: 0.4 L/acre; Leader: 0.5 L/acre		
Triton C**	39 g/acre		
Trophy	Trophy A: 0.24 L/acre + Trophy B: 0.372 L/acre		
In durum wheat			
2,4-D (Amine 600/Ester 700)***	Up to 0.30 L/acre. Amine, 0.26 L/acre Ester	29 - 58 mL	11.5 - 17.4 g
Enforcer D	0.243 - 0.486 L/acre		
Enforcer M	0.243 - 0.5 L/acre		
Frontline***	Frontline A: 40 mL/acre. Frontline B: 0.34 L/acre		
Paradigm and mixes	Same rates as for spring wheat above		
Pixxaro and mixes	Same rates as for spring wheat above		
In winter wheat			
2,4-D Amine or ester	0.4 L/acre or equivalent	29 - 58 mL	NR****
Buctril M/Logic M	Buctril M 0.4 L/acre, Logic M 0.5 L/acre		
MCPA Amine or ester	0.4 L/acre or equivalent		
Refine SG	Refine SG: 12 g/acre		

Note: All mixes must be applied with a non-ionic surfactant (such as Agral 90, Ag-Surf, Surf 92, Super Spreader, LI 700 at 0.25% v/v or 0.25 L per 100 L spray solution), unless otherwise indicated.

* Reduction in wild oats control may be observed with this tank mix partner. ** Addition of a second surfactant is not required.
*** Apply tank-mix in at least 45 L/acre of water. **** Not registered.

UPL AgroSolutions supports the following, non-registered mixes: Akito, Akito+2,4-Ester, Akito+MCPA Ester, Barricade II, Enforcer D, Frontline 2,4-D, Momentum, Stellar XL, tribenuron (Express SG, Spike).

Application information

Apply with: Ground and aerial appliction. **Water volume:** Ground – 22.5 - 45 L/acre. Aerial – 11 L/acre minimum.

Mixing instructions

Use mixing instructions "d" on page 15.

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Application tips
When spraying under the conditions of waterlogged or saturated soils, temperature extremes such as heat or freezing weather, drought, low fertility or plant disease wheat can show unacceptable injury symptoms. Weed control may also be reduced by these same conditions.

How it works
Flucarbazone-sodium is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing point of the plant.

Expected results
Growth of susceptible plants stops soon after application. Symptoms include discolouration (yellowing, reddening and purpling) and complete control may take 1 to 2 weeks.

Restrictions
Rainfall: Do not apply if it is raining or if rainfall is expected within 1 hour after application. **Grazing:** Do not graze treated fields or use green crop for feed. Wheat grain or straw from harvested treated fields may be fed to livestock. **Pre-harvest intervals:** Observe minimum interval to harvest of 80 days after treatment. **Re-cropping:** The following crops may be planted 11 months after an application of Everest. **Re-entry interval:** 12 hours.

Soil zones and rotational crops			
Gray-Wooded	**Black**	**Dark Brown**	**Brown**
Spring wheat, barley, canola, field pea*	Spring wheat, barley, durum wheat	Spring wheat, barley, durum wheat	Spring wheat
	Canola, flax, sunflower	Canola, flax, sunflower	
	Field pea*, field bean, soybean	Field pea*, soybean	

* Field pea can be successfully grown the year following flucarbazone-sodium application providing the following 3 criteria are all met:

1. Soil pH must be below 7.5. 2. Organic Matter content must be above 4%. 3. Precipitation must be equal to or above the 10-year average (minimum 100 mm within 60 days of application in year of application).

Environmental precautions
Do not allow this chemical to drift onto other crops, especially canola, tame oats, or other non target crops.

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Heated storage is required. MP Himalaya may be frozen.

Exhilarate/IPCO Exhilarate/Co-op Exhilarate

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Exhilarate A (PCP # 33803)	Corteva Agriscience	Halauxifen methyl ester: 20% Florasulam: 20%	Wettable granule	0.8 kg
Plus M Ester 600 (PCP # 29622)		MCPA Ester: 600 g/L	Emulsifiable concentrate	2 x 7.56 L
IPCO Exhilarate co pack of Exhilarate A (PCP # 33803)	Corteva Agriscience	Halauxifen methyl ester: 20% Forasulam: 20%	Wettable granule	0.8 kg
IPCO MCPA Ester 600 (PCP # 27802)	IPCO	MCPA Ester: 600 g/L	Emulsifiable concentrate	2 x 7.5 L

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Product	Company	Active ingredient	Formulation	Container size
Co-op Exhilarate co pack of Exhilarate A (PCP # 33803)	Corteva Agriscience	Halauxifen methyl ester: 20% Forasulam: 20%	Wettable granule	0.8 kg
Co-op MCPA Ester 600 (PCP # 29001)	Federated Cooperatives Ltd.	MCPA Ester: 600 g/L	Emulsifiable concentrate	2 x 7.5 L

Crops, staging and rates

Crop	Stage	Rates
Spring wheat (including durum), winter wheat and barley	3-leaf to just prior to flag leaf emergence	Exhilarate A at 10 g/acre Plus M Ester 600 at 189 ml/acre

Weeds and staging

Weeds controlled at the 1 - 8 leaf stage unless otherwise specified by the Exhilarate label.

alfalfa, volunteer (up to 25 cm tall)
American dragonhead
barnyard grass (up to 5-leaf, 2 tiller)
buckwheat, wild
canola, volunteer
chickweed†
cleavers (1 - 9 whorl)†
cow cockle
dandelion (seedlings and spring rosettes up to 30 cm diameter)
fleabane, Canada (up to 15 cm tall)
flax, volunteer
flixweed (up to 8-leaf and 8 cm tall)
hemp-nettle (1 - 8 leaf)†
henbit
lamb's-quarter†
wild mustard (up to 4-leaf)
narrow-leaved hawk's-beard (up to bolting and 30 cm in height)
ragweed, common (up to 6-leaf)‡
redroot pigweed
round-leaved mallow (up to 6-leaf)
shepherd's-purse (up to bolting and 30 cm tall smartweed (green, lady's-thumb)
sow thistle, annual (up to 4-leaf)
stinkweed (up to 4-leaf)
stork's bill (up to 8-leaf)
velvetleaf (up to 5-leaf)

Weeds Suppressed

kochia ‡
night flowering catchfly (up to bolting stage, 15 cm in height)
scentless chamomile (up to bud stage)
cleavers (1 - 9 whorl)†
sow-thistle, perennial (up to 6-leaf)
thistle, Canada (up to the bolting stage, 30 cm tall)
white cockle (spring seedlings and over-wintered plants up to the bud stage)

† Including group 2 resistant biotypes; ‡ Including group 2 and 9 resistant biotypes

Registered tank mixes

Tank mix partner	Crops	Rates
Simplicity or Simplicity GoDRI	Spring wheat (including durum) and winter wheat	Simplicity: 200 ml per acre Simplicity GoDRI: 28 g/acre + Bindem Utility Modifier at 60 mL/acre
Axial*	Spring wheat and barley	500 ml/acre
Everest 3.0	Spring wheat, durum	29 - 58 mL acre
Tandem	Spring wheat, durum	Low rate: Tandem A - 150 mL/acre, Tandem B - 85 mL/acre HIgh rate: Tandem A - 200 mL/acre, Tandem B - 125 mL/acre

* No surfactant is required with Axial. Corteva Agriscience will support the following tank mixes not on the Exhilarate label: Traxxos, Varro and Axial Extreme. Do not exceed the 189 ml/acre rate of MCPA Ester 600 when tank mixing Exhilarate with Axial Extreme, Axial or Traxxos.

Application information

How to apply: Ground application only. **Water volume:** 20 - 40 L/acre.

Application tips

Do not apply during periods of dead calm or when winds are gusty. Do not apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE S572.1) coarse classification. Boom height must be 60 cm or less above the crop or ground.

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How it works

Exhilarate is a mixture of a systemic auxin-type herbicides (Group 4) and an ALS enzyme inhibitor-type herbicide (Group 2). The product controls weeds by disrupting normal plant growth patterns and/or by inhibiting production of the enzyme essential for production of certain amino acids essential for plant growth.

Expected results

Weeds start to twist between 2 to 20 days after spraying, dependent on weather conditions and nature of weeds. Following twisting and bending, plants will turn brown and die.

Restrictions

Rainfall: Applications are rain fast within 1 hour of application. **Grazing:** Livestock may be grazed on treated crops 7 days following application. **Re-cropping:** Fields previously treated with Exhilarate can be seeded after a minimum of 10 months to alfalfa, spring wheat, spring barley, canola, faba bean, flax, field corn, Juncea canola, field pea, potato (except seed potato), oriental, brown and yellow mustard, soybean, oats, sunflower or dry bean (Phaseolus vulgaris species including pinto, kidney and white types). Lentil can be planted 22 months after application of Exhilarate. **Pre-harvest Intervals:** Do not harvest the treated crop within 60 days after application. Do not cut the treated crop for hay or silage within 21 days after application. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zone of 1 metre between terrestrial and water habitats.

Toxicity

Exhilarate A: Oral LD_{50} (rats) = >5000 mg/kg. MCPA Ester 600: Oral LD_{50} (rats) = > 1793 mg/kg.

Storage

Store in original containers in a secure, dry, well ventilated storage. Shake Plus M Ester component well before using.

Express FX (co-pack)/Express FX (all-in-one)

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Express FX co-pack of: Express SG (PCP# 28262) + Dicamba L (PCP# 31536)	FMC of Canada Limited	Tribenuron methyl: 50%	Soluble granules	486 g
		Dicamba: 480 g/L	Solution	4.7 L
Express FX (all-in-one) (PCP# 33039)		Tribenuron methyl: 6.52% + dicamba: 60.87%	Wettable granules	1.86 kg

Note: Express FX is purchased alone but must be tank mixed with glyphosate before use.

Crops, staging and rates

Rate: Express FX co-pack, Express SG – 6 g/acre. Dicamba L – 59 mL/acre. Express FX (all-in-one) – 46.5 g/acre.

Crop	Staging	Comments
Express FX co-pack: barley, spring wheat (including durum), oats	1 day prior to seeding	Must be tank mixed with glyphosate
Express FX (all-in-one) formulation: barley, spring, durum and winter wheat, oats,	1 day prior to seeding	Must be tank mixed with glyphosate

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Express FX (co-pack)/Express FX (all-in-one) (cont'd)

Crop	Staging	Comments
Chemfallow	With any chemfallow treatment, allow at least 10 days to elapse between treatment and tillage. Only weeds emerged at time of application will be controlled.	Fields treated with a chemfallow application of EXPRESS® FX Herbicide can be seeded to any crop the following season.
Fall Application	Post-harvest	Post-harvest application fields can be spring seeded to spring and durum wheat, barley and oats. To seed canola, field corn, soybean, lentil or white bean the spring after fall application, contact the manufacturer for specific fall application timing recommendations.

Registered tank mixes

Tank mix partner	Express FX plus tank mix partner rate	Weeds controlled	Stage
glyphosate (present as potassium salt, isopropylamine salt, ammonium salt) plus Dicamba L Herbicide **OR** **Express FX wettable granule formulation**	Express FX: 6 g/acre + Dicamba L: 59 mL/acre + glyphosate acid equivalent at 0.5 L/acre (360 gm AI/L) OR Express FX (all in one): 46.5 g/acre + glyphosate acid equivalent at 0.5 L/acre (360 g AI/L)	Canada fleabane, common ragweed, kochia (including Group 2 and Group 9 resistant biotypes), narrow-leaved hawk's-beard, scentless chamomile (suppression)	Up to 8 cm
		dandelion, downy brome, flixweed, giant foxtail, green foxtail, hemp-nettle, lady's-thumb, lamb's-quarter, Persian darnel, redroot pigweed, Russian thistle, stinkweed, volunteer barley, volunteer canola (including glyphosate-tolerant varieties), volunteer flax, volunteer wheat, wild mustard, wild oats	Up to 15 cm
		cow cockle	Up to 3-leaf
		wild buckwheat	Up to 8-leaf
		Canada thistle (suppression), white cockle (suppression)	Rosettes

FMC supports the following mix not on the Express FX label. Apply using the most restrictive limitations of both labels. Herbicides: Aim EC, Focus (spring and winter wheat), 2,4-D Ester, Authority® 480 herbicide (spring/durum wheat)

Application information

With: Apply with ground equipment. Do not apply by air. **Water volume:** 22 - 44 L/acre.

Mixing instructions

Use mixing instructions "e" on page 15.

Application tips

Effectiveness may be reduced if spray mixture remains in the tank for more than 24 hours.

How it works

Absorbed by foliage and roots, inhibits cell elongation and disrupting metabolism.

Expected results

Express FX stops the growth of susceptible weeds immediately. However, typical symptoms (discoluoration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions.

Restrictions

Rainfall: Rain soon after application may reduce control. **Grazing and harvesting:** Do not graze or feed to livestock within 7 days of application.

Re-cropping: Fields treated with a spring or chemfallow application of EXPRESS® FX Herbicide can be seeded to any crop the following season. Post-harvest application fields can be spring seeded to spring and durum wheat, barley and oats. To seed canola, field corn, soybean, lentil or white bean the spring after fall application, contact the manufacturer for specific fall application timing recommendations. **Re-entry interval:** 12 hours.

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Environmental precautions

Overspray or drift to important wildlife habitats such as shelterbelts, wetlands, sloughs or dry slough borders, or woodlots should be avoided. Do not contaminate irrigation water. Toxic to aquatic organisms and non-target terrestrial plants. Avoid application when heavy rain is forecast. With the co-pack, observe a 3-metre buffer zone, and for Express FX, use a 5-metre buffer zone for terrestrial habitat.

Toxicity

Acute oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool, dry place.

Express Pro

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Express Pro (PCP# 29212)	FMC of Canada Limited	Tribenuron-methyl: 42.9% + metsulfuron methyl: 8.6%	Soluble granules	567 g

Note: Must be mixed with glyphosate (those present as a potassium or isopropylamine or ammonium or trimethylsulfonium salt).

Crops, staging and rates

Crop	Staging	Rate
Barley, spring wheat (including durum), winter wheat	1 day prior to seeding	Express Pro: 7 g/acre + glyphosate acid equivalent at 0.5 L/acre (360 g AI/L)
Summerfallow		
Post-harvest*	Only spring wheat, durum wheat, barley, oats may be seeded the following spring	

* Registered use only for Express Pro.

Do not apply to wheat and barley underseeded to legumes or grass.

Weeds and staging

Weeds controlled	Stage
Canada fleabane, cleavers, common ragweed, narrow-leaved hawk's-beard, scentless chamomile, night-flowering catchfly* (suppression)	Up to 8 cm
Chickweed*	1 - 6 leaf
Dandelion, downy brome, flixweed, giant foxtail, green foxtail, hemp nettle, kochia, lady's-thumb, lamb's-quarter, Persian darnel, redroot pigweed, Russian thistle, stinkweed, volunteer barley, volunteer canola (including glyphosate tolerant), volunteer flax, volunteer wheat, wild mustard, wild oats	up to 15 cm
Cow cockle, wild buckwheat	up to 3-leaf
White cockle*, Canada thistle (suppression)	rosette

* Express Pro only.

Registered tank mixes

If using lower than the ½ L rate of glyphosate, adjuvant is required with the mix. FMC supports the following, non-registered mixes with Express Pro. Apply mixes using the most restrictive limitations for either product. Herbicides: Aim EC, Focus (spring and winter wheat).

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Express Pro (cont'd)

Application information

How to apply: Ground application only. **Water volume:** Ground: 22.5 - 45 L/acre.

Mixing instructions

Use mixing instructions "e" on page 15.

Application tips

Do not use more than 7 g/acre/year. Do not apply to crops underseeded to legumes or grasses. With any summerfallow treatment, allow at least 10 days to elapse between treatment and tillage. Only weeds emerged at time of application will be controlled. Weeds must be actively growing at time of application or control might be reduced.
Do not re-enter treated fields until 12 hours after application. Once dissolved, Express Pro herbicides will not settle out, even if the sprayer is parked for long periods of time. Spray preparation should be used within 24 hours or product degradation may occur.

Do not use on highly variable soils that have large gravelly or sandy areas, eroded knolls or calcium deposits.

- Express Pro applied to fields to be planted to spring wheat, durum wheat, winter wheat or barley that are stressed by severe conditions such as drought, low fertility, saline soils, waterlogged soils (soils at or near field capacity), disease or insect damage may result in crop injury as crop injury may occur. Heavy rainfall soon after application may result in visual crop injury or possible yield reduction. Conditions such as thin crop stand, sandy soil or low soil organic matter may increase the severity of injury.

How it works

Express Pro rapidly stops growth of susceptible weeds. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions. Activity of the herbicide mixture may be delayed by cold, dry conditions after application.

Rainfall: Heavy rainfall immediately after application may wash the herbicide off the foliage, which may reduce the effectiveness of Express Pro. Do not apply if rain is forecast for the time of application.

Restrictions

Re-cropping: Fields treated with Express Pro may be seeded to wheat (spring, durum or winter) or spring barley a minimum of 24 hours after application. The following crops may be seeded 10 months after application: Canola, dry bean, flax, faba bean, field corn, lentil, soybean, oats and pea. **Grazing:** Refer to glyphosate label. **Post-harvest application:** Fields can be spring seeded to spring and durum wheat, barley and oats. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Use a buffer zone of 4 metres between sprayed area and sensitive habitat.

Toxicity

Tribenuron methyl: Acute oral LD_{50} (rats) = > 5,000 mg/kg. Metsulfuron methyl: Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed.

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Express SG/MPower Extra/Cleat/Tribe

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Express SG (PCP# 28262)	FMC of Canada Limited	Tribenuron-methyl: 50%	Soluble granules	486 g
MPower Extra (PCP# 33143)	NewAgco Inc	Tribenuron-methyl: 75%	Dry flowable	320 g
Cleat (PCP # 33327)	Rotam North America	Tribenuron-methyl: 75%	Wettable granules	324 g
Tribe (PCP # 34345)	Sharda CropChem Ltd	Tribenuron-methyl: 75%	Wettable granules	320 g

Note: Express SG is purchased alone but must be tank mixed with either 2, 4-D or glyphosate before use.

Crops, staging and rates

Rate: Express SG: 6 g/acre; MPower Extra/Cleat: 4 g/acre **NOTE: MPower Extra is only registered for use as a pre-seed application prior to seeding wheat and barley. Cleat is only registered for use as a pre-seed application prior to planting wheat, barley, soybean and SU tolerant canola.**

Crop	Staging	Comments
Barley, spring wheat (including durum), winter wheat, oats, canary seed, pulses (including dry bean*, faba bean*, lupin*, field pea*, lentil*, soybean*)	1 day prior to seeding	Must be tank mixed with glyphosate
Pasture and rangeland	Early bud to prebloom for weeds	Use a minimum of 22.5 L/acre of water
Alfalfa*, red clover* and alsike clover* (grown for seed or forage)	Preseed 24 hours prior to seeding	Must be tank mixed with glyphosate with a minimum of 22.5 L spray solution/acre. Injury to crop may occur on coarse textured soil or low organic matter matter (<3%) soils
Summerfallow		Must be tank mixed with 2,4-D or glyphosate
Post-harvest		Fields treated with a post-harvest application of Express SG in the fall can be seeded in the spring to spring wheat, durum wheat, barley, oats, canary seed, pulse crops (including dry bean, faba bean, field pea, lentil, lupin and soybean), alfalfa, red clover, alsike clover, meadow bromegrass, smooth bromegrass, timothy and creeping red fescue or fields may be summer fallowed. To spring seed canola, field corn or flax after a post-harvest application of Express SG, please contact the manufacturer for specific fall application post-harvest timing recommendations.
Smooth bromegrass*, meadow bromegrass*, timothy*, creeping red fescue*	Can be seeded after a post harvest treatment, the next spring, or preseed 24 hours prior to seeding	Must be tank mixed with glyphosate with a minimum of 22.5 L spray solution/acre. Injury to crop may occur on coarse textured soil or low organic matter matter (<3%) soils
Tribenuron-methyl tolerant sunflowers	2 - 8 leaf	Tank mix with Assure II, Poast Ultra, Select, Centurion and Shadow RTM

* Injury to these crops may occur on coarse-textured soils, low in organic matter (<3%), or in fields with variable soils, gravelly soils, sandy areas or eroded knolls. Avoid planting these crops in soils >50% sand.

Registered tank mixes

All crops listed above can be mixed with glyphosate at 180 g ae/acre except tribenuron-methyl tolerant sunflower.

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Express SG/MPower Extra/Cleat (cont'd)

Note: MPower Extra/Cleat is only registered to be mixed with glyhphosate and 2,4-D.

Annual and perennial weed burn-off (prior to seeding) in cereals, canaryseed, fallow, and pulse crops (including dry bean, faba bean, field pea, lentil, lupin and soybean) – Express SG at 6 g/acre + tank mix partner			
Tank mix partner	**Rate**	**Weeds controlled**	**Stage**
glyphosate (present as potassium salt, isopropylamine salt, ammonium salt)	glyphosate at 180 g ae/acre	Canada fleabane, common ragweed, narrow-leaved hawk's-beard, scentless chamomile (suppression)	Up to 8 cm
		common chickweed (up to 8-leaf), dandelion, wild carrot (up to 10 cm), tufted vetch (suppression) downy brome, flixweed, giant foxtail, green foxtail, hemp-nettle, kochia, lady's-thumb, lamb's-quarter, Persian darnel, redroot pigweed, Russian thistle, stinkweed, volunteer barley, volunteer canola (including glyphosate-tolerant varieties), volunteer flax, volunteer wheat, wild mustard, wild oats	Up to 15 cm
		cow cockle, wild buckwheat	Up to 3 leaf
		Canada thistle (suppression), white cockle (suppression)	Rosettes
glyphosate (present as potassium salt, isopropylamine salt, ammonium salt)	glyphosate at 328 g ae/acre	All annual grasses listed above plus crab grass (large and smooth) and annual blue grass. All annual broadleaved weeds listed above plus prickly lettuce, shepherd's purse, annual sow thistle, and narrow-leaved vetch	Weeds up to 15 cm in height
glyphosate + Aim EC*	glyphosate: 180 g ae/acre + Aim EC: 14.8 - 47.4 mL/acre	morning glory (up to 3 leaves), round-leaved mallow, hairy nightshade, pigweed (prostrate, smooth, tumble), common purslane, smartweed, tansy mustard, cleavers, cocklebur, kochia, eastern black nightshade, shepherd's-purse, prickly lettuce, corn spurry	Up to 10 cm
Pre-seed to faba beans, field peas and soybeans			
glyphosate + Authority 480*	glyphosate: 180 g ae/acre + Authority 480: 89 or 118 mL/acre	All weeds controlled by Express SG + glyphosate plus kochia, cleavers (suppression), common groundsel, common purslane, Eastern black nightshade	
Pre-seed to spring and durum wheat			
glyphosate + Authority 480	glyphosate: 180 g ae/acre +Authority 480: 89 mL/acre	All weeds controlled by Express SG + glyphosate, plus kochia, cleavers (suppression), common groundsel, common purslane, Eastern blacknightshade	
Pre-seed to spring or winter wheat only, soybeans and field peas			
Glyphosate + Focus*	Glyphosate: 180 g ae/acre + Focus (apply at 91, 113 or 136 mL/acre)	Weeds controlled under Express SG + glyphosate and Focus labels.	
Pre-seed to spring, durum wheat and barley			
glyphosate + Dicamba L	glyphosate: 180 g ae/acre + Dicamba L: 59 mL/acre	All weeds controlled by Express SG + glyphosate + kochia (all biotypes)	Kochia - up to 8 cm
Summerfallow			
2,4-D ester LV-700	2,4-D ester	Flixweed, stinkweed and other weeds listed on the 2,4-D label.	Fall rosettes and spring seedlings
Rangeland and pasture			
	plus non-ionic surfactant at 0.2% v/v (2 L/1000 L spray solution)	Control of tall buttercup, narrow-leaved hawk's-beard	Early bud to pre-bloom
	Express SG: 12 g/acre plus non-ionic surfactant at 0.2% v/v (2 L/1000 L spray solution)	Control of above weeds plus dandelion, white cockle, common tansy	Early bud to pre-bloom

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Annual and perennial weed burn-off (prior to seeding) in cereals, canaryseed, fallow, and pulse crops (including dry bean, faba bean, field pea, lentil, lupin and soybean) – Express SG at 6 g/acre + tank mix partner			
Tank mix partner	**Rate**	**Weeds controlled**	**Stage**
ExpressSun sunflower (2 - 8 leaf)			
Express SG + Hasten NT adjuvant or a non-ionic surfactant	Hasten NT spray adjuvant at 0.5% v/v (5 L/1000 L spray solution) or a non-ionic surfactant, such as Agral* 90 or AgSurf*, at 0.2% v/v (2 L per 1000 L of water)	lamb's-quarter (control), wild buckwheat (suppression)	Up to 9 leaf lamb's-quarter; 1 - 6 leaf wild buckwheat
Assure II	Assure II: 0.2 - 0.3 L/acre + Merge: 0.5 - 1.0% v/v or Sure-Mix: 0.5% v/v.	lamb's-quarter (control), wild buckwheat (suppression) plus all other weeds according to rates of use on Assure II label	Actively growing weeds on Assure II label
Express SG Herbicide + Select*, Centurion* or Shadow RTM* Herbicide + Amigo* Adjuvant	Express SG Herbicide (6 g/ac) + Select*, Centurion* or Shadow RTM* Herbicide (76 ml/ac) + Amigo* Adjuvant 1% v/v (1 L per 100 L of water)	wild oat and lamb's-quarter (control); green foxtail and wild buckwheat (suppression)	Actively growing weeds; control of 2 - 6 leaf wild oat and suppression of 2 - 6 leaf green foxtail
EXPRESS® SG Herbicide and HASTEN* NT spray adjuvant + Poast* Ultra Liquid Emulsifiable Herbicide	EXPRESS® SG Herbicide (6 g/ac) and HASTEN* NT spray adjuvant at 0.5% v/v (5 L per 1000 L of water) plus Poast* Ultra Liquid Emulsifiable Herbicide at 190 ml/ac	This tank mix will control up to 9 leaf lamb's-quarter. Suppression of 1 - 6 leaf green foxtail, 1- 6 leaf wild oats and 1 - 6 leaf wild buckwheat.	Actively growing weeds. Application should be made using minimum spray volume of 22 L/ac
Pre-seed to field pea and soybeans only			
Glyphosate + Authority Supreme*	Glyphosate: 180 g ae/acre + Authority Supreme (apply at 162 or 202 or 243 mL/acre)	Weeds controlled under Express SG + glyphosate and Authority Supreme labels	

* Injury to pulse and grass crops may occur on coarse textured soil, low organic matter (<3%) or in fields with variable soils, gravel areas or eroded knolls. Avoid planting pulse crops in soils with >50% sand.

FMC supports the following mixes not on the Express SG label for ExpressSun sunflowers only: Assure II, Select, Centurion, Shadow RTM, Poast Ultra. For soybean only: Authority Supreme, Focus. For spring and winter wheat only: Focus. Apply all tank mixes according to the most restrictive use limitations for either label.

Application information

Apply with ground equipment. Do not apply by air. **Water volume:** 22.5 - 45 L/acre.

Mixing instructions

Use mixing instructions "e" on page 15.

Application Tips

Effectiveness may be reduced if spray mixture remains in the tank for more than 24 hours. Injury to pulse crops may occur on coarse-textured soils, low in organic matter (less than 3%), or in fields with variable soils, gravely areas, sandy areas or eroded knolls. Avoid planting pulse crops in soils containing more than 50% sand.

How it works

Absorbed by foliage and roots, inhibits cell elongation.

Expected results

Express SG stops the growth of susceptible weeds immediately. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions.

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Restrictions

Rainfall: If rain occurs soon after application, control may be reduced. Heavy rainfall soon after application may result in visual crop injury or possible yield reduction. Environmental conditions that slow the drying of the spray mix on the foliage may increase the time required. **Pre-harvest intervals:** Do not apply within 70 days of harvest for ExpressSun® sunflowers. **Re-cropping:** The following crops can be seeded 2 months after application of Express SG herbicide – canola and flax. Fields treated with Express SG may be seeded to winter wheat.
Post-harvest: Fields treated with a post-harvest application of Express SG in the fall can be seeded in the spring to spring wheat, durum wheat, barley, oats, canary seed, pulse crops (including dry bean, faba bean, field pea, lentil, lupin and soybean), alfalfa, red clover, alsike clover, meadow bromegrass, smooth bromegrass, timothy and creeping red fescue, or fields may be summer fallowed. To spring seed canola, field corn or flax after a post-harvest application of Express SG, please contact the manufacturer for specific fall application timing recommendations.
Re-entry interval: 12 hours.

Do not use on highly variable soils that have large gravely or sandy areas, eroded knolls or calcium deposits. Conditions such as thin crop stand, sandy soil or low soil organic matter may increase the severity of injury. EXPRESS® SG Herbicide applied to pre-seed to fields that are stressed by severe conditions such as drought, low fertility, saline soils, waterlogged soils (soils at or near field capacity), disease or insect damage may result in crop injury. Drought, disease or insect damage following application may also result in crop injury, grade or yield loss.

Environmental precautions

Do not contaminate irrigation water. Toxic to aquatic organisms.

Toxicity

Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, dry place.

Fierce WG/Fierce EZ

Group 14, 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Fierce WG (PCP# 31117)	Nufarm Agriculture	Flumioxazin 33.5% Pyroxasulfone 42.5%	76% wettable granule	2.72 kg
Fierce EZ (PCP # 33869)	Nufarm Agriculture	Flumioxazin: 160 g/L Pyroxasulfone: 203 g|/L	Suspension concentrate	7.16 L

* Not registered.

Crops, staging and rates

Spring applications

Crop	Stage	Rate Fierce WG	Rate Fierce EZ
Soybean*, chickpea, field pea	Pre-seed to pre-emergent. Crop should be seeded prior to or within 3 days of application	85 g/acre	178 mL/acre
Spring wheat (not including durum) and field corn**	Pre-seed only. Apply a minimum of 7 days before seeding wheat and corn. **Apply on minimum to no-till soils only**	85 g/acre	178 mL/acre

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Fall applications

Crop	Stage	Rate Fierce WG	Rate Fierce EZ
Soybean*, lentil (small reds and large green varieties), chickpea, field pea	Applications should be made prior to soil freeze. Do not apply on top of snow cover	85 g/acre	178 mL/acre
Spring wheat (not including durum) and field corn**	Applications should be made prior to soil freeze. Do not apply on top of snow cover. **Apply to minimum to no-till soils only**		
Winter wheat	Apply a minimum of 7 days before seeding winter wheat		

* Seed soybean at least 1.5 inches (4 cm) deep. ** Seed spring wheat at least 1 inch (3 cm) deep. Apply Fierce a minimum of 7 days before seeding wheat. When seeding spring wheat, fields treated with Fierce must be minimum till to no-till.

If applying Fierce WG without a glyphosate tank mix partner, add a non-ionic surfactant at 0.25% v/v.

Weeds, rates and staging

Weeds controlled or suppressed with Fierce WG and Fierce EZ

annual sow thistle
barnyardgrass
Canada fleabane
cleavers
common chickweed
common ragweed
common waterhemp
dandelion (seedling)
downy brome*
eastern black nightshade
Foxtail barley*
green foxtail (including Group 1 and 2 resistant)
green pigweed
hairy nightshade
Japanese brome*
kochia (including Group 2, 4 and 9 resistant)
lamb's-quarter
large crabgrass
Palmer amaranth
Pennsylvania smartweed
redroot pigweed
velvetleaf
Russian thistle*
volunteer canola* (all varieties)
wild buckwheat
wild mustard (including Group 2 resistant)
wild oats*

* Suppression only.

Registered tank mixes

Glyphosate.

Supported tank mixes: Fierce WG/Fierce EZ: Fall application, all crops – Blackhawk. Fierce WG/Fierce EZ: Spring applications – prior to soybean, spring wheat, field corn and fallow – Blackhawk. Prior to chickpea, field pea, spring wheat and field corn. Prior to lentil – Goldwing.

Application information

How to apply: Ground equipment only. Use 50 mesh screens. Do not apply by air. **Water volume:** 40 L/acre.

Application tips

Fierce WG/Fierce EZ is a soil-applied residual herbicide and will only control weeds emerging after the product has been activated by moisture. Weeds present at the time of application should be controlled with a suitable tank mix partner (see Registered Tank Mixes section). DO NOT incorporate or till after an application of Fierce WG/Fierce EZ. Seeding after an application of Fierce WG/Fierce EZ should only be done with low disturbance seeding systems. Significant crop injury may occur from applications made to poorly drained soils and/or applications made under cool, wet conditions. Severe crop injury will result when soils are flooded following applications of Fierce WG/ Fierce EZ. Treated soil that is splashed onto newly emerging crops may result in temporary injury.

Moisture is necessary to activate Fierce WG/Fierce EZ in the soil for residual weed control. Dry weather following applications of Fierce WG/Fierce EZ may reduce effectiveness. However, when adequate moisture is received after dry conditions, Fierce WG/Fierce EZ will control susceptible germinating weeds listed on the label. Fierce WG/Fierce EZ may not control weeds that germinate after application but prior to an activating rainfall/irrigation or weeds that germinate through cracks resulting from dry soil.

How it works

Flumioxazin is a Group 14 herbicide. Flumioxazin controls weeds by inhibiting protoporphyrinogen oxidase, an essential enzyme required by plants for chlorophyll biosynthesis. Seedling weeds are controlled pre-emergence, or shortly after exposure to sunlight following contact with the soil applied herbicide. Pyroxasulfone is a Group 15 herbicide. Pyroxasulfone controls weeds by inhibiting the synthesis of very long chain fatty acids. Pyroxasulfone halts growth at the apical meristem and coleoptile by reducing cell division and expansion. Weeds affected by Pyroxasulfone may not emerge or may emerge with irregular leaf margins and reduced growth. Together Flumioxazin and Pyroxasulfone target 2 separate systems within target species resulting in broadleaf and grass weed control superior to either active ingredient applied alone.

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Expected results
Susceptible weeds will die before emergence or shortly after exposure to sunlight. Some species may remain green and stunted for several days prior to senescence.

Restrictions
Mechanical incorporation or disturbance of the soil after application will reduce weed control. **Rainfall:** 1 hour. **Grazing:** Fierce WG/Fierce EZ: For field corn, do not permit livestock to graze field within 93 days after application and do not harvest as green feed or silage within 93 days after application. For soybeans, do not harvest as green feed or permit livestock to graze fields within 21 days after application and do not cut hay/fodder within 50 days after application. For wheat (spring and winter), do not harvest as green feed or permit livestock to graze fields within 42 days after application and do not cut hay/fodder within 52 days after application. For all other crops, do not graze, cut or feed treated crops to livestock.
Re-cropping: No restrictions: soybean, chickpea, field pea. 7 days – field corn, spring wheat, winter wheat. 6 months – lentil. 11 months – barley, durum wheat, oats, alfalfa. 12 months – canola, mustard seed. For crops not listed a successful bioassay must be preformed before planting. **Re-entry interval:** 12 hours.

Environmental precautions
This product is toxic to aquatic organisms, small wild mammals, certain insects and non-target terrestrial plants.

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in a cool, dry, secure place.

Flurox-24/Rush 24/Foxxy Pro

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Flurox-24 (PCP# 30194)	Nufarm Agriculture Inc	Nufarm fluroxypyr 180: 180 g/L	Emulsifiable concentrate	7.28 L
2,4-D 700 (PCP# 27820)		2,4-D 700 ester: 660 g/L	Emulsifiable concentrate	10.3 L
Rush 24 (PCP# 30815) + 2,4D 700 ester (PCP # 33111)	ADAMA Canada	Fluroxypyr: 180 g/L	Emulsifiable concentrate	9.6 L
		2,4-D ester: 660 g/L	Emulsifiable concentrate	9.8 L
Foxxy Pro co-pack of: Foxxy (PCP# 32952) + MP 2,4-D Ester (PCP# 30460)	NewAgco Inc	Fluroxypyr: 180 g/L	Emulsifiable concentrate	9.6 L, 230 L
		2,4-D Ester: 660 g/L	Emulsifiable concentrate	9.8 L, 240 L

Crops, staging and rates
Cereals: 4-leaf to flag leaf stage.

Low rate: Flurox/Rush/Foxxy Pro: 0.182 L/acre, 2,4-D 700: 0.245 L/acre (1 case treats 40 acres)

High rate: Rush 24/Foxxy Pro: 0.245 L/acre + 2,4-D 700: 0.260 L/ac; Flurox-24: 0.240 L/acre + 2,4-D 700: 0.343 L/ac.

Seedling and established grasses (seed production only): Rush 24/Foxxy Pro/Flurox-24: 0.24 L/acre + 2,4D 700: 0.343 L/acre.

barley	durum wheat	smooth bromegrass*	timothy*
creeping red fescue*	intermediate wheatgrass*	spring wheat	winter wheat
crested wheatgrass*	meadow bromegrass*	tall fescue*	

* Registered under the User Requested Minor Use Registration.
**Apply to winter wheat in the spring from the 3-tiller stage, to just before the flag leaf stage.

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Weeds controlled

Weed stage: 2 - 4 leaf stage, unless otherwise noted.

Low rate

- annual sunflower
- bluebur
- burdock
- cleavers (1 - 6 whorl)
- clovers (sweet)
- field horsetail (top growth)
- flixweed
- goat's-beard
- hoary cress (top growth)
- kochia*
- mustards (except green, dog and tansy)
- plantain
- prickly lettuce
- ragweed
- shepherd's-purse
- vetch
- volunteer canola
- wild buckwheat (1 - 6 leaf)
- wild mustard
- wild radish

High rate

- annual sow thistle (suppression)
- blue lettuce (top growth)
- Canada thistle (top growth)
- cleavers (1 - 8 whorl)
- common chickweed* (up to 8 cm)[1]
- dandelion (spring rosettes)
- docks dog mustard
- field bindweed (top growth)
- field peppergrass
- gumweed
- hairy galinsoga
- hedge bindweed
- hemp-nettle (2 - 6 leaf)[1]
- hoary cress[1]
- lady's-thumb
- leafy spurge (top growth)
- oak-leaved goosefoot
- perennial sow thistle (top growth) (suppression)
- redroot pigweed
- round-leaved mallow (1 - 6 Leaf)
- Russian thistle
- smartweed
- stork's-bill (1 - 8 leaf)
- tansy
- tartary buckwheat
- volunteer flax (1 - 12 cm)
- wild buckwheat (1 - 8 leaf)

* Including biotypes resistant to Group 2 herbicides that inhibit ALS/AHAS enzymes.
[1] Suppression.

Registered tank mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Adjuvant rate
Bison*/Nufarm Tralkoxydim	Barley, spring wheat, durum wheat	0.2 L/acre	Nufarm Tralkoxydim adjuvant 0.5% v/v, or Carrier at 0.5% v/v
Everest	Spring wheat, durum wheat	17. 4 g/acre	Agral 90 or Ag Surf: 0.25% v/v
Horizon/Ladder/Signal**	Spring wheat, durum wheat	93 mL/acre	Score: 0.8% v/v or Nufarm Enhance: 0.25% v/v
Puma Advance/Bengal WB	Spring and durum wheat	0.21 - 0.41 L/acre	None required

* Do not apply this tank mix prior to the 4-leaf stage of the cereal crop as temporary crop injury could occur, particularly in spray overlaps. NewAgco supports the following tank mixes not on the label. Aurora/Horizon, HellCat/Puma, Everest, Liquid Achieve, Simplicity.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** Ground: 20 - 40 L/acre.

Application tips

Optimum activity requires active crop and weed growth. The temperature range for optimum activity is 8°C to 24°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, for example, drought, heat or cold stress, if weeds have initiated flowering or if heavy infestations exist. Application before the 4-leaf stage of wheat and barley may cause severe twisting of leaves and leaf, stem and head deformities, which may reduce yield up to 10%. Do not apply later than the flag-leaf stage. Some twisting may be evident on barley. This twisting is transitory and may disappear within 3 weeks.

How it works

The components of these products move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected results

Broadleaf weeds: Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.

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Flurox-24/Rush 24/Foxxy Pro (cont'd)

Restrictions

Rainfall: Do not apply if rain is expected in 1 hour. **Grazing:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest forage or cut for hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days prior to slaughter. **Pre-harvest intervals:** Do not harvest the treated mature crop within 60 days after application. **Re-cropping:** Fields treated with these products can be seeded the following year to alfalfa, barley, canola, corn, dry bean, flax, forage grass, lentil, mustard, oats, pea, potato, rye, soybean, sugar beet, sunflower, wheat or summerfallowed. Do not seed crops other than those listed above for at least 1 year following treatment. **Re-entry interval:** 12 hours.

Environmental precautions

Leave a 15-metre buffer between sprayed area and aquatic habitat. **Runoff:** Under certain conditions, these products have the potential to runoff from treated areas. To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment. Site characteristics and conditions that may lead to runoff include, but are not limited to heavy rainfall, moderate to steep slope, bare soil, poorly draining soil (e.g., soils that are compacted, fine textured or low in organic matter such as clay). Avoid application of this product when heavy rain is forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip (buffer zone) between the treated area and the edge of the water body.

Toxicity

2,4-D: Acute oral LD_{50} = technical 639 - 764 mg/kg. Fluroxypyr: Acute oral LD_{50} > 2,000 mg/kg.

Storage

Store in a dry, heated area. If product is frozen, bring to room temperature and agitate before use.

FMC PrecisionPac Cross Spectrum Herbicides

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
CS-100-23235 herbicide formulation				
PrecisionPac blend: CS-100-23235 PCP# 32575	FMC of Canada Limited	Pyroxsulam: 14.7% Thifensulfuron-methyl: 7.3% Tribenuron-methyl: 7.3% Metsulfuron-methyl: 1.5%	Wettable granules	PrecisionPac dispensing system 50 - 200 acres per grower bag
CS-75-23235 herbicide formulation				
PrecisionPac blend: CS-75-23235 PCP #32579	FMC of Canada Limited	Pyroxsulam 13.2% Thifensulfuron-methyl 8.9% Tribenuron-methyl 8.9% Metsulfuron-methyl 1.8%	Wettable granules	PrecisionPac dispensing system 50 - 220 acres per grower bag
CS-100-2525 herbicide formulation				
PrecisionPac blend: CS-100-2525 PCP# 32121	FMC of Canada Limited	PPyroxsulam: 15.0% Thifensulfuron-methyl: 7.5% Tribenuron-methyl: 7.5 %	Wettable granules	PrecisionPac dispensing system 20 - 200 acres per grower bag
CS-75-2525 herbicide formulation				
PrecisionPac blend: CS-75-2525 (PCP #32577)	FMC of Canada Limited	Pyroxsulam: 13.6% Thifensulfuron-methyl: 9.2% Tribenuron-methyl: 9.2%	Wettable granules	PrecisionPac dispensing system 20 - 220 acres per grower bag

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Product	Company	Active ingredient	Formulation	Container size
CS-100-12 herbicide formulation				
PrecisionPac blend: CS-100-12 (PCP #33015)	FMC of Canada Limited	Pyroxsulam: 15% Thifensulfuron-methyl: 15%	Wettable granules	PrecisionPac dispensing system 20 - 200 acres per grower bag
CS-75-12 herbicide formulation				
PrecisionPac blend: CS-75-12 (PCP #33016)	FMC of Canada Limited	Pyroxsulam: 13.6% Thifensulfuron-methyl: 18.3%	Wettable granules	PrecisionPac dispensing system 20 - 220 acres per grower bag

Crops, staging and rates

Rate: CS-100-23235: 41.15 g/acre CS-100-2525: 40.5 g/acre CS-100-12: 40 g/acre
CS-75-23235: 34.15 g/acre CS-75-2525: 33.14 g/acre CS-75-12: 33 g/acre

Crop	Staging	Comments
Wheat (spring, durum): All FMC PrecisionPac Cross Spectrum Herbicides	3-leaf to before the flag leaf	Must have 0.25% v/v of registered adjuvant added. Registered adjuvants: Agral 90, ProSurf II, Sentry, Liberate Adjuvant, Ag-Surf II, HiActivate Non-ionic Liquid Spreader/Activator, Super Spreader Adjuvant, Enhance
Winter wheat: CS-100-12 and CS-75-12	Apply to winter wheat in the spring, when winter wheat is in the 2 - 7 leaf, 4-tiller stage	Same surfactants as above for wheat (spring, durum)

Weeds controlled

Apply to young, actively growing weeds that are less than 10 cm in height or diameter, unless otherwise indicated.

Product	Broadleaf weeds controlled/suppressed	Grassy weeds controlled/ supressed
CS-75-23235	**Broadleaf weeds controlled:** Annual smartweed (green smartweed, lady's thumb), common chickweed (1 - 6 leaf), cow cockle, dandelion (spring or fall rosettes up to 20 cm in diameter), Flixweed, Hemp-nettle, lamb's-quarter, narrow-leaved hawk's-beard (up to 20 cm), night flowering catchfly, redroot pigweed, round-leaved mallow (1 - 6 leaf), Russian thistle, scentless chamomile, sow thistle (perennial), stinkweed, stork's-bill, volunteer canola (excluding group 2 herbicide tolerant varieties), white cockle, wild buckwheat, wild mustard. **Broadleaf weeds suppressed:** Canada thistle (top growth control, apply before bud stage, <15 cm in height)	**Grass weeds controlled:** Wild oats (up to 4-leaf, 2-tiller). For control of low wild oat populations (<75 plants/ m^2), Japanese brome (1-leaf to 4-leaf, 2-tiller; under good growing conditions)
CS-100-23235	**Broadleaf weeds controlled:** Annual smartweed (green smartweed, lady's-thumb), cleavers (up to 6-whorl), common chickweed (up to 10 cm), corn spurry (up to 2-whorl, < 10 cm in height), cow cockle, dandelion (spring or fall rosettes up to 20 cm in diameter), flixweed, hemp-nettle, lamb's-quarter, narrow-leaved hawk's-beard (up to 20 cm), night-flowering catchfly, redroot igweed, round-leaved mallow (1 - 6 leaf, < 10 cm in size), Russian thistle, scentless chamomile, shepherd's-purse (up to 30 cm tall), sow thistle (perennial), stinkweed (up to 30 cm tall), Stork's-bill, volunteer canola (1 - 6 leaf, excluding group 2 herbicide tolerant varieties), white cockle, wild Buckwheat, wild mustard **Broadleaf weeds supressed:** Canada thistle (top growth control, apply before bud stage, <30cm in height)	**Grass weeds controlled:** Barnyard grass (1 - 5 leaf), Japanese brome (1 - 6 leaf), wild oats – high populations (>75 plants/ m^2) (up to 4-leaf, 2-tiller), yellow foxtail (1 - 5 leaf). **Grassy weeds suppressed:** Downy brome (2 - 6 leaf, 4-tiller), green foxtail (1 - 5 leaf), persian darnel (1-leaf to 4-leaf, 2-tiller)
CS-75-2525	**Broadleaf weeds controlled:** Annual smartweed (green smartweed, lady's-thumb), common chickweed (1 - 6 leaf), cow cockle, flixweed, hemp-nettle, lamb's-quarter, narrow-leaved hawk's-beard, night flowering catchfly, redroot pigweed, Russian thistle, sow thistle (perennial), stinkweed, volunteer canola (except Group 2, herbicide tolerant), wild buckwheat, wild mustard. **Broadleaf weeds suppressed:** Canada thistle (top growth control, apply before bud stage, <15 cm in height).	**Grass weeds controlled:** Wild oats (up to 4-leaf, 2-tiller). For control of low wild oat populations (<75 plants/ m^2), Japanese brome (1-leaf to 4-leaf, 2-tiller; under good growing conditions)

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FMC PrecisionPac Cross Spectrum Herbicides (cont'd)

Product	Broadleaf weeds controlled/suppressed	Grassy weeds controlled/ supressed
CS-100-2525	**Broadleaf weeds controlled:** Annual smartweed (green smartweed, lady's thumb), cleavers (up to 6-whorl), common chickweed (up to 10 cm), corn spurry (up to 2-whorl, < 10 cm in height), cow cockle, flixweed, hemp-nettle, lamb's-quarter, narrow-leaved hawk's-beard, night flowering catchfly, redroot pigweed, round-leaved mallow (up to 6-leaf stage, <10 cm in size), Russian thistle, shepherd's-purse (up to 30 cm tall), sow thistle (perennial), stinkweed (up to 30 cm tall), volunteer canola (1 - 6 leaf excluding group 2 herbicide tolerant varieties), wild buckwheat, wild mustard. **Broadleaf weeds suppressed:** Canada thistle (top growth control, apply before bud stage, <30 cm in height), dandelion (seedlings and overwintered rosettes less than or equal to 20 cm), white cockle (up to the first flower stage, less than 20 cm in height)	**Grass weeds controlled:** Barnyard grass (1 - 5 leaf), Japanese brome (1 - 6 leaf), Wild oats - high populations (>75 plants/m^2) (up to 4-leaf, 2-tiller), Yellow foxtail (1 - 5 leaf). **Grassy weeds suppressed:** Downy brome (2 - 6 leaf, 4-tiller), Green foxtail (1 - 5 leaf), Persian darnel (1-leaf to 4-leaf, 2-tiller)
CS-75-12	**Broadleaf weeds controlled:** Annual smartweed (green smartweed, lady's-thumb), common chickweed (1 - 6 leaf), corn spurry, cow cockle, hemp-nettle, lamb's-quarter, redroot pigweed, Russian thistle, stinkweed, volunteer canola (excluding Group 2 herbicide tolerant varieties), wild mustard, wild buckwheat (1 - 3 leaf). **Broadleaf weeds suppressed:** Narrow-leaved hawk's-beard (seedlings and overwintered rosettes prior to bolting)	**Grass weeds controlled:** Wild oats (up to 4-leaf, 2-tiller). For control of low wild oat populations (<75 plants/ m^2), Japanese brome (1-leaf to 4-leaf, 2-tiller; under good growing conditions)
CS-100-12	**Broadleaf weeds controlled:** Cleavers (up to 6-whorl), Common chickweed, Corn spurry (up to 2-whorl stage, < 10 cm in height), Cow cockle (up to 8-leaf), Flixweed, Green smartweed, Hemp-nettle (1 - 8 leaf), lamb's-quarters, narrow-leaved hawk's-beard (rosette), redroot pigweed (1 - 8 leaf), Round-leaved mallow (up to 6-leaf stage, <10cm in size), Russian thistle, Shepherd's-purse (up to 30 cm tall), Smartweed (lady's-thumb,1 - 5 leaf), Stinkweed (up to 30cm tall), Volunteer canola (1 - 6 leaf, excluding Group 2 herbicide tolerant varieties), wild mustard, wild buckwheat (1 - 6 leaf). **Broadleaf weeds suppressed:** Canada thistle (top growth control, apply before bud stage, <30 cm in height), dandelion (seedlings and overwintered rosettes less than or equal to 20 cm), white cockle (up to the first flower stage, less than 20 cm in height)	**Grass weeds wontrolled:** Barnyard grass (1 - 5 leaf), Japanese brome (1 - 6 leaf), wild oats - high populations (>75 plants/m^2) (up to 4-leaf, 2-tiller), yellow foxtail (1 - 5 leaf). **Grassy weeds suppressed:** Downy brome (2 - 6 leaf, 4-tiller), green foxtail (1 - 5 leaf), persian darnel (1-leaf to 4-leaf, 2-tiller)

Registered tank mixes

CS-100-23235; CS-75-23235; CS-100-2525; CS-75-2525:

Product	Rate	Additional weeds controlled
Wheat (spring durum)		
MCPA Ester 500 or MCPA Ester 600	226 mL/acre (MCPA Ester 500) 190 mL/acre (MCPA Ester 600)	**CS-100-23235; CS-75-23235:** Weeds controlled or suppressed by herbicide alone, as well as annual sow thistle and volunteer Group 2 tolerant canola varieties. Apply when volunteer canola is in the 1 - 6 leaf stage with **CS-100-23235** or 2 - 4 leaf stage with **CS-75-23235**. **CS-100-2525; CS-75-2525:** White cockle, dandelion (spring and fall rosettes, up to 15 cm in diameter), scentless chamomile, Group 2 tolerant canola (1 - 6 leaf stage)
Perimeter II + 0.25% v/v adjuvant	85 mL/ac	**CS-100-23235; CS-75-23235; CS-100-2525; CS-75-2525:** 85 mL/acre for control of kochia (including Group 2 resistant biotypes, seedling to 8-leaf), volunteer flax. **CS-75-2525,CS-75-23235:** + cleavers (1 - 6 whorl). **CS-100-2525; CS-75-2525:** + stork's bill (1 - 6 leaf)

FMC supports the following mix that is not on the PrecisionPac Cross Spectrum Herbicide labels. Apply mix according to the most restrictive use limitations for either product: 2,4-D ester.

CS-100-12: Winter wheat (spring application) suppression for downy brome.

CS-100-12 Herbicide applied as a spring application will provide suppression of downy brome in winter wheat. Apply at a rate of 40.5 g/acre. Add BASF Assist Oil Concentrate at 0.8% v/v (0.8 L/100 L of spray mixture) or Merge* Adjuvant at 0.5% v/v (0.5 L/100 L of spray mixture; spring application only). Apply using equipment that will assure uniform coverage. In addition to suppression of downy brome when applied in the spring, this tank mix also controls and suppresses weeds listed.

FMC supports the following mixes that are not on the **CS-100-12; CS-75-12** label. Apply mix according to the most restrictive use limitations for either product: Perimeter® II Herbicide, MCPA Ester.

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Application information

CS-100-23235; CS-75-23235; CS-100-2525; CS-75-2525; CS-100-12, CS-75-12: Ground application: Water volume – 22 L/acre.

CS-100-2525; CS-75-2525; CS-100-12, CS-75-12: Aerial application: Water volume – 10 - 20 L/acre. When a tank mixture is used, consult the labels of the tank-mix partners.

Mixing instructions

Use mixing instructions "e" on page 11.

Application tips

Effectiveness may be reduced if spray mixture remains in the tank for more than 24 hours. Do not apply to crops underseeded to legumes or grasses as injury to forage may result.

How it works

Absorbed by foliage. Inhibits cell elongation.

Expected results

PrecisionPac Cross Spectrum Herbicides stop the growth of susceptible weeds immediately. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions.

Restrictions

Rainfall: 2 hours. **Grazing:** May not be grazed or fed to livestock within 7 days of application.
Pre-harvest intervals: Allow 60 days between application and harvest. **Re-cropping: CS-100-23235; CS-75-23235:** The following crops may be seeded 11 months after application: barley, canola, flax, oats, pea, soybean, dry bean, lentil and spring wheat. The following crops may be seeded 10 months after application: field corn.

CS-100-2525; CS-75-2525; CS-100-12, CS-75-12: The following crops can be seeded 11 months after an application of the herbicide: barley, brown mustard, canola, dry bean (of the species *Phaseolus vulgaris*), flax, canola quality *Brassica juncea*, lentils, oats, field pea, chickpea, spring wheat, soybean and yellow mustard or fields can be summer fallowed. The following crops can be seeded 10 months after an application of the herbicide – sunflower and potato. **CS-100-12**, **CS-75-12**, **CS-100-2525**, **CS 75-2525** field corn can also be seeded 10 months after an application of the herbicide.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Overspray or drift to important wildlife habitats, such as ponds, wetlands, streams, woodlots and shelterbelts, should be avoided. **CS-100-23235**; **CS-75-23235:** A 1-metre buffer zone should be established between the area to be sprayed and aquatic habitats. For terrestrial habitats, a 4 metre buffer zone is required for ground applications. **CS-100-2525**, **CS-75-2525:** A 1-metre buffer zone should be established between the area to be sprayed and aquatic habitats; for terrestrial habitats, a 4-metre buffer zone is required for ground applications. For aerial applications – a 125 metre (fixed wing) or 100 metre (rotary wing) is required for terrestrial habitats.

CS-100-12, **CS-75-12:** A 1 metre buffer zone should be established between the area to be sprayed and aquatic habitats. For terrestrial habitats, a 15-metre buffer zone is required for ground applications and a 200-metre (fixed wing) or 175-metre (rotary wing) is required for aerial applications.

Toxicity

Oral LD_{50} (rats) > 5,000 mg/kg.

Storage

Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container closed.

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Focus Herbicide

Group 14, 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Focus Herbicide (PCP# 32292)	FMC of Canada Limited	Pyroxasulfone: 447 g/L + carfentrazone-ethyl: 53 g/L	Suspension emulsion	4.5 L

Crops, staging and rates

Registered crops: Field corn, soybeans, lentils, field peas, sunflower, spring and winter wheat. Do not apply to durum wheat. **Spring applied or in front of winter wheat:** Prior to seeding or up to 3 days after seeding.
Fall applied: May be applied with glyphosate in the fall to control emerged winter annuals such as stinkweed and mustard. A fall application of FOCUS® Herbicide will also provide early season control or suppression of labelled weeds the following spring.

Crop	Treatment	Rate (per acre)		Treated per jug	
Field corn, soybean, lentil, field pea, wheat (spring and winter wheat only)		Soil type		Soil type	
		Coarse/medium texture (1-3% O.M.)	Medium-fine/fine texture (O.M. > 3 - 7%)	Coarse/medium texture (1 -3% O.M.)	Medium-fine/fine texture (O.M. > 3 - 7%)
	Spring applied: early season control	91 ml/ac		50 acre/jug	
	Spring applied: extended control	113 ml/ac	136 ml/ac	40 acre/jug	33 acre/jug
	Fall applied: extended control	113 ml/ac	136 ml/ac	40 acre/jug	33 acre/jug

Weeds controlled

Pre-emergence control of

- barnyard grass
- cleavers
- common waterhemp
- crabgrass (large)
- downy brome
- foxtail barley*
- giant foxtail*
- green foxtail
- green pigweed
- Japanese brome
- kochia*
- lamb's-quarter*
- redroot pigweed
- ryegrass (Italian)
- stinkweed*
- velvet leaf
- wild buckwheat*
- wild mustard*
- wild oats*
- wormseed mustard
- yellow foxtail

* Suppression

Registered tank mixes

Pre-plant/pre-emergence: Aatrex Liquid 480 (0.85 to 1.25 L/acre) field corn only – glyphosate (at recommended rates). **Pre-seed spring or winter wheat, soybean, field pea:** Express SG + glyphosate (180 g ae/acre). Do not apply products containing saflufenacil with, before or after application of Focus as crop injury may occur. FMC also supports the following tank mixes not on the Focus label. Use the most restrictive use limitation for either label. **Pre-seed to spring and winter wheat:** 2,4-D amine or ester + glyphosate (180 to 360 g ae/acre). **Pre-seed to spring and winter wheat:** Express Pro + glyphosate (180 g ae/acre). **Pre-seed spring or winter wheat:** Express FX + glyphosate (180 g ae/acre), Intruvix.

Application information

How to apply: Ground equipment only. Do not apply by air. **Water volume:** 40 L/acre minimum. Focus can be applied only once per growing season. Use a minimum spray volume of 40.5 L/acre. High spray volumes are needed for dense weed stands. Weed control improves with improved coverage.

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Seeding: Focus should be applied to a uniform seedbed that is firm and clod free. Spring and winter wheat, lentil and field corn seeds must be planted at least 2.5 cm deep. Soybean must be planted a minimum of 4 cm deep. **Fall Application:** FOCUS Herbicide should be applied to the stubble or soil surface and allow moisture from rainfall or snow to move the product into the soil. Do not mechanically incorporate in the fall or spring as this can destroy the herbicide barrier and allow weeds to escape. Do not apply to frozen soils or existing snow cover to prevent runoff. For fall treatments use an extended control treatment rate for the appropriate soil type and organic matter.

Expected results

Extremes in environmental conditions such as temperature, moisture, soil conditions and cultural practices may affect activity. Moisture is necessary to activate the active ingredient pyroxasulfone in soil for weed control. Dry weather following applications may reduce effectiveness.
Applications to crops under stress due to either inadequate or excess moisture for normal crop development, cool and hot temperatures, sodic soils, poorly drained soils, hail damage, flooding, pesticide injury, mechanical injury or widely fluctuating temperatures may result in crop injury.

Restrictions

Rotational crop	Replant interval (months)
field corn, lentil, soybean, spring and winter wheat, field pea, sunflower	0 months after
barley, canola, mustard, oats, durum wheat, chickpea, flax, safflower	12 months after
Sugar beet	24 months after

Note: For crops not listed above, use a field bioassay to confirm crop safety. If there is a lack of adequate or normal soil moisture due to drought conditions following an application of FOCUS® Herbicide, the minimum rotational crop interval described above must be extended for one additional year that the drought has occurred and a representative bioassay of the field must be conducted with the potential rotational crop and adequate soil moisture to determine the crop sensitivity to FOCUS® Herbicide.

Focus requires 12.5 mm, or more, of moisture at once to activate product. Do not follow a fall application of FOCUS® Herbicide (or any other product containing pyroxasulfone) with a spring application of AUTHORITY® 480 Herbicide (or any other product containing sulfentrazone) to fields where spring wheat will be planted. Do not apply AUTHORITY® SUPREME Herbicide (or any other product containing pyroxasulfone) in the spring to fields that were treated with applications of FOCUS® Herbicide (or any other product containing pyroxasulfone) during the previous fall. Do not make more than one application of Focus® herbicide (or other products containing pyroxasulfone) per 12 month period. **Rainfall:** Rainfall within 1 hour of application, or heavy rains shortly after application, may reduce weed control of carfentrazone component of product. Moderate rainfall will improve the activity of the pyroxasulfone part of the herbicide. Excessive rainfall, irrigation or prolonged saturated soil conditions after application may increase the risk of seedling injury, especially shallow seeded crops. Focus can affect lentil and field pea growth under conditions that include high pH (≥7.5), cool weather, prolonged and excessive moisture, seedling diseases and other conditions unfavourable to growth. It can appear as stunting or discolouration. Symptoms may persist until conditions improve. **Grazing:** Do not graze or feed on wheat grain, forage, hay or straw less than 42 days after application. **Re-entry interval:** 12 hours.

Environmental precautions

Do not use on peat or muck soils and soils with 7% or more organic matter content or on soils classified as sand, containing >1% organic matter. Use a buffer of 5 metres between treated area and sensitive terrestrial or freshwater habitats.

Toxicity

Acute oral (rat) LD_{50} > 5,000 mg/kg.

Storage

Store in original container in cool, dry, well-ventilated location. Store above 5°C to keep product from freezing.

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Fortress MicroActiv

Group 3, 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Fortress MicroActiv (PCP# 19521)	Gowan Canada	Triallate: 10% + trifluralin: 4%	Granules	22.7 kg, 454 kg

Crops, staging and rates

Rate: 4.85 - 6.88 kg/acre

Crop	Staging
Barley **Flax*** **Mustard** **Canola** **Wheat (spring and durum)**	Fall surface application: apply after Oct. 1 and when soil temperature is less than 4°C at depth of 5 cm and delay incorporation until the following spring. Fall preplant incorporated: apply in the fall after September until soil freeze up. Spring preplant incorporated: prior to seeding

* Do not use on low linolenic acid varieties.

Weeds controlled

green foxtail — wild oats — yellow foxtail

Annual broadleaves suppressed

kochia — lamb's-quarter — wild buckwheat

red root pigweed — Russian thistle

* All tank mixes with Glyforce WDG require the addition of a non-ionic surfactant such as Agral 90, Ag Surf, or Companion. Surfactant should be added at a rate of 142 mL/acre.

Rate

Apply Fortress MicroActiv according to soil organic matter contents.

Fortress rates – fall treatment

Crop	Rate kg/acre				Acres treated per 454 kg bag			
	< 2% OM	2 - 4% OM	4 - 6% OM	> 6% OM	< 2% OM	2 - 4% OM	4 - 6% OM	> 6% OM
Wheat	N.R.*	4.45	5.67	5.67**	n/a	102	80	80
Barley	4.45	5.67	5.67	6.88	102	80	80	66
Canola, flax*, mustard**	5.67	5.67	5.67	6.88	80	80	80	66

* N.R. – Not recommended.
** For fall incorporated applications (not surface), apply 6.88 kg/acre when organic matter exceeds 8%.
*** Do not use on low linolenic acid varieties.

Fortress rates – spring treatment

Crop	Rate kg/acre				Acres treated per 454 kg bag			
	< 2% OM	2 - 4% OM	4 - 6% OM	> 6% OM	< 2% OM	2 - 4% OM	4 - 6% OM	> 6% OM
Wheat	N.R.*	N.R.*	4.45	5.67	n/a	n/a	102	80
Barley	N.R.*	4.45	5.67	6.88	n/a	102	80	66
Canola, flax*, mustard**	5.67	5.67	6.88	6.88	80	80	66	66

* Not recommended.
** Do not use on low linolenic acid varieties.

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Fall surface application: Where fields are prone to water and/or wind erosion and fall tillage is therefore undesirable, fall surface applications should be made after October 1 or within 3 weeks of soil freeze-up (average soil temperature at the 5 cm depth should be 4°C or less). Fall surface application should be made to standing stubble, chem fallow or summerfallow fields in a state of low soil erodibility. Avoid smooth, hard-packed soil conditions in summerfallow, which may allow granules to drift. Surface applications should not be made to fields covered in snow or that have excessive crop residue, which will not allow granules contact with soil. Under excessively warm and/or wet conditions between application and crop emergence, control may be reduced. For best results under heavy wild oats infestations, use the incorporated treatments only.

Incorporation

Time: The first incorporation should be completed within 24 hours of application, except for the fall surface application. The second incorporation may then be done during the fall or delayed until the spring.

For surface applications: Incorporate twice at right angles in the spring. Early seeding and a delayed second incorporation of 48 hours or more will provide best results.

Do not incorporate this product more than 5 cm. This can be accomplished by setting the tillage equipment to work the soil not deeper than 7.5 cm to 10 cm.

Implement: Before applying this product, be sure the soil is in good working condition. All deep tillage by cultivation or double disc implements must be completed prior to application of this product.

Application tips

Calibrate equipment to deliver desired amount of product. Use only a hoe-drill or a double disc press drill to seed barley or wheat into a Fortress-treated field. Do not apply to soil with less than 2% organic matter if it is to be seeded to wheat. Do not apply Fortress for wheat on land that has been treated with trifluralin since June 1 of the previous year.

Seeding: Flax, mustard and rapeseed can be seeded in treated layers. Barley and wheat are more sensitive and should be planted 6 to 7.5 cm. Wheat must be seeded at least 1 cm below the treated layer. Do not seed deeper than 7.5 cm. To ensure an even crop stand, increase the usual seeding rate of barley and wheat by 10%. Seed into warm, moist seedbed. A pre-seed burn-off herbicide treatment is required to eliminate weed competition prior to crop emergence.

How it works

Absorbed by wild oats shoots and foxtail roots, usually resulting in death before emergence. Under dry conditions, some wild oats and foxtail may emerge before being killed.

Expected results

Weeds: Wild oats and foxtail die before they emerge. Weed control may be reduced under conditions of prolonged, cool soil temperatures at the time of germination or extreme drought in spring. **Crops:** Thinning in barley and wheat are known to occur under conditions of heavy rainfall and/or cold weather after application and before crop emergence. In most cases, thinning is more than offset by tillering. Some thinning may be noted on eroded knolls. Poor results may be expected if there is incomplete incorporation due to wet, cloddy soil or heavy trash, very dry soil conditions in spring or prolonged cool soil temperatures at time of germination. Ridges left by seeding may disrupt the treated layer and allow escapes.

Restrictions

Rainfall: Moisture is required for activation. Rainfall of at least 1.5 cm within 2 weeks of application in the spring is required to ensure maximum performance. **Grazing:** Do not graze the treated crop or cut for hay; there are not sufficient data to support such use.
Re-cropping: Under normal conditions, Fortress MicroActiv carryover will not harm crops grown in rotation. As a precaution, tame oats, sugar beet, creeping red fescue and small-seeded grasses such as timothy and canary seed should not be grown in rotation following a Fortress-treated crop. **Re-entry interval:** 12 hours.

Environmental precautions

Do not apply this product directly to aquatic habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity

Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a dry place.

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Foxxy CRX Herbicide

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Foxxy CRX co-pack of: Foxxy (PCP# 32952) + Clobber (PCP #33114) + MP RX (PCP# 33520)	NewAgco Inc	Fluroxypyr 180 g/L	Emulsifiable concentrate	9.6 L, 230 L
		Clopyralid 360 g/L	Emulsifiable concentrate	3.4 L, 81 L
		Thifensulfuron 50% + tribenuron 25%	Wettable dry granules	320 g

Crops, staging and rates

Crop	Stage	Rates
Spring wheat, durum wheat, barley	3 leaf - flag leaf	Foxxy: 0.24 L/acre + Clobber: 0.085 L/acre + MP RX: 8 g/acre

Weeds, rates and staging

All weeds less than 10 cm tall unless otherwise indicated.

ball mustard
Canada thistle[5]
chickweed[2] (1 - 6 leaf)
cleavers[3]
common groundsel
corn spurry
cow cockle
flixweed
green smartweed
hemp-nettle
kochia[3] (up to 8 leaf)
lady's-thumb
lamb's-quarter
narrow-leaved hawk's-beard
redroot pigweed
round-leaved mallow[1]
Russian thistle
scentless chamomile[1]
shepherd's-purse
stinkweed
sow thistle[1]
stork's-bill[1] (2 - 6 leaf)
tartary buckwheat
volunteer canola[3,4]
volunteer flax (1 - 12 cm)
volunteer sunflower
wild buckwheat (cotyledon - 3 leaf)
wild mustard

Note: [1] Suppression [2] Apply when chickweed is small and actively growing, but before canopy prevents thorough coverage.
[3] Including Group 2 resistant biotypes [4] Addition of MPCA is required to control Group 2 tolerant canola, see label for recommended rates.
[5] Seasonal control. For best results, apply before bud stage when thistles are no larger than 15 cm tall

Supported tank mixes

MPower MCPA Ester at 190 mL/acre, Aurora, HellCat, Axial, Everest, Simplicity, Traxos

Application information

Ground equipment only. **Water volume:** 20 - 40 L/acre.

Application tips

Ensure thorough spray coverage of target weeds and use higher water volumes with dense crop canopy and/or large weeds. If application is stopped prior to completion, re-suspend spray solution by full agitation prior to commencing spraying again. Product will degrade if left in the sprayer for more than 24 hours after mixing. Frost 3 days before or 3 days after application may reduce weed control and crop tolerance.

How it works

Foxxy CRX is a combination of 3 systemic herbicides. Typical symptoms (discolouration, twisting of stems) of dying weeds may not be visible for several days to 2 weeks after application, depending on growing conditions.

Expected results

Complete control of weeds may take 3 to 4 weeks. When weeds are stressed, control can be reduced or delayed since weeds are not actively growing. Do not make applications to weeds stressed longer than 20 days due to lack of moisture as unsatisfactory control can result. Application to crops that are stressed by severe weather conditions, frost, low fertility, water-logged soil (soil at or near field capacity), disease or insect damage may result in crop injury.

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Restrictions

Rainfall: Rainfall within 4 hours may reduce weed control. **Re-entry interval:** 12 hours. **Grazing:** Livestock may graze treated areas 7 days after application. Withdraw meat animals from treated areas at least 3 days before slaughter. Allow 7 days after application before cutting hay or harvesting forage. Mature crops may be harvested 60 days after application. **Re-cropping:** 1 year after application – wheat, barley, canola, rye, sugar beet, flax, mustard, oat, pea or summerfallow. Very dry soil conditions after application can result in risk of injury to peas the following year. For pea rotation, rainfall from June 1 to August 31 in the year of application must be greater than 140 mm (5.5 inches) and annual rainfall must be greater than 175 mm (6.9 inches). Contact NewAgco for further information.

Environmental precautions

Some of the components in this product are highly toxic to non-target terrestrial plants and aquatic organisms. Avoid contamination of aquatic systems during application and observe buffer zones specified on the component labels. **Runoff and leaching:** Do not apply to irrigated land where tail water will be used to irrigate cropland. Do not contaminate irrigation water. Do not use on highly variable soils that have large gravelly or sandy areas, eroded knolls, or calcium deposits.

Toxicity

Foxxy: Acute oral LD_{50} (rats) = >2,000 mg/kg.
Clobber: Acute oral LD_{50} (rats) = >2,000 mg/kg.
MP RX: Acute oral LD_{50} (rats) = >5,000 mg/kg.

Storage:

Do not freeze. If product is frozen, bring to room temperature and agitate before use.

Foxxy MR

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Foxxy MR co-pack of: Foxxy (PCP#32952), MPower MCPA Ester 600 (PCP#34156), MPower R (PCP# 30945)	NewAgco Inc.	Fluroxypyr 180: 180 g/L	Emulsifiable concentrate	9.6 L, 230 L
		MCPA Ester: 600 g/L	Emulsifiable concentrate	9.6 L, 230 L
		Thifensulfuron-methyl: 50% + tribenuron-methyl: 25%	Water dispersible granules	320 g

Surfactant: Add a non-ionic surfactant such as Agral 90, Ag-Surf, or Liberate at 0.2 L/100L of spray solution.

Crops, staging and rates

Crop	Staging	Rate per acre
Spring wheat, durum wheat, barley	3 leaf - flag leaf	MPower R: 8 g/acre Foxxy: 240 mL/acre MCPA Ester: 240 mL/acre

Weeds, rates and staging

Unless otherwise noted, apply to young and actively growing weeds that are less than 10 cm in height or diameter.

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Foxxy MR (cont'd)

Weeds controlled

- annual smartweed
- annual sunflower
- ball mustard
- burdock (prior to 4 leaf)
- chickweed[1]
- cleavers (1 - 4 whorls)[2]
- corn spurry
- wild mustard
- cocklebur
- common groundsel
- cow cockle
- flixweed
- hemp-nettle[3]
- kochia (2 - 8 leaf)[2]
- lamb's quarters
- wild radish
- mustards (except dog and tansy)
- narrow-leaved hawk's-beard
- plantain
- prickly lettuce
- ragweeds
- redroot pigweed
- shepherd's-purse
- stinkweed
- vetch
- volunteer canola[4]
- volunteer flax (1 - 12 cm)
- volunteer sunflower
- wild buckwheat[5]

Weeds suppressed

- Canada thistle[6]
- round-leaved mallow[7]
- scentless chamomile
- sow thistle
- stork's-bill (1 - 8 leaf)
- toadflax

[1]Apply when chickweed is small (1- 6 leaf) and actively growing, but before crop canopy prevents thorough herbicide coverage of weeds. Chickweed emerging after application will not be controlled. Biotypes resistant to Group 2 herbicides will not be controlled. [2]Including Group 2 resistant biotypes. [3]Not including Group 2 resistant biotypes. [4]ClearField volunteers are controlled with an additional 132 mL/ac MCPA 600 Ester. [5]Apply to actively growing wild buckwheat in the cotyledon to 3 leaf stage. Under environmental stress, such as dry weather, control may be reduced. Large plants may re-grow after treatment. [6]Apply when the majority of thistles have emerged and are actively growing. For best top growth control, apply before bud stage when thistles are no larger than 15 cm in height and before crop canopy prevents thorough coverage of weeds. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. Later emerging thistles will not be suppressed.[7]Apply to actively growing round leaved mallow from the 2 - 6 leaf stage. Foxxy MR will keep mallow stunted, but may not reduce overall populations. [8]Apply to toadflax that is no larger than 15 cm in height. A control program for this weed includes both frequent tillage and chemical application

Registered tank mixes

None registered. AgraCity supports the following tank mixes not on the label. Apply mixes according to the most restrictive use limitations for either product. **Herbicides:** Axial, Aurora, HellCat, Himalaya, Simplicity, Traxos.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 22 L/acre minimum.

Mixing instructions

Fill sprayer tank ½ full with clean water. Maintain agitation throughout mixing and application process. Add MPower R and agitate for 5 minutes. Add any liquid tank mix partner, followed by Foxxy and MCPA Ester. Add any required surfactant last.

Application tips

Use higher water volumes for dense crop canopy or larger weeds. Foxxy MR left in the tank for more than 24 hours may have reduced efficacy. When the crop is under stress, transient crop injury such as discoloration or reduced height may occur. Best results will occur when temperatures are between 12ºC and 24ºC when the weeds are small and actively growing.

How it works

Foxxy MR is absorbed through the foliage. MPower R inhibits cell elongation. The other components mimic naturally occurring plant hormones and control weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected results

Growth stops immediately. Discoloration of dying weeds may not be noticeable for 1 - 3 weeks after application, depending on growing conditions and weed species.

Restrictions

Rainfall: Rainfall within 4 hours of application will reduce weed efficacy. **Grazing:** Livestock may graze treated areas 7 days after application. **Re-cropping:** Grow all major crops the year after application.
Pre-harvest Intervals: Do not harvest mature crops within 60 days after application. **Re-entry interval:** 12 hours.

Environmental precautions

For ground application, use a 15 m buffer between sprayed area and sensitive habitat. Do not contaminate water when cleaning equipment. MCPA is toxic to aquatic organisms and non-target terrestrial plants and can readily leach in the soil.

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Toxicity

MPower R: Oral LD_{50} (rats) > 2,000 mg/kg. Foxxy: Oral LD_{50} (rats) > 4,640 mg/kg. MCPA 600 Ester: Oral LD_{50} (rats) = 1,046 mg/kg.

Storage

Store in a dry heated area. If product is frozen, bring to room temperature and agitate before use.

glyphosate

Group 9

Formulation

Product	Company	Acid equivalent concentration	Formulation	Container size
Advantage Glyphosate 360 (PCP # 33694)	Advantage Crop Protection Inc	360 g/L	Solution	500 L, 1,000 L
Advantage Glyphosate 540 (PCP # 33746)	Advantage Crop Protection Inc	540 g/L	Solution	10 L, 120 L, 500 L, 1,000 L
Clearout 41 Plus (PCP# 28322)	NewAgco Inc	360 g/L	Solution	115 L, 1,000 L
Co-Op Vector 540 (PCP#31598)	Federated Co-operatives Ltd	540 g/L	Solution	10 L, 115 L, 450 L, 800 L
Credit Xtreme (PCP# 29888)	Nufarm Agriculture	540 g/L	Solution	10 L, 450 L
Crush'R Plus (PCP# 29995)	Ag West Inc	360 g/L	Solution	9.5 L, 30 L, 113 L, 940 L, 1,040 L
Flame Glyphosate 360 (PCP# 33088)	Farmer's Business Network	360 g/L	Solution	10 L
KnockOut Extra (PCP# 29266)	Libertas Now Inc	360 g/L	Solution	9.5 L, 30 L, 113 L, 940 L, 1,040 L
Matrix (PCP# 29775)	IPCO	480 g/L	Solution	10 L, 115 L, 450 L, 960 L
MP Disruptor 360 (PCP# 29290)	NewAgco Inc	360 g/L	Solution	500 L, 1,000 L
MP Disruptor 540 (PCP# 32817)	NewAgco Inc	540 g/L	Solution	500 L, 1,000 L
Destroyer Glyphosate 540 (PCP # 32945)	NewAgco Inc	540 g/L	Solution	500 L, 1,000 L
R/T 540® liquid herbicide (PCP# 28487)	Bayer	540 g/L	Solution	10 L, 115 L, 450 L
Roundup Transorb® HC liquid herbicide (PCP# 28198)	Bayer	540 g/L	Solution	10 L, 115 L, 450 L
Roundup WeatherMax® with Transorb 2 Technology® liquid herbicide (PCP# 27487)	Bayer	540 g/L	Solution	10 L, 115 L, 450 L
Roundup WeatherPRO® herbicide ** **(PCP # 33653)**	Bayer	Glyphosate: 540 g/L	Solution	10 L, 800 L
Sharda Glyforce WDG (PCP# 33400)	Sharda CropChem Ltd	Glyphosate: 68.77%	Water dispersible granules	No package size*
Sharda Glyphosate 360 (PCP# 31493)	Sharda CropChem Ltd	360 g/L	Solution	10 L, 1,000 L

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glyphosate (cont'd)

Product	Company	Acid equivalent concentration	Formulation	Container size
Smoke (PCP# 31063)	Farmers Business Network	360 g/L	Solution	120 L, 500 L, 1,000 L
Smoke 540 (PCP # 33697)	Farmers Business Network	540 g/L	Solution	10 L, 120 L, 500 L, 1,000 L
StartUp (PCP# 29498)	Loveland Products	540 g/L	Solution	10 L, 115 L, 450 L, 800 L
Stonewall 540 (PCP# 33379)	Winfield United Canada	540 g/L	Solution	10 L, 115 L, 500 L, 800 L, 1,000 L
VP 480 (PCP# 28840)	Corteva Agriscience	480 g/L	Solution	10 L, 115 L, 450 L, 960 L
IPCO Factor 540 (PCP# 27988)	IPCO	540 g/L	Solution	10 L, 115 L

* All tank mixes with Glyforce WDG require the addition of a non-ionic surfactant such as Agral 90, Ag Surf or Companion. Surfactant should be added at a rate of 142 mL/acre. **Note: Roundup WeatherPRO is registered for the following uses: non-cropland areas, industrial, military bases, recreational areas, rights-of-way and public areas. Refer to the label for use rates and weeds controlled.

Application rates of glyphosate products with various acid equivalent concentrations. The first column displays the actual amount of active ingredient applied per acre. The additional columns are the actual L/acre needing to be applied to meet that acid equivalent value.

Acid equivalent concentration			
Acid equivalent	**360 g/L**	**480 g/L**	**540 gL**
g ae/acre*	**L/acre**		
111	0.31	0.225	0.20
122	0.34	0.25	0.22
148	0.41	0.30	0.27
180	0.50	0.38	0.33
241	0.67	0.50	0.45
270	0.75	0.56	0.50
324	0.90	0.68	0.60
360	1.00	0.75	0.67
435	1.21	0.91	0.81
450	1.25	0.94	0.83
510	1.42	1.06	0.94
540	1.50	1.125	1.00
690	1.92	1.44	1.28
720	2.00	1.50	1.33
870	2.42	1.81	1.61
1000	2.78	2.08	1.85
1015	2.82	2.11	1.88
1740	4.83	3.63	3.22
1765	4.90	3.68	3.27

* g ae/acre = grams of acid equivalent per acre.

Cropland uses

Annual weed control prior to crop emergence or in summerfallow: all crops.
Quackgrass control: prior to seeding or after harvest.
Canada thistle control: summer-fallow, shelterbelts and post-harvest.
Dandelion control: prior to crop emergence or post harvest.
Other perennial weeds control: summerfallow, shelterbelts and post-harvest.

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Spot treatments (in-crop) of perennial weed control: cereals, corn, soybean and forages.
Pre-harvest control of quackgrass, Canada thistle, milkweed, toadflax, dandelion, season-long control of perennial sow thistle and harvest management.
Weed control in glyphosate tolerant crops: canola, corn and sugar beet.
Post-harvest stubble treatments: all crops.
Weed control in non-crop areas: industrial, right-of-way, recreational and public areas.
Brush control, turf renovation, directed application in woody nursery stock, roadsides and shelterbelts.

Weeds controlled

Annual

annual bluegrass	downy brome	narrow-leaved vetch	stinkweed
annual sow thistle	flixweed	night-flowering catchfly	stork's-bill
barnyard grass	green foxtail	Persian darnel	volunteer flax
Canada fleabane	green smartweed	prickly lettuce	volunteer mustard
common chickweed	hemp-nettle	red root pigweed	volunteer wheat
common ragweed	kochia*	round-leaved mallow	wild mustard
corn spurry	lady's-thumb	Russian thistle	wild oats
crabgrass	lamb's-quarter	shepherd's-purse	wild tomatoes
dodder	narrow-leaved hawk's-beard	smooth pigweed	

Perennial

alfalfa	curled dock	Japanese knotweed	smooth bromegrass
Canada bluegrass	dandelions	kentucky bluegrass	toadflax
Canada thistle	field bindweed	perennial sow thistle	wormwood
cattails	foxtail barley	poison ivy	yellow nutsedge
common milkweed	hemp dogbane	purple loosestrife	
cottontop	hoary cress	quackgrass	

Brush

alder	Douglas fir	poplar	snowberry
birch	hemlock	raspberry	willow
cedar	maple	rhododendron	withrod
cherry	pine	sheep laurel	

* Will not control kochia biotypes resistant to glyphosate.

Annual weed control prior to crop emergence or in summerfallow

Weeds controlled	Weed stage	glyphosate grams acid equivalent per acre	Surfactant per acre
Green foxtail, lady's-thumb, stinkweed, volunteer barley, volunteer canola (non-glyphosate tolerant), volunteer wheat, wild mustard, wild oats	Up to 8 cm in height	111	0.14 L
All weeds listed above plus suppression of foxtail barley, flixweed and kochia*	8 - 15 cm in height	148	0.14 L
All weeds listed above plus downy brome, giant foxtail, Persian darnel, Canada fleabane, common ragweed, flixweed, hemp-nettle, lamb's-quarter	Weeds up to 15 cm in height. For narrow-leaved hawk's-beard 8 - 15 cm or wild buckwheat (3 - 4 leaf stage) use high rate	180 - 270	Surfactant is not required
All weeds listed above plus annual sow thistle, bluegrass, crabgrass, kochia, prickly lettuce, shepherd's-purse and narrow-leaved vetch	Up to 15 cm in height	324	Surfactant is not required
All annual grasses and broadleaved weeds listed above	Greater than 15 cm in height	510	Surfactant is not required

* Will not control kochia biotypes resistant to glyphosate.

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Registered tank mixes in minimum and zero tillage systems cropping systems – prior to seeding

Not all glyphosate products are registered for all tank mixes below. Refer to individual glyphosate for registered tank mixes, glyphosate rates and registered crop species labels.

Spring wheat, winter wheat, barley and rye

- glyphosate + 2,4-D (0.23 - 0.34 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4-leaf stage)
- glyphosate + 2,4-D (0.45 - 0.68 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 6-leaf stage)
- glyphosate + Buctril M (0.2 - 0.4 L), Logic M (0.25 - 0.5 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4-leaf stage)
- glyphosate + Engenia (0.096 L) for broad-spectrum weed control, excluding volunteer glyphosate tolerant canola
- glyphosate + Express SG (6 g/acre) + Agral 90 (0.35% v/v) for broad-spectrum weed control. Agral 90 only required if glyphosate rate is below 0.5 L/acre (360 g active ingredient/L equivalent)
- glyphosate + Pardner (0.51 L/acre), Brotex (0.6 L/acre): for broad-spectrum weed control
- Both mixes below for control of hard to kill and glyphosate resistant and/or tolerant weeds
  - glyphosate + Blackhawk (300 mL/acre)
  - glyphosate + Goldwing (133 - 266 mL/acre)

Field corn, sweet corn and flax:

- glyphosate + MCPA amine 500 (0.28 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4-leaf stage)
- glyphosate + Buctril M (0.2 - 0.4 L/acre), Logic M (0.25 to 0.5 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4-leaf stage)

Field corn only:

- glyphosate + Engenia (0.096 L) for broad-spectrum weed control, excluding volunteer glyphosate tolerant canola

Field corn, canaryseed and soybeans:

- glyphosate (300 mL/acre) + Blackhawk either pre-seed or post-seed but pre-emergent

Corn, buckwheat, canaryseed, millet, oats, triticale:

- glyphosate + Goldwing (133 - 266 mL/acre): for control of hard to kill and glyphosate resistant and/or tolerant weeds

Field peas, lentils, and chickpeas

- glyphosate + MCPA amine 500 (0.2 - 0.28 L/acre) for broad-spectrum weed control, including glyphosate tolerant canola. Note: use only amine formulations prior to seeding pea, lentils and chickpea
- glyphosate + Goldwing (133 - 266 mL/acre)

Canaryseed and seedling forage grasses (bromegrass, crested wheatgrass, intermediate wheatgrass, slender wheatgrass, tall wheatgrass, Russian wildrye, timothy, orchard grass, creeping red fescue, meadow fescue, meadow foxtail, tall fescue, meadow bromegrass, streambank wheatgrass and reed canarygrass)

- glyphosate + Buctril M (0.2 - 0.4 L), Logic M (0.25 - 0.5 L/acre) for broad-spectrum weed control, including control of volunteer Roundup Ready canola (up to 4-leaf stage)

Canola:

- glyphosate + Conquer (15 mL + 242 mL) for control of hard to kill and glyphosate resistant and/or tolerant weeds
- glyphosate + Conquer II (121 - 242 mL/acre)

Registered tank mixes in minimum and zero tillage systems cropping systems – chemfallow

- glyphosate + 2,4-D (0.5 L/acre)
- glyphosate + Engenia (0.096 L)
- glyphosate + Express SG (6 g/acre)
- glyphosate + Pardner (0.51 L/acre), Brotex (0.6 L/acre)

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- glyphosate + Express Pro (7 g/acre)
- glyphosate + Blackhawk (300 mL/acre)

Quackgrass control prior to seeding or after harvest in annual and forage cropping systems

Apply to actively growing quackgrass. Reduced control may result if rhizomes become dormant. This may occur when soil fertility is poor or land has not been tilled for several years.

Application on forages should be followed by tillage and should be made when good growing conditions exist.

	Weed stage	Acid equivalent in grams active ingredient per acre	Remarks
Quackgrass control: season long control on light to moderate infestation	3 - 4 green leaves. On fall tilled ground, delay the application until majority of quackgrass has 4 - 5 leaves	360	Allow 3 or more days after treatment before tillage. Fall treatment should be applied 3 - 4 weeks after swathing to actively growing quackgrass. Do not apply after first damaging frost in the fall. Frost of - 5°C is usually tolerated by new shoots. Frost damage is evident by drying of new shoots shortly after frost
Quackgrass control: heavy infestations or sod bound quackgrass	3 - 4 green leaves or more	360 - 1000	Use higher rate for sod bound quackgrass (left undisturbed for at least 2 years). Allow 3 or more days after treatment before tillage. Fall treatment should be applied 3 - 4 weeks after swathing to actively growing quackgrass. Do not apply after first damaging frost in the fall. Frost of - 5°C is usually tolerated by new shoots

Canada thistle control: Summerfallow and post harvest

	Weed stage	Acid equivalent in grams active ingredient per acre	Remarks
Control of Canada thistle at the rosette stage (summerfallow)	Rosettes at least 15 cm in diameter	360	Conduct summerfallow tillage as usual and perform the last tillage operation between July 15 and August 1. Allow thistle to re-grow for a minimum of 5 weeks until they are 15 cm in diameter and majority of them are in a rosette stage. Allow 10 or more days after treatment before tillage. Treatment after a mild frost is possible provided leaves are green and plants are actively growing
Control of Canada thistle: post-harvest stubble treatment	Bud stage or beyond	648 - 1000	Allow 20 to 25 cm of new growth before application. Thistles must be sprayed at least 2 weeks prior to killing frost. Straw should be removed or evenly spread to allow for proper regrowth and spray coverage. Heavy frost prior to treatment may decrease control. Allow 5 or more days after treatment before tillage

Registered tank mixes for Canada thistle control

- glyphosate + Engenia (0.096 L)

Dandelion control: Prior to seeding or after harvest

For best results, apply up to and including dandelion bloom.

Dandelion stage of growth gram a.i/acre		Remarks
Less than 15 cm rosettes	Greater than 15 cm rosettes	
360	540 - 720	Allow 3 or more days after treatment before tillage for all rates. Use the higher rate when infestations are heavy.

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Alfalfa control (fall treatment)

Staging	Rate a.i. per acre	Remarks
Early bud to full bloom (fall application only)	540 - 720	Use high rate when alfalfa populations are high or when grass infestation is heavy. Allow at least 5 days before tillage. Apply in 23 - 135 L/acre water.

Registered tank mixes for alfalfa control (fall and spring)

The addition of 2,4-D may improve alfalfa control in situations where control may be more difficult to obtain, such as in minimum tillage systems where populations are heavy and with spring applications.

Tank mix	Acid equivalent in grams active ingredient per acre	Remarks
glyphosate + 2,4-D	glyphosate: 360 - 720 g a.i./acre + 2,4-D: 0.49 - 0.97 L	For spring applications, use only the low rate of 2,4-D (i.e., 0.49 L/acre) and recommended rate of glyphosate. Only cereal crops not underseeded to legumes may be planted following spring applications of this tank mix, and a 14-day interval between application and planting is required

Spot treatment (in-crop) of perennial weeds in wheat, oat, barley, corn, soybean, forage legumes and forage grasses

Glyphosate may be applied for the control of Canada thistle, quackgrass and other perennial weeds (absinthe, blue grasses, smooth bromegrass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow thistle and yellow nutsedge in forage crops, barley, wheat, oats, soybean and legumes, including seed production. Treatments may be made up to heading of small grain, initial pod set on soybean and legumes, silking of corn and emergence of seed heads. The crop in the treated area will be killed. Avoid drift beyond the treated area. Application can be made using a boom sprayer, knapsack, or high volume equipment. Applications should be made using the same rates and at the same growth stages as listed in the quackgrass, Canada thistle and other perennial weed control tables.

Other perennial weed control in summerfallow, shelterbelts and post-harvest

Weeds controlled	Weed stage	Rate a.i. per acre	Remarks
Common milkweed	Bud to full bloom	1,765	Allow 7 or more days after treatment before tillage. Reduced control may occur after full bloom. Milkweed may not all be in the correct stage, therefore, repeat treatments may be required
Field bindweed	Full bloom or beyond	1,000 - 1,728	Allow 7 or more days after treatment before tillage
Foxtail barley	Seedling to heading	360 - 720	Allow a minimum of 1 day after treatment before tillage or seeding. Use higher rates for larger, more established plants, heavy infestations or if plants are stressed
Toadflax rosette stage (summerfallow)	Rosettes at least 15 cm tall or across	360	Allow 7 or more days after treatment before tillage in summerfallow
Alfalfa	Early bud to full bloom stage. Fall applications only	540 - 720	Allow 5 or more days after treatment before tillage. Use the higher rates when alfalfa populations are high or when heavy grass infestations are also present

Pre-harvest perennial weed control

Crop: Wheat, barley (including malting barley*), oats*, canola (rapeseed), dry bean, flax (including solin), lentil, mustard (Weathermax only), pea, soybean and forages.

Weeds controlled: Quackgrass, Canada thistle, common milkweed, toadflax, dandelion, perennial sow thistle (season long)

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Rate

Crops	
Wheat, barley (including malting barley*), oats*, canola (rapeseed), dry beans, flax (including solin), lentil, pea, soybean	Forages
360 g a.i./acre	360 - 720

Caution: Do not apply to any crops if grown for seed.

* Barley grown for malt and tame oats grown for milling are registered for the pre-harvest application. However, farmers should contact malt barley and milling oats buyers prior to application to confirm acceptance of glyphosate treated grain.

** These crops are registered with R/T 540, Roundup Transorb HC, Roundup WeatherMax and Roundup Ultra 2 only under *User Requested Minor Use Label Expansion program.* The manufacturer assumes no responsibility with respect to performance and/or crop tolerance claims for herbicide performance.

How to apply

Ground (all products). Aerial: Do not apply by air, except Sharpshooter, Shooter Plus, Roundup Transorb HC, Roundup WeatherMax, RT/540, Smoke, MPower Glyphosate.

Crop staging: Apply when average seed moisture is at or below 30%. Accurate measurement of seed moisture must be made before application. The following chart lists visual symptoms that can be used as guidelines as to when 30% grain moisture has been reached.

Crop*	Percent seed moisture	Visual symptoms
Wheat, barley, oat	Less than 30	Hard dough stage; a thumbnail impression remains on seed
Canola (including glyphosate tolerant varieties)		Pods are green to yellow; most seeds are yellow to brown
Flax (including low-linoleic acid varieties)		Majority (75% - 80%) of bolls are brown
Forage	Not applicable	Forage 3 - 7 days prior to the last cut before rotation or forage renovation. Do not apply to forage stands that are to be maintained
Pea	Less than 30	Majority (75% - 80%) of pods are brown
Lentils		Lowermost pods (bottom 15%) are brown and seeds rattle
Dry bean		Stems are green to brown in colour; pods are mature (yellow to brown in colour); 80% - 90% leaf drop (original leaves)
Soybean (including glyphosate tolerant varieties		Stems are green to brown in colour; pod tissue is dry and brown in appearance; 80% - 90% leaf drop
Chickpea		Stems are green to brown in colour; pods are mature (yellow to brown in colour); 80% - 90% leaf drop (original leaves)
Lupin		
Faba bean		

* Not all glyphosate products are registered for pre-harvest application on all crops species listed above. Refer to individual crop labels for registered uses and crop species.

Weeds controlled and staging

Quackgrass (4 to 5 green leaves), Canada thistle (at bud stage or beyond), common milkweed (bud to full bloom), toadflax (bud to full bloom), dandelion (rosette to full bloom), season-long control of perennial sow thistle (at or beyond the bud stage), and most of the annual weeds that are green at the time of pre-harvest application.

Harvest management benefits

This treatment may also provide harvest management benefits by drying down crop and vegetative crop growth. Apply only during the period 7 to 14 days before harvest to ensure best weed control and to maximize harvest management benefits. Earlier application may reduce crop yield and/or quality and may lead to excess glyphosate residues in the crop. Extremely cool, wet and cloudy weather conditions between time of application and the anticipated harvest date may slow down activity of this product, thereby delaying crop dry down and harvest date.

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Environmental precautions

Over-spray or drift to important wildlife habitats such as bodies of water, wetlands (e.g., sloughs), shelterbelts, woodlots and other cover on the edges of fields frequented by wildlife, should be avoided.

Ground application: Leave a 15-metre buffer zone between the last spray swath and the edge of any of these habitats. Do not expose or contaminate any body of water or non-target vegetation by direct application, spray drift, or when cleaning and rinsing spray equipment.

Aerial applications: maintain a 25-metre buffer zone from water and wetland areas, and 55-metre buffer from shelterbelts, woodlots and other cover on the edge of treated fields.

For use in glyphosate tolerant crops

Glyphosate tolerant canola

Crop: Canola variety with Roundup ready gene. Always use pedigreed (certified) canola seed. Canola that is not designated as glyphosate tolerant will be damaged or destroyed by this treatment. Note: Not all glyphosate products are registered. **Crop stage:** Up to and including 6-leaf stage of glyphosate tolerant canola. Temporary yellowing may occur if applied at the 4 - 6 leaf stage of the crop. **With:** Ground application only. **Water volume:** 40 - 90 L/acre. **Grazing:** All portions of the treated crop may be fed to livestock.

Weeds controlled	Rate a.i. per acre
Single application	
Annual grasses: barnyard grass, green foxtail, volunteer barley, volunteer wheat, wild oats **Annual broadleaves:** Stinkweed, redroot pigweed, wild mustard, Russian thistle, lamb's-quarter, non-glyphosate tolerant volunteer canola (rapeseed), hemp-nettle, lady's-thumb, kochia*, chickweed, corn spurry, wild tomato, cleavers, wild buckwheat, shepherd's-purse, cow cockle**, night-flowering catchfly**, smartweed**, stork's-bill, flixweed, narrow-leaved hawk's beard, round-leaved mallow	120 - 180
Perennial weed suppression: Canada thistle, dandelion, perennial sow thistle, and season-long control of quackgrass	180
Double application (first application as above)	
Additional flushes of weeds listed above plus round-leaved mallow, Canada thistle, foxtail barley, dandelion, perennial sow thistle, quack grass (season-long control)	180
Single application for perennial weed control	
All the weeds in single application listed above plus season-long control of Canada thistle and perennial sow thistle	270

* Will not control kochia biotypes resistant to glyphosate.

** The lower rate can be used for control of shepherd's-purse, cow cockle and night-flowering catchfly at the 1 - 3 leaf stage of the crop or for control of smartweed at the 4 - 6 leaf stage.

Note: A maximum of 1 L/acre of glyphosate products containing 356 or 360 g active ingredient per litre, 0.76 L/acre for products containing 480 grams active ingredient per litre, and 0.67 L/acre for products containing 540 g active ingredient per litre per season is allowed in glyphosate tolerant canola.

Note: For TrueFlex canola only: 0.67 L/acre Roundup WeatherMAX and Roundup Transorb: Apply from emergence to first flower. Up to 2 applications per season. 1.33 L/acre Roundup WeatherMAX and Roundup Transorb: Apply from emergence to 6-leaf stage. 1 application per season.

Registered tank mixes in glyphosate tolerant canola

For season long control of top growth of Canada thistle and control of wild buckwheat in glyphosate tolerant canola.

Tank mix	Rate a.i. per acre	Remarks
glyphosate + Lontrel 360	glyphosate: 180 gL + Lontrel: 113 mL	Apply in 40 L of water per acre. Apply when canola is in the 2 - 6 leaf stage

glyphosate tolerant corn

Crop: Corn with Roundup ready gene. Always use pedigreed (certified) corn seed. Corn that is not designated as glyphosate tolerant will be damaged or destroyed by this treatment. **Crop stage:** Up to and including 8-leaf stage of glyphosate tolerant corn. **How to apply:** Ground application only. Do not apply by air. **Water volume:** 40 - 90 L/acre.

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Rate a.i. per acre	Weeds controlled
360	**Annual grasses:** barnyard grass, green foxtail, volunteer barley, volunteer wheat, wild oats **Annual broadleaves:** chickweed, cleavers, corn spurry, cow cockle, flixweed, hemp-nettle, kochia*, lady's-thumb, lamb's-quarter, narrow-leaved hawk'-beard, night-flowering catchfly, redroot pigweed, round leaved mallow*, Russian thistle, shepherd's-purse, smartweed, stinkweed, stork's-bill, volunteer canola (except glyphosate tolerant varieties), wild buckwheat, wild mustard, wild tomato
A second (sequential) application	
360	Late flushes of heavy infestations of the above weeds plus control of common milkweed, field bindweed, round-leaved mallow, yellow nutsedge

* Will not control kochia biotypes resistant to glyphosate.

A single application of 1.5 L/acre of VP 480 is registered but can only be applied up to and including the 6-leaf stage of RR corn.

Note: Weeds will be more easily controlled and early crop competition avoided with applications made when the weeds are small. Control of weeds greater than 25 cm in height will be inconsistent, although some weeds may be controlled.

Weed control in non-cropland areas

Weed	Rate a.i. per acre	Hand held high volume application % solution	Remarks
Annual grasses and broadleaves	324 - 450	0.67 %	Apply to actively growing weeds. Water volume: 20 - 40 L/acre
Quackgrass	690 - 1,015	1.34%	20 - 120 L/acre of water volume. Add 0.5% v/v of a recommended surfactant when using water volumes greater than 60 L/acre. Higher rate for long term control and for heavy infestations
Canada thistle (bud stage)	690 - 1,015	1.34 %	20 - 120 L/acre of water volume. Add 0.5% v/v of a recommended surfactant when using water volumes greater than 60 L/acre. Higher rate for long term control and for heavy infestations
Purple loosestrife	870	0.67 - 1.34%. Use 22% solution for wiper application	
Other perennials	870 - 1,740	1.34 %	Water volume: 40 - 120 L/acre. Add 0.5% v/v of a recommended surfactant when using water volumes greater than 60 L/acre. Higher rate for long term control and for heavy infestations
Brush and trees: birch, cherry, poplar, western snow berry, willow	435 - 870	0.67 - 1.34 %	Water volume: 40 - 120 L/acre. Timing: Summer through early fall
Alder, maple, raspberry, salmonberry	870	1.34 %	Water volume: 40 - 120 L/acre. Timing: Late summer through early fall
Turf renovation	360 - 1,740	0.67 - 1.34 %	Water volume: 40 - 120 L/acre. Use higher end of the rate range for perennials

Registered tank mixes for non-crop and industrial areas – residual control

Tank mix	Acid equivalent in grams active ingredient per acre	Remarks
glyphosate	glyphosate: 360 - 1740 g/acre	Water volume: 80 - 160 L/acre. Do not apply to coarse, sandy or gravelly soil. 1 application per year

Additional application information

Water volume: Handgun (high water volume): 80 - 120 L/acre. **Boom:** 23 - 45 L/acre in most situations; use of the lower volume may improve control when hard water (Ca or Mg) or iron (Fe) ions are present.
Chemicalfallow: 20 - 40 L/acre.

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Application tips
Tillage or mowing prior to application will reduce effectiveness on perennial weeds. Minimum days to wait before tillage after application: annual weeds, 1 day; spring and fall quackgrass, 3 days; Canada thistle bud stage, 5 days; fall rosette stage, 7 to 10 days; field bindweed, milkweed and other perennials, seven days. Best results are obtained when temperatures are near 20°C and when weeds are actively growing. Control will be reduced if foliage is heavily covered with dust. Hard water or water containing calcium (Ca), Magnesium (Mg) and iron (Fe) ions will reduce the activity of glyphosate. Dirty water or water with suspended soil or organic matter will reduce control.

How it works
A non-selective, systemic herbicide that moves from the foliage into roots and kills the entire plant.

Expected results
Wilting and yellowing of annual weed occurs within 2 to 4 days; perennial requires 7 to 10 days. Complete browning of above ground growth and deterioration of roots occurs. Cool, cloudy conditions may slow activity.

Restrictions
Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage and a repeat treatment may be required. Do not apply if rainfall is forecast for the time of application. **Roundup Transorb HC, Roundup WeatherMax, Roundup Ultra 2, and R/T 540:** Rainfall occurring within 60 minutes of treatment may result in reduced weed control. **Movement in the soil:** Negligible leaching. **Grazing restrictions:** Do not graze or harvest treated areas until plants have turned brown and started to deteriorate. **Re-cropping:** No restrictions.
Re-entry interval: 12 hours.

Environmental precautions
Avoid direct application to any body of water populated with fish or used for domestic purposes. Leave a 15-metre buffer zone between sprayed area and sensitive habitats.

Toxicity
Acute oral LD_{50} = 4,320 mg/kg.

Storage
Heated storage is not required. May be stored below 0°C.

GoldWing

Group 4, 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
GoldWing (PCP# 32112)	Nufarm Agriculture	Pyraflufen-ethyl: 13.5g/L + MCPA ester: 420g/L	Emulsifiable concentrate	10.7 L, 85.5 L

Crops and staging

Prior to emergence

barley	chickpea	flax	oats
bean	corn (sweet, field and pop)	lentil	rye (spring and winter)
buckwheat	faba bean	lupin	triticale
canary seed	field pea	millet (pearl and proso)	wheat (spring, durum, winter)

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Weeds, rates and staging

Broadleaf weeds controlled by Goldwing alone. Low rate: 133 mL/acre. High rate: 266 mL/acre

- annual sow thistle[1]
- Canada fleabane[3]
- cleavers
- cow cockle[3]
- dandelion[1]
- flixweed[3]
- goat's-beard[2]
- kochia (all herbicide resistant biotypes)
- lamb's-quarter (all herbicide resistant biotypes)
- mallow
- mustards (except dog and tansy)
- narrow-leaved hawk's-beard
- night-flowering catchfly
- redroot pigweed
- stinkweed
- voluneer canola (all types)
- wild buckwheat[3]
- wild mustard[1]

[1] Suppression only. [2] Only suppressed at higher rate. [3] Suppressed at low rate, controlled at high rate.

Registered tank mixes

Tank mix partner	Product rates	Crop Stage
glyphosate	180 - 360 gae/ac	Prior to emergence

Not registered but supported tank mix: Valtera (56 - 85 g/acre) and Valtera EZ (60 - 90 ml/acre), Fierce (85 g/acre) and Fierce EZ (178 ml/acre) prior to emergence.

Application information

How to apply: Apply with ground equipment only. **Water volume:** Minimum 40 L/acre.

Application tips

Do not apply during periods of dead calm. Do not apply with spray droplets smaller than medium classification. Keep booms lower than 60 cm from target. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. GoldWing will damage emerged crop plants, even in minute quantities. Apply GoldWing prior to the emergence of the crop, either as a pre-seed or pre-emergence application. GoldWing does not provide residual weed control. Apply when weeds are in the seedling stage and actively growing.

How it works

GoldWing is designed for use as a contact and systemic herbicide for broadleaf weed control. Pyraflufen-ethyl, a member of the phenyl pyrazole class of herbicides, inhibits the protoporphyrinogen oxidase (PPO) enzyme, which results in cell membrane destruction and necrosis. MCPA ester, a member of the phenoxy class of herbicides, mimics plant growth regulators, interfering with cell enlargement and division, and development in susceptible plants.

Expected results

Contact activity will be apparent within hours. Initially, leaves will take on a water-soaked appearance before turning necrotic; systemic symptomology will appear over time. Plants will be necrotic and may exhibit epinasty (twisting) before death. Complete plant death will occur within a few days.

Restrictions

Rainfall: Rainfall within 2 hours of application may reduce control. **Grazing:** Do not permit lactating dairy animals to graze field within 7 days of application. Withdraw meat animals from treated fields 3 days before slaughter.
Pre-harvest intervals: Do not graze or cut treated crops for forage until 30 days after application.
Re-cropping: All crops can be seeded 30 days after an application of GoldWing. **Re-entry interval:** 12 hours.

Environmental precautions

Runoff: Avoid application when heavy rain is forecast or to areas with steep slopes and/or compacted clay soils.

Toxicity

Pyraflufen-ethyl: Acute oral LD_{50} (rats) > 5,000 mg/kg.
MCPA: Acute $oral_{50}$ (rats) = 700 mg/kg.

Storage

Store in a cool, dry, secure space. Do not freeze.

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Grazon XC

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Grazon XC (PCP# 31642)	Corteva Agriscience	Picloram: 97.5 g/L + 2,4-D: 360 g/L	Solution	10 L, 110 L

Crops, staging and rates

Permanent grass pasture and rangeland. Apply in spring or early summer after first growth appears.
Rate: Grazon XC: 1 - 2.5 L/acre.

Weeds, rates and staging

Weeds controlled with Grazon XC at 1.0 L/acre (season long control)

Canada thistle	dandelion	yarrow

Weeds controlled with Grazon XC at 1.89 L/acre

burdock	goldenrod	prickly lettuce	toadflax*
common ragweed	leafy spurge*	red clover	vetch
fleabane	plantain	sweet clover	wild carrot

Tree and wood species controlled with Grazon XC at 2.5 L/acre (height restrictions will apply)

aspen	birch	willow

* Under less than ideal conditions or for tree control, use a recommended surfactant (such as Gateway Adjuvant or any non-ionic surfactant) at 0.25% v/v. Maximum rainfastness with 0.375% v/v. Add surfactant after herbicide is thoroughly mixed.

Registered tank mixes

None registered.

Application information

Apply with ground sprayers or by aircraft using a drift control system. Water volume: Ground – 80 L/acre for optimum results. Air – best coverage is obtained at 20 L/acre in aerial use.

Application tips

Apply in spring or early summer after weeds have fully emerged and when weeds are growing rapidly. Ensure that there is adequate coverage of target weeds. Broadleaf crops are extremely sensitive to Grazon XC and care should be taken to prevent drift onto sensitive crops. Use appropriate drift control measures to prevent Grazon XC from affecting sensitive, non-target vegetation. Do not apply on soils that are very permeable (sandy loam to sand) to prevent Grazon XC from affecting sensitive, non-target vegetation through the entire profile and that have an underlying shallow aquifer.

How it works

Interferes with cell division, causing leaf cupping, stem distortion and eventual death of plant. Grazon is absorbed through leaves and roots.

Expected results

Perennial weeds show distorted stems and cupped leaves that turn yellow and then brown. Usually native grass increases in abundance as a result of reduced competition. Poor results may be expected if weeds are not actively growing in late summer or due to drought or frost. Apply up to 2.5 L/acre of Grazon XC to control deciduous trees and wood species listed with high water volumes when foliage is fully developed and actively growing. Maximum 1 application per year. For faster burndown of coniferous species, use a recommended surfactant with Grazon XC at 0.25% or up to 0.375% v/v for maximum rainfastness. Add surfactant after herbicide is mixed.

Restrictions

Re-entry interval: 12 hours. For non-crop areas, don't enter until spray has dried. **Rainfall:** If rainfall occurs within 4 hours of application, effectiveness may be reduced. Do not apply if rainfall is forecast for the time of application.

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Grazing: Do not allow lactating dairy animals to graze the treated areas within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. Feed livestock untreated forage for 7 days prior to moving onto land that produce broadleaf crops.
Pre-harvest intervals: Do not harvest forage or cut hay within 30 days after application. **Re-cropping:** Legumes may not be established in a pasture for several years after a Grazon treatment. **If legumes are essential in a pasture, do not use Grazon.** Do not break up treated pasture and plant to sensitive broadleaf crops for at least 5 years after application of Grazon. Do not move cut forage or manure from treated areas to areas that may be seeded to a sensitive crop.

Environmental precautions

Grazon products are slightly toxic to aquatic organisms, including fish. Grazon products are highly mobile in the soil and water.

Toxicity

Acute oral LD_{50} (rats) = 2,598 mg/kg.

Storage

Store in a cool, dry place. Do not freeze. If freezing occurs, bring to room temperature and mix thoroughly.

Heat Complete

Group 14, 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Heat LQ (PCP# 31468)	BASF Canada	Saflufenacil: 342 g/L	Suspension concentrate	1.73 L jug
Zidua SC (PCP# 32542)		Pyroxasulfone: 500 g/L		3.89 L jug
Merge (PCP# 24702)		Surfactant blend: 50%		8.1 L jug

*1 case of Heat Complete treats 40 - 80 acres, depending on rate used.

Crops, staging and rates

Crop	Stage	Rate	
		Heat LQ	Zidua SC
Corn, field pea, chickpea	Pre-seed or pre-emergence	22 - 43 mL/acre	49 - 97 mL/acre
Lentil†	Pre-seed or pre-emergence	22 mL/acre	49 mL/acre
Soybean	Pre-seed or pre-emergence	22 - 29 mL/acre	49 - 65 mL/acre

†DO NOT use rates higher than 22 mL/acre of Heat LQ or 49 mL/acre of Zidua SC, or injury could result. Please contact BASF before applying pre-seed any other soil-applied herbicide with, before or after applications of Heat Complete. The addition of other soil-applied herbicides may increase the sensitivity of lentil to Heat Complete, and injury may result.

Note: Heat Complete must be applied with Merge (0.2 L/acre).

Weeds and staging

Grasses: Prior to emergence
green and yellow foxtail* wild oats
*Residual suppression only.

Broadleaves: Apply up to the 8-leaf stage unless otherwise specified

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Heat Complete (cont'd)

Broadleaf weeds controlled

Canada fleabane[1]	lady's-thumb[4]	redroot pigweed[2]
cleavers[2]	lamb's-quarter[2]	shepherd's-purse[4]
common waterhemp[2] (prior to emergence)	narrow-leaved hawk's-beard (up to 8 cm)	stinkweed[2]
dandelion[3] (up to 15 cm)	perennial sow thistle[4,5]	wild buckwheat[2]
flixweed	prickly lettuce[4,5]	wild mustard[2]
kochia[1,2] (up to 15 cm)	ragweed (common, giant)[4]	round-leaved mallow

[1] Includes Group 2 and glyphosate-resistant biotypes. [2] Residual suppression (may be rate dependent). [3] Top growth burndown control only of perennial plants; control of spring-germinating plants. [4] Burndown control is rate-dependent. [5] Top growth burndown control.

Registered tank mixes

Heat Complete must be tank mixed with glyphosate 0.5 - 1 L/acre of 360 g/L equivalent. Merge (200 mL/acre) is always required regardless of glyphosate formulation used.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 20 - 40 L/acre. Use higher water volumes for dense weed stands or larger weeds.

Mixing instructions

Do not over agitate at any point in the process. Add products to the spray tank in the following order: Zidua SC – Heat LQ – glyphosate – Merge adjuvant. If foaming occurs, add an anti-foaming agent. Follow mixing instructions "d" on page 15.

Application tips

Good growing conditions promote weed growth and enhance the activity of Heat Complete. Weeds hardened off by cold weather or drought stress may not be controlled. Insufficient water volumes or coarse sprays may also reduce control levels.

How it works

Heat Complete is rapidly absorbed by root and foliar uptake; once absorbed, it exhibits mobility in plants. Heat LQ is a Group 14 herbicide that inhibits protoporphyrinogen oxidase (PPO). Cell membrane damage induced by inhibition of PPO leads to plant death. Susceptible weeds develop injury symptoms within hours of application under active growing conditions; plant death occurs within 3 to 5 days depending on growing conditions. Zidua SC is a Group 15 herbicide and controls weeds by inhibiting the synthesis of very long chain fatty acids, which halts growth at the apical meristem and coleoptile by reducing cell division and expansion. Weeds affected by Zidua SC may not emerge, or may emerge with irregular leaf margins and reduced growth.

Restrictions

Rainfall: Follow the glyphosate manufacturer's recommendation for rainfast. **Grazing:** Do not graze or cut for feed within 60 days of application. **Pre-harvest interval:** After 60 days, all labelled crops can be harvested. **Re-cropping:** In the event of crop failure, only labeled crops may be seeded on fields treated with Heat Complete (rate restrictions apply). All other crops may be seeded 1 year after treatment. Contact manufacturer for additional information on re-cropping intervals. **Re-entry interval:** 12 hours.

Toxicity

Acute oral toxicity (rats): LD_{50} > 2,000 mg/kg.

Storage

Store in a cool, dry place. Do not freeze. If frozen, thaw completely and shake well before use.

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Heat/Heat LQ

Group 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Heat (PCP# 29368)	BASF Canada	Saflufenacil: 70%	Wettable granule	844 g
Heat LQ (PCP# 31468)		Saflufenacil: 342 g/L	Suspension concentration	1.73 L jug Heat LQ + 2 x 8.1 L Merge; 4 x 10.79 L

Heat: 1 jug treats 30 - 80 acres, 1 case treats 240 - 640 acres Heat LQ: 1 case treats 30 - 80 acres. Tote treats 730 - 2,000 acres, depending on rate.

Crops, staging and rates

Crop	Stage	Rate
Wheat (spring, winter, durum), barley, oats, canaryseed, corn (field, sweet), field pea, chickpea, faba bean	Pre-seed or pre-emerge	10.4 - 28.4 g/acre 21.5 - 59 mL/acre Heat LQ
Lentil*	Pre-seed or pre-emerge	10.4 g/acre 21.5 mL/acre Heat LQ
Soybean		10.4 - 14.6 g/acre 21.5 - 29.5 mL/acre Heat LQ
Chemfallow		10.4 - 28.4 g/acre 21.5 - 59 mL/acre Heat LQ
Canola (all types), field pea, soybean and dry, common bean, sunflower, red lentil, chickpea, wheat (all types), barley, faba bean**	Pre-harvest	20 g/acre 43 mL/acre Heat LQ
Seedling bromegrass for seed production	Pre-seed or pre-emergent	10.4 - 28.4 g/acre 21.5 - 59 mL/acre Heat LQ

* Do not use rates higher than 10.4 g/acre or 21.5 mL/acre of LQ or injury could result. Please contact BASF before applying pre-seed any other soil applied herbicide with, before or after applications of Heat/Heat LQ. The addition of other soil applied herbicides may increase the sensitivity of lentils to Heat LQ, and injury may result.

** Heat or Heat LQ must be tank mixed with glyphosate when applied to red lentils, preharvest.

Note: Heat, or Heat + glyphosate must be applied with Merge (200 mL/acre) or MSO (Heat WG only). The surfactant is not included in the package. Heat LQ package includes Merge.

Weeds and staging

Broad leaves: Apply up to the 8-leaf stage unless otherwise specified.

Broadleaf weeds controlled (pre-seed and pre-emergence application)

Canada fleabane[1]
cleavers (maximum 4 whorl)**
common ragweed[1]
dandelion* (top growth control maximum 15 cm)
flixweed*
kochia (maximum 15 cm)
lamb's-quarter
narrow-leaved hawks-beard (maximum 8 cm)
redroot pigweed [1]**
round leaf mallow
stinkweed**
volunteer canola (all types)[1]**
wild buckwheat[1]**
wild mustard**

[1] Pre-harvest drydown. * Rapid burndown when tank mixed with glyphosate.

** Applications at the 28.4 g/acre rate or 59 mL/acre of the LQ formulation will also provide suppression of the emergence of these weeds.

Registered tank mixes

Heat should always be tank mixed with glyphosate 0.5 - 1 L/acre of 360 g/l equivalent for pre-seed or pre-emergence. For desiccation purposes, Heat can be used by itself or with up to 1 L/acre of 360 g/L equivalent. Merge (200 mL/acre) is always required regardless of the glyphosate formulation used. It is recommended to use 400 mL/acre of Merge when Heat is used on its own as a harvest aid.

Application information

How to apply:

Pre-seed/Pre-emerge and chemfallow applications: Ground equipment only. **Water volume:** 20 - 40 L/acre.

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Heat/Heat LQ (cont'd)

Use higher water volume (40 L/acre) when for dense weed stands or larger weeds. **Pre-harvest**: Harvest aid and desiccation applications – ground and aerial application. **Water volume:** Ground application – 80 L/acre alone, 40 L/acre with glyphosate tank mix. Aerial application – 20 L/acre.

Application tips

Good growing conditions promote weed growth and enhance the activity of Heat and Heat LQ. Weeds hardened off by cold weather or drought stress may not be controlled. Insufficient water volumes or coarse sprays may also reduce control levels. For pre-harvest purposes, apply Heat with glyphosate for broad-spectrum weed management and crop dry down. In lentil, apply when bottom 15% of pods are dry and rattle when shaken. The seed should be less than 30% moisture. In field pea, apply when majority of pods are brown (70 to 80%). For canola, apply at 75 to 80% seed colour change. In dry beans and soy beans, apply when 80 to 90% of leaves have dropped and pods are mature. Note: Using glyphosate with Heat for pre-harvest purposes may affect seed germination.

How it works

Heat is rapidly absorbed by root and foliar uptake: once absorbed, it exhibits mobility in plants. Heat is a potent inhibitor of protoporhyrinogen oxidase (PPO). Cell membrane damage induced by inhibition of PPO leads to plant death. Susceptible weeds develop injury symptoms within hours of application under active growing conditions; plant death occurs within 3 to 5 days depending on growing conditions.

Restrictions

Rainfall: Follow the glyphosate manufacturers recommendation for rainfast. **Grazing:** Field corn (60 days), legume forage (chickpea, lentil, field pea, soybean) (60 days), small grains (wheat,barley, oats) 30 days. **Pre-harvest intervals (at seeding):** Leave 60 days between application and harvest. **Desiccation pre-harvest interval:** Dry, common beans – 2 days. Canola, field pea, red entil, soybean – 3 days. Sunflower – 7 days. **Re-cropping (plant back):** Registered crops may be reseeded if necessary in the event of crop failure. Lentils may be reseeded only if the 10.4 g/acre (21.5 mL/acre Heat LQ) rate was applied. Soybeans may only be reseeded if the 10.4 - 14.6 g/acre (21.5 - 29.5 mL/acre Heat LQ) was applied. Canola, dry beans, flax and mustard may be seeded the following year in addition to all registered crops without rate restrictions. **Re-cropping after Pre-harvest:** Barley, canary seed, canola (all types), chickpea, corn (field and sweet), flax, lentils, oats, field pea, soybean and wheat (spring, winter, and durum) can all be seeded the spring after application.
Re-entry interval: 12 hours.

Toxicity

Acute oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in cool, dry place. Do not freeze. If frozen, thaw completely and shake well before use.

Himalaya Pass

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Himalaya Pass co-pack of: Himalaya (PCP# 33370) + Battlefront (PCP# 33003)	NewAgco Inc	Flucarbazone: 66%	Water dispersible granule	695 g
		Florasulam: 50 g/L	Suspension concentrate	6.4 L

Note: Himalaya Pass should be mixed with glyphosate (not included in packaging).

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Crops, staging and rates

Crop	Stage	Rates
Spring wheat (excluding durum)	Up to 1 day prior to seeding	Himalaya: 8.7 g/acre + Battlefront: 40 mL/acre

Weeds, rates and staging

Weeds controlled when mixed with glyphosate at 180 - 360 g ae/ac:

annual blue grass[2]
annual sow thistle[2]
Canada fleabane
Canada thistle[2]
chickweed
cleavers
cow cockle
crabgrass[3]
dandelion[1]
downy brome
flixweed
foxtail barley[2]
giant foxtail
green foxtail
hemp-nettle
kochia3
lady's thumb
lamb's-quarter
narrow-leaved hawk's-beard
narrow-leaved vetch
prickly lettuce[2]
quackgrass[2]
ragweed
redroot pigweed
Russian thistle
scentless chamomile
wild mustard
shepherd's-purse
smartweed
stinkweed
toadflax[2]
volunteer barley
volunteer canola (all HT types)
volunteer flax
volunteer wheat
wild buckwheat
wild oats

[1] Seedling, over-wintered rosettes, mature plants up to 30 cm in diameter.
[2] With the addition of extra glyphosate, refer to label for rates.
[3] Excluding glyphosate-resistant biotypes.

Registered tank mixes

No registered tank mixes.

Application information

How to apply: Ground application only. **Water volume:** 20 - 40 L/acre.

Mixing Instructions

Fill the tank half with water and begin agitation. Add the Himalaya and fully dissolve. Next, add the Battlefront and mix thoroughly. Add the desired rate of glyphosate and apply.

Application tips

Himalaya Pass must be applied to emerged, actively growing weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of florasulam and flucarbazone by allowing maximum foliar uptake. For best results, ensure thorough spray coverage of target weeds.

How it works

Flucarbazone is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing point of the plant. Florasulam is taken up by leaves and stops growth of susceptible weeds rapidly via inhibition of the ALS enzyme.

Expected results

Weeds susceptible to Himalaya Pass will stop growing almost immediately. Newer leaves start to yellow and wilt, followed by a loss of green colour. Symptoms will spread to the rest of the plant with some weeds showing purpling or reddening. Under good growing conditions, complete control may occur within 7 to 10 days after application while control may take longer under poor growing conditions.

Restrictions

Rainfall: Rainfall within 1 hour after application may reduce weed **Grazing:** Do not graze treated fields or use green crop for feed. Wheat grain or straw from harvested treated fields may be fed to livestock. **Re-cropping:** The following crops may be planted 11 months after an application of this product.

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Himalaya Pass (cont'd)

Soil zones and rotational crops			
Gray-wooded	**Black**	**Dark brown**	**Brown**
Spring wheat, barley	Spring wheat, barley, durum wheat	Spring wheat, barley, durum wheat	Spring wheat
Field Pea*	Canola, flax, sunflower	Canola, flax, sunflower	
Canola	Field pea*, field bean, soybean	Field pea*, soybean	

*Field pea can be successfully grown the year following application providing the following 3 criteria are all met: a) Soil pH must be below 7.5. b) Organic matter content must be above 4%. c) Precipitation must be equal to or above the 10-year average (minimum 100 mm within 60 days of application in year of application).

Pre-harvest intervals: Mature crop may be harvested 80 days after application. **Re-entry interval:** 12 hours.

Environmental precautions

Overspray or drift to sensitive habitats should be avoided. A buffer zone of 30 metres is required near sensitive habitats. Do not allow this chemical to drift onto other crops, especially canola, tame oats, or other non target crops.

Toxicity

Himalaya: Oral LD_{50} (rats) = > 5,000 mg/kg

Battlefront: Oral LD_{50} (Rat) > 2,000 mg/kg

Storage

Store in dry, heated area. If product is frozen, allow to warm at room temperature for a few days and agitate before use.

Horizon NG/Foothills NG/Signal/ Ladder All In/Aurora/Slam'R Clodinafop/ Foax/Cadillac/Cadillac One

Group 1

Formulation

Product		Company	Active ingredient	Formulation	Container size
Horizon NG*	**Horizon NG* (PCP# 29089)**	Syngenta	Clodinafop-propargyl: 60 g/L	Emulsifiable concentrate	7.57 L, 121.1 L
Foothills NG*	**Foothills NG (PCP# 30341)**	Loveland Products	Clodinafop-propargyl: 60 g/L	Emulsifiable concentrate	7.57, 121.1 L
Signal	**Signal (PCP# 29172)**	Nufarm Canada	Clodinafop-propargyl: 240 g/L	Emulsifiable concentrate	3.68 L, 14.72 L, 58.9 L
	Enhance (PCP# 29952)		Triglyceride ethoxylate: 10 POE 80%	Emulsifiable concentrate	4 L, 16 L, 64 L
Ladder All In (PCP#32497)		ADAMA Canada	Clodinafop-propargyl: 80 g/L	Emulsifiable concentrate	5.66 L case, 90.6 L
Aurora (PCP# 29711)		NewAgco Inc	Clodinafop-propargyl: 240 g/L (requires a surfactant)	Emulsifiable concentrate	7.36 L, 9.36 L, 92 L, 112 L
Chem Spray Adjuvant			Surfactant blend: 17%	Solution	7 L, 15 L, 188 L

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Product		Company	Active ingredient	Formulation	Container size
Slam'R Clodinafop	**Slam'R Clodinafop (PCP# 30137)**	AG West Inc	Clodinafop-propargyl: 240 g/L (requires a surfactant)	Emulsifiable concentrate	3.68 L
Foax (PCP# 31261)		Farmers Business Network	Clodinafop-propargyl: 240 g/L	Emulsifiable concentrate	3.68 L, 115 L
Crop Oil 8317 (PCP# 30030)			Surfactant blend: 17%		6.4 L
Cadillac Unpacked (PCP# 30428)		WinField United Canada	Clodinafop-proparyl: 240 g/L	Emulsifiable concentrate	7.36 L
Cadillac One (PCP# 32539)		WinField United Canada	Clodinafop-propargyl: 80 g/L	Emulsifiable concentrate	11.32 L, 90.6 L

* Adjuvant included in the formulation.

Crops, staging and rates

Crop	Stage	Rate
Spring wheat (including durum)	1 - 6 leaf stage prior to emergence of 4th tiller	NG formulations 376 - 473 mL/acre; all others 93 - 117 mL/acre
Spring and durum wheat	Prior to emergence of 4th tiller	283 - 323 mL/acre for Ladder All In/ Cadillac One

Weeds and staging

Weed	Stage	Additional remarks
barnyard grass, Persian darnel	1 - 5 leaf on main stem	For optimum control, apply before tillering.
green foxtail, yellow foxtail	1 - 5 leaf on main stem	For optimum control, apply prior to emergence of the 3rd tiller
volunteer canary seed, wild oats	1 - 6 leaf on main stem*	Prior to emergence of 4th tiller
volunteer oats	3 - 6 leaf on main stem	

*1 - 6 leaf on main stem prior to 4th tiller emergence with Ladder All In.

Weeds controlled

Product	Rate per acre		Weeds controlled
	Herbicide	Adjuvant	
Horizon NG* Foothills NG* NextStep NG* Ladder All In* Cadillac One*	376 mL, 283 mL for Ladder All In	Do not add Score adjuvant	Barnyard grass, green foxtail, yellow foxtail, volunteer canary seed, volunteer oats, wild oats
	473 mL, 323 mL for Ladder All In/Cadillac One		Above weeds plus Persian darnel
Signal, Aurora, Slam'R Clodinafop, Foax, Cadillac	93 mL	0.8 % v/v	Barnyard grass, green foxtail, volunteer canary seed, volunteer oats, wild oats
	117 mL	1.0 % v/v	Persian darnel plus above weeds

* Horizon NG, Foothills NG, Ladder All In, Cadillac One contain a built-in adjuvant system. Do not add Score adjuvant to either Horizon NG, Foothills NG or NextStep NG.

Registered tank mixes

Note: Not all products are registered for all tank mixes. Check label for tank mix partners.

Tank mix partner	Tank mix product rates	Crop stage
Herbicide		
2,4-D Amine 500/600[2]	0.4 to 0.45 L/acre/0.283 - 0.372 L/acre	3 leaf - flag leaf
Ally	3.0 g/acre	2 leaf - flag leaf

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Horizon NG/Foothills NG/Signal/Ladder All In/Aurora/Slam'R Clodinafop/Foax/Cadillac/ Cadillac One (cont'd)

Tank mix partner	Tank mix product rates	Crop stage
Approve	0.5 L/acre	4 leaf - flag leaf
Attain[6]	Attain A: 0.18 to 0.24 L/acre Attain B: 0.30 to 0.40 L/acre	4 leaf - flag leaf
Benchmark	Benchmark A: 40 mL/acre Benchmark B: 0.453 L/acre	2 leaf - 6 leaf
Buctril M/Badge	Buctril M: 0.40 L/acre Badge: 0.50 L/acre	2 leaf - 5 leaf
Curtail M	0.6 L/acre to 0.80 L/acre	3 leaf - just before flag leaf
Dichlorprop-D	0.70 L/acre	4 leaf - early flag leaf (shot blade)
Dyvel	0.50 L/acre	2 leaf - 5 leaf
Enforcer D	0.50 L/acre	4 leaf - early flag leaf (shot blade)
Enforcer M	0.50 L/acre	2 leaf to early flag leaf (shot blade)
Estaprop XT[7]	0.48 L/acre	4 leaf - early flag leaf (shot blade)
Flurox 24	Fluroxypyr: 0.24 L/acre 2,4-D ester 700: 0.38 L/acre	4 leaf - early flag leaf
Frontline[5]	Frontline A: 40 mL/acre Frontline B: 0.28 L/acre	2 leaf - 6 leaf
Koril	0.4856 L/acre	
Lontrel	0.17 to 0.34 L/acre.	3 leaf - flag leaf
Lontrel + MCPA ester 500	0.11 to 0.17 L/acre + 0.45 L/acre	
MCPA 300 Sodium salt	0.49 to 1.1 L/acre	
MCPA Amine 500/600[2]	0.34 to 0.45/0.283 - 0.372 L/acre	
MCPA Ester 500/600	0.34 to 0.45/0.28 - 0.37 L/acre	
Mecoprop[4]	2.2 to 2.8 L/acre	3 leaf - just before flag leaf
Mextrol 450	0.51 L/acre	2 leaf - flag leaf
Pardner/Bromotril	Pardner: 0.40 L/acre Bromotril: 0.50 L/acre	2 leaf to early flag
Prestige[6]	Prestige A: 0.243 to 0.32 L/acre Prestige B: 0.60 to 0.80 L/acre.	3 leaf - flag leaf
Pulsar	0.246 - 0.371 L/acre	2 leaf - 5 leaf stage
Refine SG[1]	12 g/acre	2 leaf - flag leaf
Target[7,8]	0.40 to 0.60 L/acre	2 leaf - 5 leaf
Thumper/Thrasher	Thumper 0.40 L/acre Thrasher: 0.50 L/acre	4 leaf - flag leaf
Trophy[3]	Trophy A: 0.24 L/acre Trophy B: 0.45 L/acre	3 leaf - flag leaf
Insecticide		
Decis	0.032 L/acre to 0.049 L/acre	Prior to emergence of 4th tiller
Matador/Silencer	0.025 L/acre to 0.034 L/acre	
Fungicide		
Tilt/Propel/Bumper	Tilt/Propel: 0.202 L/acre Bumper: 0.121 L/acre	Prior to emergence of 4th tiller

[1] Addition of surfactants other than Score is not required. [2] A reduction in control of green foxtail and wild oats may be observed when Horizon is tank mixed with 2,4-D Amine and MCPA Amine. [3] Rates above 2.0 L/ha may cause crop injury. [4] Tank mix with Mecoprop provides suppression of Canada thistle (top growth control). [5] Not registered for use with Horizon NG. Check with individual product registrations for permitted mixes. [6] Refer to broadleaf tank mix label for list of weeds controlled at low and high use rates. [7] Barnyard grass is also controlled. [8] Persian darnel is also controlled. ADAMA also supports the unregistered mix of Ladder with ForceFighter M. Agricity supports the following tank mixes: Buck M, Clobber M, Foxxy Buck M, Foxxy CM, Foxxy M, Foxxy Pro, Foxxy R, Foxxy Pro Rx, + non-MPower products: Infinity, Infinity FX, Matador, and Tilt.

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Registered tank mixes of Horizon NG and Foothills NG with broadleaf weed herbicides – aerial application

Tank mix partner	Product rates	Crop stage
Buctril M/Badge	Buctril M: 0.40 lL/acre or Badge: 0.5 L/acre	2 - flag leaf
Target	0.40 - 0.61 L/acre	2 - 5 leaf

Note: When tank mixing, always add the broadleaf herbicide (Buctril M or Target) to the spray tank first, followed by Horizon NG herbicide.

Application information
With: Apply with ground sprayers or by aircraft using a drift control system.
Water volume: Ground – 20 - 40 L/acre. Air – 12 L/acre.

Mixing instructions
Use mixing instructions "c" on page 15.

Application tips
Weed control following application of clodinafop-propargyl alone or in combination with broadleaf weed herbicides can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding or prolonged cool temperatures. Application under stress conditions is not recommended as it can damage the crop and weed regrowth can occur.

How it works
Clodinafop-propargyl is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control.

Expected results
Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within 1 to 3 weeks after application. Further colour changes and complete control are achieved 3 to 5 weeks after application.

Restrictions
Rainfall: Rainfall within 30 minutes may reduce control. **Grazing:** Do not graze or harvest treated crops for forage within 3 days of application. **Pre-harvest intervals:** Leave at least 60 days from application to harvest. **Re-cropping:** No restrictions. **Re-entry interval:** 12 hours.

Environmental precautions
The active ingredient, clodinafop-propargyl, is highly toxic to fish. Do not apply codinafop-propargyl based products directly to freshwater habitats.

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Heated storage not required. If stored for 1 year or longer, shake well before using.

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Hotshot

Group 2, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Hotshot copack of: Bromotril 240 EC (PCP# 28276) Priority (PCP# 30831)	ADAMA Canada	Bromoxynil: 240 g/L Florasulam: 50 g/L	Emulsifiable concentrate + Suspension concentrate co-pack	2 x 9.7 L 1.6 L

Crops, staging and rates

Crop	Stage	Rate
Barley, oats, wheat	Pre-seed	388 mL/acre bromoxynil + 32 mL/acre florasulam (50 ac/case)

Weeds, rates and staging

Apply to young, actively growing weeds up to the 4-leaf stage.

American nightshade
annual sow thistle,****
bluebur
chickweed
cleavers
cocklebur
common buckwheat,***
common groundsel,***
common ragweed
cow cockle
green smartweed
hemp-nettle,****
kochia*
lady's-thumb
lamb's-quarter***
narrow-leaved hawk's-beard****
pale smartweed
perennial sow thistle,****
redroot pigweed****
Russian thistle,*
shepherd's-purse
stinkweed
tartary buckwheat***
triazine resistant pigweed
velvet leaf**
volunteer canola
wild buckwheat***
wild mustard

* Spray up to 5 cm high. ** Spray before plants are 8 cm high. *** Controlled up to the 8 leaf stage. **** Suppression.

Registered tank mixes

Tank mix with glyphosate for a wider spectrum of grassy and broadleaf weed control.

Application information

Water Volume: 20 - 40 L/acre by ground.

Application tips

Dust on leaves can reduce efficacy.

How it works

Bromoxynil provides fast, contact herbicide activity and controls Group 2 and Group 9 (glyphosate) resistant biotypes. Florasulam, an ALS inhibitor, adds additional control of weeds like hemp-nettle and narrow-leaved hawk's-beard.

Expected results

Weeds turn brown and die within 3 to 5 days.

Restrictions

Rainfall: Do not apply if forecasted rainfall is imminent. **Grazing:** Must not be grazed or fed to livestock for 30 days after treatment. **Re-cropping:** The following crops may be seeded the year after application: barley, brown mustard, canola, chickpea, field beans, flax, juncea canola, lentil, oriental mustard, pea, soybean, sunflower, wheat or yellow mustard. **Re-entry interval:** 24 hours.

Environmental precautions

Runoff: Observe a 5-metre buffer zone from aquatic habitats.

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Toxicity
Acute oral LD_{50} (rats) = 500 mg/kg.

Storage
Store in a cool, dry place. Can be stored to -10°C. If frozen, bring to room temperature and agitate before use.

Hurricane

Group 6, 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Hurricane (PCP#32662)	UPL AgroSolutions	Bentazon: 320 g/L Acifluorfen: 160 g/L	Soluble liquid	10 L

Crops, staging and rates

Crop	Stage	Rate
Soybean	1 - 2 trifoliate leaf stage	710 mL/acre

To achieve consistent weed control, 1 of the following additives is recommended: AMS, Crop Oil Concentrate, or UAN. Merge or Sure-Mix meet the adjuvant requirements for Hurricane and are recommended when tank-mix products require these specific adjuvants.

Additive	Ground application	Air application
AMS	1.13 kg/acre	1.13 kg/acre
Oil Concentrate	0.5 - 1.0 L/acre	0.5 L/acre
UAN Solution	1.9 - 3.8 L/acre	1.9 L/acre
Merge	0.5 - 1.0 L per 100 L of water, unless otherwise stated by tank-mix partner	See tank-mix partner label
Sure-Mix Surfactant	0.5% v/v	0.5% v/v

Weeds, rates and staging
Weeds are controlled up to the 6-leaf stage unless otherwise indicated.

Common ragweed	Lamb's-quarter*	Redroot pigweed
Common waterhemp	Morning glory (up to 4 leaf)	

* suppression or partial control.

Registered tank mixes
Assure II (150 - 300 mL/acre) with Merge or Sure-Mix
Basagran (up to 235 mL/acre) with Crop Oil Concentrate, AMS, or UAN
Pinnacle (3.3 or 4.8 g/acre) with NIS and AMS or UAN
Poast Ultra (up to 450 mL/acre) with Merge or Assist Oil Concentrate
Pursuit (85 mL/acre) with NIS and AMS or UAN
Odyssey (17.2 g/acre) with Merge
Glyphosate* products (see label for specific products) (360 - 1,020 g ae/acre)
Liberty 200SN** (0.61 - 1.0 L/acre) with Crop Oil Concentrate
Clethodim products (up to 150 mL/acre) with Amigo

* *Only apply to glyphosate-tolerant soybeans. **Only apply to glufosinate-tolerant soybeans.

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Hurricane (cont'd)

Application information
How to Apply: Ground application only. **Water Volume:** 40 - 80 L/acre.

Mixing instructions
Use mixing instructions "d" on page 15.

Application tips
The most effective control will result from making post emergence applications early, when weeds are small. Early application to weeds results in improved weed control and makes thorough spray coverage easier to obtain. Leaf speckling, yellowing, bronzing, or burning may occur, but plants generally outgrow this condition within 10 days. New growth is normal and crop vigour is not reduced.

How it works
Bentazon is a contact herbicide that interferes with photosynthesis. Acifluorfen is a Group 14 herbicide. Group 14 herbicides inhibit protoporphyrinogen oxidase (PPO). Cell membrane damage induced by inhibition of PPO leads to plant death.

Expected results
Symptoms will appear within 1 to 2 hours of application. Leaves appear water-soaked. Cells begin to bronze and may see speckling or leaf curling. Bronzing will turn to necrosis as plants die.

Restrictions
Rainfall: Rainfall within 4 hours of application may reduce effectiveness. **Grazing:** Do not graze the treated crop or cut for hay. **Re-cropping:** No restrictions listed. **Pre-harvest intervals:** No restrictions listed.
Re-entry interval: 48 hours.

Environmental precautions
Toxic to non-target terrestrial plants. Observe buffer zones.

Toxicity
Acute oral LD_{50} (rats) = 998 mg/kg

Storage
Do not store below 4°C or above 37°C.

Hyvar X/Hyvar X-L

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Hyvar X (PCP# 8637)	AMVAC	Bromacil: 80%	Wettable powder	2 kg, 25 kg
Hyvar X-L (PCP# 11018)		Bromacil: 240 g/L	Water soluble liquid	4 L, 10 L

Crops, staging and rates
Non-cropland areas such as railroad and pipeline right-of-ways, petroleum tank farms, lumberyards, storage areas and industrial plant sites where bare ground is desired. Annual and perennial grasses and broadleaf weeds, Hyvar X: 3.13 - 5.45 kg, Retreat: 1.31 - 2.73 kg/acre. Small areas: 135 g/100 m^2 Hyvar X-L – 12 - 18 L/acre. Retreat 7 - 9 L/acre, small areas: 450 mL/100 m^2.

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Weeds and staging

Weeds	Staging
Annual and perennial weeds such as crabgrass, dandelion, foxtail, quackgrass, pigweed, ragweed, wild carrot	Apply just before and during the period of active growth
Brush species such as alder, ash, aspen poplar, balsam poplar, basswood, birch, cherry, dogwood, elm, hawthorn, hemlock, maple, oak, pine. spruce, sumac, willow	Apply in spring or summer as basal treatment

Rate

Weeds	Hyvar X	Hyvar X-L
Annual and perennial grasses and broadleaf weeds	Initial: 3.13 - 5.45 kg/acre	Initial: 12 - 18 L/acre
	Re-treatment: 1.31 - 2.73 kg/acre	Re-treatment: 7 - 9 L/acre
	Small areas: 135 g per 100 m^2	Small areas: 450 mL per 100 m^2
Brush species	Mix 870 grams in 10 L of water and apply 30 - 60 mL per stem 5 - 10 cm in basal diameter	Mix 1 L in 5 L of water and apply 55 mL per stem, 5 - 10 cm in basal diameter

Registered tank mixes

None.

Application information

Do not apply by air.

With: Apply with power sprayer, handguns, backpack sprayer. Watering can may be used to treat small areas.
Water volume: Fixed boom sprayer: 100 - 1,000 L/acre. Use enough water to uniformly cover the area to be treated. Handgun: 646 L/acre.

Application tips

If dense growth is present, results will be improved if vegetation is removed before treatment. Do not apply closer than 1.5 times the height of nearby trees. Roots from large trees may extend well beyond the height of the tree and may extend beneath areas to be treated. Be cautious where trees are in close proximity to the treatment site.
Do not apply to brush standing in water, lawns, walks, driveways, tennis courts or similar areas. Applying, draining or flushing equipment too near feeding roots of susceptible vegetation may cause injury. Thoroughly clean all traces of Hyvar from application equipment immediately after use.

How it works

Bromacil is readily absorbed through the roots but much less readily through the leaves. Once in the plant, it inhibits photosynthesis.

Expected results

Susceptible plants become chlorotic and then die. Effects are slow to appear and may not become apparent until the chemical has been carried into the root zone of the weeds by moisture. The degree of control and duration of effect will vary with the amount of chemical applied, soil type, rainfall and other conditions.

Restrictions

Rainfall: Rainfall required to carry the chemical into the root zone where it is absorbed. **Re-entry interval:** Do not enter treated area until spray has dried.

Environmental precautions

Bromacil is slightly toxic to aquatic organisms, including fish. Bromacil leaches; avoid use on permeable soils.

Toxicity

Acute oral LD_{50} (rats) = 2,000 mg/kg.

Storage

Hyvar X: Store in a cool, dry place. Hyvar X-L: Combustible, keep away from heat or open flame. Do not allow to freeze.

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Ikwin

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Ikwin (PCP # 33047)	Parijat Industries distributed by UAP	Fluroxypyr: 180 g/L	Emulsifiable concentrate	9.6 L

Crops, staging and rates

Crop	Stage	Rate
Spring and durum wheat, barley	2-leaf up to and including initiation of stem elongation	Ikwin: 162 - 324 mL/acre
Seedling and established creeping red fescue, intermediate wheatgrass, crested wheatgrass, meadow bromegrass, smooth bromegrass, timothy for seed production only	4-leaf to flag leaf stage in a minimum of 40 L/acre of water	Ikwin: 243 mL/acre*

*Must be applied as a tank-mix wirh 2,4-D Ester in forage grasses. Refer to Ikwin label for rates.

Weeds, rates and staging

Ikwin	Ikwin	Ikwin
cleavers (1 - 4 whorl)	kochia** (2 - 8 leaf)	round-leaved mallow (1- 6 leaf)
	volunteer flax (1 - 12 cm)	chickweed** (up to 8 cm)*
	stork's-bill (1 - 8 leaf)*	hemp-nettle (2 - 6 leaf)*
		wild buckwheat (1 - 4 leaf)*

* Suppression. ** Includes biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme.

Registered tank mixes

Please refer to the label for registered tank mixes for these products.

Application information

Ground application only. **Water volume:** 40 L/acre.

Application tips

Only apply to actively growing weeds. When weeds are stressed due to frost, drought, heat or other extremes of weather at, shortly before or immediately after application, weed control may be reduced and crop injury may increase.

How it works

Fluroxypyr acts as a synthetic plant hormone, causing uncontrolled plant tissue growth. The chemical is absorbed by the leaves and translocated throughout the plant. Plants become malformed and die.

Expected results

Uncontrolled growth with distorted plants browning and dying.

Restrictions

Pre-harvest interval: 60 days. **Rainfall:** Rainfast within 1 hour. **Grazing:** Do not cut or graze treated fields within 7 days after application. **Re-cropping:** Barley, canola, flax, forage grasses, lentil, mustard, oat, pea, rye or wheat can be seeded the year after application. **Re-entry interval:** 12 hours.

Environmental precautions

Do not apply fluroxypyr adjoining susceptible or non-target vegetation. Keep a 15-metre buffer between sensitive, aquatic habitats and treated areas.

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Toxicity
Oral LD_{50} (rats) > 5,000 mg/kg. Dermal LD_{50} > 2,000 mg/kg.

Storage
Store in a cool, dry area.

Inferno Duo/Himalaya Extra

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Inferno Duo (PCP# 30663)	UPL AgroSolutions	Flucarbazone: 45 % + tribenuron methyl: 23.9 %	Water dispersible granules	1,018 g
Himalaya Extra co-pack of: Himalaya (PCP# 33370) + MP Extra (PCP# 33143)	NewAgco Inc	Flucarbazone: 66% Tribenuron-methyl: 75%	Water dispersible granules	695 g 320 g

Crops, staging and rates

Crop	Stage	Rate
Spring wheat (excluding durum), winter wheat	Pre-plant, post-plant pre-emergence*	12.8 g/acre

Note: Inferno Duo can be applied up to 1 week prior to planting or immediately after planting prior to crop emergence in spring wheat (excluding durum wheat) and winter wheat. * Inferno Duo only.

Weeds and staging

Product	Rate per acre	Weeds controlled
Inferno Duo	12.8 g/acre	Control: canola, shepherd's-purse, narrow-leaved hawk's-beard Suppression: wild oats, dandelion
Inferno Duo + glyphosate (182 g acid equivalent glyphosate)	12.8 g/acre +182 g acid equivalent L glyphosate	Control: barley, Canada fleabane, canola, cow cockle, common ragweed, dandelion[1], downy brome, flax, flixweed, foxtail barley[2,3] giant foxtail, green foxtail, hemp-nettle, kochia, lady's-thumb, lamb's-quarter, narrow-leaved hawk's-beard, redroot pigweed, Russian thistle, shepherd's-purse, stinkweed, wheat, wild buckwheat, wild mustard, wild oats. Suppression: Canada thistle
MP Himalaya Extra + glyphosate	8.7 g/acre MP Himalaya + 4 g/acre MP Extra + 180 g ae/acre glyphosate	

[1] Top growth control only. [2]Prior to seed head emergence and senescence of older leaves. [3]Apply with 360 gae/acre of glyphosate when foxtail barley is greater than 10 cm, or if heavy infestations exist or if plants are stressed. Apply prior to seed head emergence and senescence of older leaves. Inferno Duo only. Apply to young, emerged, actively growing weeds that are less than 10 cm tall or across.

Registered tank mixes
Glyphosate.

Application information
How to Apply: Ground equipment only. Do not apply by air. **Water volume:** 22.5 - 45 L/acre.

Application tips: Apply to weeds that are actively growing in the stages listed. Inferno Duo can be applied up to 1 week prior to planting, or immediately after planting prior to crop emergence in spring wheat (excluding durum wheat) and winter wheat.

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How it works

Flucarbazone sodium is a systemic herbicide that is absorbed by both leaves and roots and moves rapidly to the growing point of the plant. Tribenuron is absorbed by foliage and roots, inhibiting cell elongation. Glyphosate is a non-selective, systemic herbicide that is absorbed through the foliage and moves through the foliage and the roots, resulting in plant mortality.

Expected results

Growth of susceptible weeds stops soon after application of Inferno Duo. Symptoms of Inferno Duo include discolouration (yellowing, reddening and purpling), with complete control taking up to 1 to 2 weeks. Annual weeds susceptible to glyphosate will wilt and yellow with 2 to 4 days. Perennial weeds will wilt and yellow within 7 to 10 days.

Restrictions

Rainfall: Do not apply if rainfall is expected within 1 hour of application. **Grazing:** Do not graze treated fields or use green crop for feed. **Pre-harvest intervals:** 80 days. **Re-entry interval:** 12 hours.

Re-cropping: The following crops may be planted 11 months after an application of Inferno Duo.

Black soil zone: Barley, canola (all varieties), durum wheat, field bean, field pea*, flax, spring wheat, soybeans, sunflowers, winter wheat.

Brown soil zone: Spring wheat, winter wheat.

Dark Brown soil zone: Barley, canola (all varieties), durum wheat, field pea*, flax, spring wheat, soybeans, sunflowers, winter wheat.

Grey Wooded soil zone: Barley, canola (all varieties), field pea*, spring wheat, winter wheat.

* Field pea can be successfully grown the year following an Inferno Duo application providing the following 3 criteria are all met:

1. Soil pH must be below 7.5.
2. Organic matter content must be above 4%.
3. Precipitation must be equal to or above the 10-year average (minimum 100 mm within 60 days of application in year of application).

Rotational crops can be adversely affected if rainfall is below normal (10-year average) during the year of application. Use certified seed and good agronomic practices to reduce the effect on rotational crops.

Inferno Duo is degraded by soil microbes; environmental conditions that decrease microbial activity must be considered when making rotational cropping decisions. These environmental conditions include prolonged drought and/or cold temperatures within the following cropping season, as well as soils with both low organic matter (less than 2%) and high pH (greater than 7.5). If these conditions exist, a soil bioassay may be necessary to ensure rotational crop safety.

Toxicity

Inferno Duo: Oral LD_{50} (rats) > 5,000 mg/kg. MPower Extra: Oral LD_{50} = > 5000 mg/kg.
Himalaya: Oral LD_{50} = > 5000 mg/kg.

Storage

Does not require heated storage. Store in cool, dry place.

Inferno Trio

Group 2, 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Inferno Trio (PCP# 33273)	UPL AgroSolutions	Flucarbazone: 141 g/L Florasulam: 50 g/L Carfentrazone: 175 g/L	Suspension concentrate	3.2 L

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Crops, staging and rates

Rate: Inferno Trio: 40.5 mL/acre.

Crop	Stage
Spring wheat (excluding durum)	Pre-plant or pre-emergence[1]

Note: for optimal weed control, Inferno Trio can be applied any time between 1 week prior to planting and crop emergence.
[1] Inferno Trio only.

Weeds, rate and staging

canola (all types)*
cleavers
cocklebur
dandelion[1,2]
flixweed
green foxtail[2]
hempnettle[1]
kochia (includes resistant types)
lamb's-quarter
narrow-leaved hawk's-beard[1]
redroot pigweed*
Russian thistle[2]
shepherd's-purse
stinkweed
wild buckwheat
wild mustard
wild oat[1]

Additional weeds for Himalaya Trio:
annual sow thistle[1]
carpetweed[3]
chickweed
common purslane[3]
cow cockle
Eastern black nightshade[3]
hairy nightshade[3]
jimsonweed[3]
morning glory[3]
Pennsylvania smartweed[3]
perennial sow thistle[1]
pigweed (prostrate, smooth, tumble)[3]
smartweed
tall waterhemp[3]
tansy mustard[3]
velvet leaf[3]
round-leaf mallow[3]

[1]Suppression. [2] Inferno Trio only. [3] Up to 10 cm in height.
* Control of weeds that emerge within 7 days following application.

Registered tank mixes

Glyphosate: Inferno Trio can be mixed with glyphosate at 182 g acid equivalent to 40.5 mL/acre of Inferno Trio. Weeds controlled are all of the above-listed plus weeds on the glyphosate label.

Application information

Apply with: Ground equipment only. Do not apply by air. **Water volume:** 22.5 - 45 L/acre. Apply to weeds that are actively growing in the stages listed. Inferno Trio can be applied anytime between 1 week prior to planting and crop emergence.

Application tips

Wheat exposed to water-logged or saturated soils, temperature extremes such as hot or cold, drought, low fertility or plant disease after application could result in unacceptable injury symptoms. Weed control may also be reduced by these same conditions, or if heavy weed infestations exist or when applications are made outside the application recommendations.

How it works

Inferno Trio is absorbed by foliage and roots of grass and broadleaf weeds. These weeds cease growth soon after application, removing the competitive effects of susceptible weeds. However, complete weed control may not be seen for 1 to 2 weeks.

Expected results

Growth of susceptible plants stops soon after application. Symptoms include discolouration (yellowing, reddening and purpling) and complete control may take 1 to 2 weeks.

Restrictions

Rainfall: Do not apply if it is raining or rainfall is expected within 1 hour after application. **Grazing:** Do not graze treated fields or use green crop for feed. Wheat grain or straw from harvested treated fields may be fed to livestock. **Pre-harvest interval:** Observe minimum interval to harvest of 80 days after treatment. **Re-cropping:** The following crops may be planted 11 months after an application of Inferno Trio. **Re-entry interval:** 12 hours.

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Inferno Trio (cont'd)

Soil zones and rotational crops			
Grey wooded	**Black**	**Dark Brown**	**Brown**
Spring wheat, barley	Spring wheat, barley, durum wheat	Spring wheat, barley, durum wheat	Spring wheat
Field pea*	Canola, flax, sunflower	Canola, flax, sunflower	
Canola	Field pea*, field bean, soybean	Field pea*, soybean	

*Field pea can be successfully grown the year following Inferno Trio application providing the following 3 criteria are all met: A) Soil pH must be below 7.5. B) Organic matter content must be above 4 %. C) Precipitation must be equal to or above the 10-year average (minimum 100 mm within 60 days of application in year of application).

Environmental precautions

Do not allow this chemical to drift onto other crops, especially canola, tame oat, or other non-target crops.

Toxicity

Oral LD_{50} (rats) > 5,000 mg/kg.

Storage

Heated storage is required.

Inferno WDG/Involve 50 WDG

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Inferno WDG (PCP# 30838)	UPL AgroSolutions	Tribenuron-methyl: 75%	Water dispersible granule	320 g
Involve 50 WDG (PCP # 33852)	ADAMA Canada	Tribenurion-methyl: 50%	Water dispersible granule	480 g

Inferno WDG is purchased alone but must be used in a mix with either 2,4-D ester or glyphosate.

Crops, staging and rates

Crop	Rate per acre		Stage
	Inferno WDG	**Involve 50 WDG**	
Wheat (including durum), barley, oats	4 g + 250 mL 2,4D Ester 700	6 g + 250 mL 2,4D Ester 700	3 - leaf stage to just before the flag leaf
Preseed: Involve 50 WDG: prior to planting spring wheat, durum, winter wheat, barley, oats, canary seed (for the birdseed market) and pulse crops (including dry bean, fababean, field pea, lupin and soybean. Inferno WDG: prior to planting spring wheat, durum, barley.	4 g + glyphosate (refer to Registered Tank Mixes)	6 g/acre + glyphosate (refer to Registered Tank Mixes)	Apply a minimum 24 hours before seeding
Summerfallow	4 g*	8 g*	
Pasture and rangeland	Not registered	6 - 12 g + non-ionic surfactant (0.35% v/v)	Broadleaf weeds in early bud to pre-bloom stage

Note: Inferno WDG and Involve 50 WDG must be used in a mix with 2,4D ester or glyphosate except for Involve 50 WDG when used for weed control in pasture and rangeland.
* Refer to label for tank mix options in summerfallow.

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Weeds and staging

Apply to young, emerged actively growing weeds that are less than 10 cm tall or across and before the crop canopy closes.

Inferno WDG + 2,4-D LV ester 700

- annual sunflower
- ball mustard
- Canada thistle (top growth)
- cow cockle
- flixweed*
- hare's-ear mustard
- indian mustard
- kochia (2 - 10 leaf)
- lamb's-quarter
- narrow-leaved hawk's-beard*
- prickly lettuce
- redroot pigweed
- Russian pigweed
- Russian thistle
- shepherd's-purse*
- stinkweed*
- sweet clover
- thyme-leaved spurge
- tumble mustard
- wild buckwheat** (1 - 3 leaf)
- wild mustard
- wild radish
- wormseed mustard

* Fall rosettes and spring seedlings. ** Suppression.

Registered tank mixes

Tank mix partner	Inferno WDG + tank mix partner rate	Additional weeds controlled
Summerfallow and pre-seed		
Glyfos	Inferno WDG: 4 g/acre + 0.3 - 0.5 L/acre of Glyfos, Cheminova glyphosate, Roundup Transorb. Use 0.336 L/acre of Roundup Weathermax	See glyphosate listing for additional weeds controlled
Cheminova glyphosate		
Roundup Transorb		
Roundup Weathermax		

Application information

With: Apply with ground equipment. Do not apply by air. **Water volume:** 40 L/acre.

Application tips

Wild oats herbicides require a 4 to 5 day interval before or after an application of Inferno WDG. Effectiveness may be reduced if spray mixture remains in tank for more than 24 hours. When tank mixed with Assert, apply within 12 hours of mixing.

How it works

Absorbed by foliage and roots, inhibits cell elongation.

Expected results

Inferno WDG stops growth of susceptible weeds immediately. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions. Favorable growing conditions following treatment promote the activity of Inferno WDG while cold, dry conditions delay the activity.

Restrictions

Rainfall: Inferno WDG requires 4 to 6 hours of dry weather to be absorbed by weed foliage. **Grazing:** Do not graze or feed to livestock within 30 days of application. **Re-cropping:** A minimum of 2 months should be left between the application of this product and harvest or seeding of the next crop. The following crops can be seeded 2 months after application: canola, flax, lentil and alfalfa. **Re-entry interval:** 12 hours.

Environmental precautions

The active ingredient, tribenuron-methyl, is considered to be toxic to many plants and non-toxic to fish, aquatic invertebrates, soil micro- and macro-organisms, birds, mammals and insects.

Toxicity

Acute oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool, dry place.

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Infinity® Herbicide

Group 6, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Infinity® (PCP# 28738)	Bayer	Pyrasulfotole: 37.5 g/L + bromoxynil: 210 g/L	Emulsifiable concentrate	6.7 L, 107.2 L, 335 L

Crops, staging and rates

Crop	Staging	Rate
Barley, wheat (including durum), winter wheat, timothy (seed production only), triticale, perennial ryegrass (seedling and established grown for seed or forage), red fescue (established grown for seed and forage), bromegrass (established grown for seed and forage)	1-leaf stage of growth until the flag leaf is just visible but still rolled	0.33 L/acre

Weeds and staging

Weeds controlled or suppressed at 1 - 6 leaf stage, unless otherwise stated

annual sow thistle
chickweed
cleavers[1,2]
Canada fleabane (10 cm in height or diameter)[1,4]
Canada thistle (suppression, up to 30 cm in height)
common ragweed
dandelion[3] (suppression, up to 10 cm in height and 25 cm in diameter)
flixweed (to 10cm. high)
giant ragweed (suppression)[1,4]
hemp-nettle
kochia[2] (to 10 cm high)
lamb's-quarter
narrow-leaved hawk's-beard (up to 10 cm, prior to bolting)
pale smartweed
perennial sow thistle (suppression)
redroot pigweed
round-leaved mallow (when applied with AMS)
Russian thistle (up to 10 cm in height)
shepherd's-purse
stinkweed
stork's-bill; only in tank mix with 2,4-D and AMS (1 - 8 leaf)
volunteer canola (including herbicide tolerant)
wild buckwheat
wild mustard

[1] For consistent control of wild oat in areas of heavy infestation, for control of Group 2 resistant cleavers at the 4 - 6 whorl growth stage, for improved control of larger kochia and suppression of Canada thistle and dandelion, add ammonium sulphate at 202 g/acre (99%) or 0.4 L/acre (49% solution) or 0.5 L/acre (40% solution). [2] Including Group 2 and Group 4 resistant biotypes. [3] Including seedlings and overwintering rosettes. [4] Including glyphosate resistant biotypes.

Registered tank mixes

Tank mix partner	Infinity plus tank mix partner rate	Additional weeds controlled and comments
In spring wheat (including durum) and barley		
Puma Advance	Infinity: 0.33 L/acre + Puma Advance: 206 mL/acre	Green foxtail. Apply when foxtail is in 1 - 6 leaf stage Wheat: 1 - 6 leaf stage, barley: 1 - 6 leaf stage
	Infinity: 0.33 L/acre + Puma Advance: 412 mL/acre	Barnyard grass, green foxtail, yellow foxtail, wild oats Apply when grasses are in 1 - 6 leaf stage
Spring wheat (including durum), winter wheat, barley and triticale		
Achieve Liquid	Infinity: 0.33 L/acre + Achieve Liquid: 200 mL/acre + Turbocharge adjuvant: 0.5 % v/v.	Barnyard grass, Persian darnel, green and yellow foxtail, volunteer oats, wild oats. Apply when barnyard grass and Persian darnel is in 1 - 4 leaf stage, foxtail is in 1 - 5 leaf stage and volunteer oats and wild oats are in 1 - 6 leaf stage
Spring wheat (including durum),winter wheat, barley		
2,4-D + AMS	226 mL/acre (500 g ai/L equivalent) + .5 L/acre (40% soln.) AMS	Weeds controlled by Infinity alone plus stork's-bill spring, durum wheat and barley may be treated from the 4-leaf stage of growth until flag leaf is just visible but still rolled. Winter wheat may be treated in spring from early tillering until flag leaf is just visible but still rolled

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Tank mix partner	Infinity plus tank mix partner rate	Additional weeds controlled and comments
Spring wheat, including durum and winter wheat		
Varro	Infinity: 0.33 L/acre + Varro: 0.2 L/acre	Wheat: 1 - 6 leaf stage plus 3 tillers but prior to jointing (presence of first node)
Spring wheat (excluding durum) and barley only		
Axial 100 EC	Infinity: 0.33 L/acre + Axial 100 EC: 243 mL/acre + Adigor adjuvant: 283 mL/acre	Apply when grasses are in 1 - 6 leaf stage, prior to 4th tiller stage of growth

Bayer supports the following mixes that are not on the Infinity label. These are with Tilt, Sevin XLR and MCPA ester on spring, winter and durum wheat and barley; spring, durum wheat and barley with Lontrel, Puma Advance + Tilt, and Decis; Horizon NG, Traxos and Traxos + Tilt in spring and durum wheat; Axial + Tilt with spring wheat and barley. Luxxur in spring, winter and durum wheat. Apply mixes according to the most restrictive use limitations for either product.

Application information

Apply with ground sprayers or by air. **Water volume:** Ground: minimum of 18.9 L/acre. Air: minimum of 11.3 L/acre.

Mixing instructions

Half fill tank with water; use continuous agitation. If mixing with AMS, add to the tank first. Add Infinity, then add tank mix partner, then fill tank. Maintain agitation through mixing and application.

Application tips

Under cool and/or dry conditions, activity may be reduced or delayed. Weed control may also be reduced if application is made when weeds are dust covered or in the presence of heavy dew, fog, mist or rain. If crop is under stress due to abnormal environmental conditions, delay application until stress passes and after both crop and weeds have resumed active growth. Apply only once per season.

How it works

Pyrasulfotole is absorbed through leaves and is translocated to meristematic regions where it inhibits the HPPD enzyme. Pyrasulfotole inhibits plant pigment biosynthesis and photosynthesis.

Expected results

Small burnt spots on the broadleaf weeds can appear in hours. Lack of plant pigments shuts down the photosynthetic pathway, resulting in bleaching symptoms and rapid death, normally in 6 to 14 days.

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce effectiveness. **Grazing:** DO NOT graze treated perennial ryegrass, red fescue or bromegrass crops within 7 days of application or harvest for hay within 30 days of application. DO NOT graze other treated crops or cut for forage or hay within 25 days of application.
Pre-harvest intervals: Do not harvest wheat or triticale for grain or straw within 50 days of application. Do not harvest barley for grain or straw within 45 days of application. **Re-entry interval:** 24 hours. **Re-cropping:** Alfalfa, barley, canary seed, canola, flax, (including low linolenic acid varieties) field pea*, tame oats, spring wheat including durum, potato and sunflower may be planted 10 months after application. Lentil can be grown 22 months after application.

* Field pea may be grown the year following Infinity application in all Black, Gray Wooded and Dark Brown soil zones. Do not plant field pea the year following Infinity application in the Brown soil zone where organic matter content is less than 2.5% and soil pH is above 7.5. Use a field bioassay for crops not listed above.

Environmental precautions

Infinity contains distillates that are toxic to aquatic organisms and non-target terrestrial plants. Avoid contamination of aquatic systems during applications. This product moves in water and is a possible leaching problem in coarse soils or where the water table is shallow.

Toxicity

Pyrasulfotole is practically non-toxic to wild mammals, birds, fish and aquatic invertebrates, earthworms and bees and does not negatively affect soil microorganisms. Infinity is toxic to aquatic plants and non-target terrestrial plants.

Storage

Do not store at temperatures below -20°C. If stored for 1 year or longer, shake well before using.

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Infinity® FX® Herbicide

Group 4, 6, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Infinity® FX® (PCP# 33248)	Bayer	Pyrasulfotole: 31.1 g/L Bromoxynil: 174.3 g/L Fluroxypyr: 72 g/L	Emulsifiable concentrate	8.1 L, 129.6 L, 405 L

Crops, staging and rates

Crop	Staging	Rate
Spring wheat, durum and barley	2 leaf to stem elongation	Infinity FX: 405 mL/acre

1 case treats 40 acres.

Weeds, rates and staging

Weeds at 1- 6 leaf stage unless noted otherwise.

annual sow thistle
Canada fleabane (seedling to 10 cm.)
Canada thistle*
chickweed
cleavers (1 - 9 whorl)
common ragweed
dandelion* (up to 25 cm across - spring seedlings and overwintering rosettes)
flixweed (up to 10 cm high)
giant ragweed*
hemp nettle
kochia (up to 15 cm high)
lamb's-quarter
narrow-leaved hawk's-beard (up to 10 cm and prior to bolting)
pale smartweed
perennial sow thistle*
redroot pigweed
round-leaved mallow* (1 - 6 leaf)
Russian thistle (up to 10 cm high)
shepherd's-purse
spreading atriplex (up to 10 leaf)*
stinkweed
stork's-bill (up to 8-leaf) (only when mixed with 2,4-D and ammonium sulfate)
volunteer canola (all varieties)
volunteer flax
volunteer soybean
wild buckwheat
wild mustard

* Suppression, ammonium sulfate at 200 g of active ingredient/acre may be added for improved broad leaf control (202 g/acre of 99% dry; 0.5 L/acre of 40% liquid; or 0.4 L/acre of 49% liquid).

Registered tank mixes

Tank mix partner	Rate	Additional weeds controlled
Spring wheat, durum and barley		
2,4-D Ester + AMS	2,4-D Ester: 170 – 227mL/acre + AMS	See 2,4-D label for additional weeds.
Liquid Achieve	200 mL/acre	Wild oats
Puma Advance	412 mL/acre	Wild oats
Spring wheat and durum		
Horizon NG	376 – 473 mL/acre	Wild oats
Varro	0.2 L/acre	Wild oats
Spring wheat and barley		
Axial	0.5 L/acre	Wild oats

Bayer also supports the following mixes that are not on the Infinity FX label. Apply mixes according to the most restrictive use limitations for either product: 2,4 D ester, MCPA ester.

Application information

Do not apply by air. Ground: minimum 19 L/acre. Higher volumes should be used under dense crop and weed canopies to ensure thorough coverage of target weeds.

Application tips

Adding ingredients in the correct order is critical for optimum performance. Check label of both products to be mixed for directions. General guidelines can be found on page 15. Use "Method A" for sprayer cleanup on page 17.

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How it works

Pyrasulfotole is absorbed through leaves and is translocated to meristematic regions where it inhibits the HPPD enzyme. Pyrasulfotole inhibits plant pigment biosynthesis and photosynthesis. Fluroxypyr is also absorbed by the leaves, and it mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes. Bromoxynil inhibits respiration and photosynthesis causing death.

Expected results

For best results, apply to emerged, young, actively growing weeds according to the weed stages listed. Under stressed conditions and/or heavy crop canopy, early application will result in improved weed control. Weeds growing under adverse environmental conditions such as drought will be less susceptible to herbicide effects.

Restrictions

Rainfall: Rainfall within 1 hour may reduce control. **Re-entry interval:** 12 hours. **Grazing:** Do not graze treated crops or cut for hay within 25 days of application. **Pre-harvest intervals:** Leave at least 60 days application to harvest for wheat, durum and barley. **Re-cropping:** The year after application, alfalfa, barley, canary seed, canola, flax, potato, sunflower, oats and wheat (durum and spring) may be seeded. Field pea may be seeded the season following application in the Black, Grey Wooded, and Dark Brown soil zones. **Do not plant field pea the season following Infinity use in the Brown Soil zone where organic matter us below 2.5% and where soil pH is above 7.5**. Lentils may be seeded the second season after application.

Environmental precautions

Use the same precautions and buffers as Infinity.

Toxicity

Acute oral LD_{50} (rats) > 2,000 mg/kg. Bromoxynil: Acute oral LD_{50} (rats) = 368 mg/kg.

Storage

Store product in original containers in a secure, dry area away from other pesticides, food or feed above -20°C. If stored over winter, shake or mix well prior to use.

Intruvix Herbicide

Group 2, 4, 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Intruvix A (PCP #33462)	FMC of Canada Limited	Dicamba, present as sodium salt: 60.87% Tribenuron-methyl: 6.52%	Wettable granules	3.72 kg
Intruvix B (PCP #33530)		Carfentrazone-ethyl: 240 g/L	Emulsifiable Concentrate	1.2 L

Note: Intruvix herbicide is purchased alone but must be tank mixed with glyphosate before use.

Crops, staging and rates

Rate: Intruvix A: 46.5 g/acre

Intruvix B: 15 mL/acre (up to 47.4 mL/acre to control other weeds on Intruvix B label)

1 case treats 80 acres

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Intruvix Herbicide (cont'd)

Crop	Staging	Comments
Wheat (spring, durum, winter), barley, oats	1 day prior to seeding	Must be tank mixed with glyphosate
Chemfallow	With any chemfallow treatment, allow at least 10 days to elapse between treatment and tillage. Only weeds emerged at time of application will be controlled.	Fields treated with a chemfallow application of Intruvix Herbicide can be seeded to any crop the following season.

Registered tank mixes (weeds, staging)*

With glyphosate (present as a potassium, isopropylamine or ammonium salt) added at 0.5 L/acre (360 g/L active equivalent)

- black nightshade
- Canada fleabane
- Canada thistle[1]
- cleavers
- common ragweed
- cow cockle
- dandelion
- downy brome
- eastern nightshade
- field bindweed
- flixweed
- giant foxtail
- green foxtail
- hemp-nettle
- kochia
- lady's-thumb
- lamb's-quarter
- morning glory
- narrow-leaved hawk's-beard
- Persian darnel
- redroot pigweed
- Russian thistle
- scentless chamomile[1]
- stinkweed
- tall waterhemp
- volunteer barley
- volunteer canola
- volunteer flax
- volunteer wheat
- white cockle[1]
- wild buckwheat
- wild mustard
- wild oats

[1] Suppression. * Refer to label for individual weed staging.

With glyphosate (present as potassium, isopropylamine or ammonium salt) added at 0.9 L/acre (360 g/L equivalent): All annual grasses listed above plus crab grass (large and smooth) and annual blue grass. All annual broadleaved weeds listed above plus prickly lettuce, shepherd's-purse, annual sow thistle, and narrow-leaved vetch. FMC also supports the following tank mixes not on the Intruvix label. Use the most restrictive use limitation for either label: Pre-seed to spring and winter wheat: 2,4-D Ester, Focus®. Pre-seed to spring and durum wheat: Authority® 480 herbicide.

Application information

Apply with ground equipment. Do not apply by air. **Water volume:** Use a minimum 40 L/acre. Higher spray volumes are required for dense weed stands. Weed control improves with the amount of coverage.

Mixing instructions

Use mixing instructions "e" on page 15.

Application tips

Effectiveness may be reduced if spray mixture remains in the tank for more than 24 hours. It is essential to get good plant coverage. Extremes in environmental conditions such as temperature, moisture, soil conditions and cultural practices may affect activity. Under very dry conditions, symptoms may be reduced as weeds are less susceptible to herbicide. Intruvix can be applied only 1 time per growing season.

How it works

Intruvix herbicide stops the growth of susceptible weeds immediately. It is rapidly absorbed by foliage and roots, inhibits cell elongation and disrupts metabolism. Also inhibits the PPO enzyme involved in chlorophyll and heme synthesis. This action results in leaky cell membranes and rapid browning and death. Degree of control and duration of effect depend on weed sensitivity, weed size, spray coverage and growing conditions.

Expected results

Initial symptoms will be observed within a few days followed by death.

Restrictions

Rainfall: If rain occurs soon after application, control may be reduced. Environmental conditions that slow the drying of the spray mixture on the foliage may increase the time required for absorption. **Re-cropping:** Wheat (spring, durum, winter), barley or oats can be seeded a minimum of 24 hours after application. Chemfallow applications can be seeded to any crop the following season. **Re-entry interval:** 24 hours.

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Environmental precautions

Overspray or drift should be avoided. Do not contaminate irrigation water. Toxic to aquatic organisms and non-target terrestrial plants. Avoid application when heavy rain is forecast. Observe a 5-metre buffer zone from any sensitive habitat without the use of drift control aids.

Toxicity

Intruvix A: Acute oral LD_{50} (rats) = > 2,000 mg/kg. Intruvix B: Acute oral LD_{50} (rats) = 4,077 mg/kg.

Storage

Store in a cool, dry place and avoid excess heat. Store above 5°C to prevent freezing.

Karmex DF/Diurex 80 W

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Karmex DF (PCP# 28543)	ADAMA Canada	Diuron: 80%	Dry flowable	11.35 kg
Diurex 80 W (PCP# 14135)			Water dispersable granules	2.27 kg

Crops, staging and rates

General non-selective weed control – annual and perennial grasses and broadleaf weed seedlings.

Crop	Rate	Timing and specific comments
Non-crop areas	Initial Treatment Sandy or sandy loam: 5.8 - 11 kg/acre broadcast Clay or high organic soils: 16 - 22 kg/acre broadcast Re-treatment: 2.0 kg/acre	Apply at any time, except when ground is frozen, providing adequate moisture is received by rainfall or artificial means. Best results are obtained when applied shortly before weed growth begins. Dense growth should be removed. Observe a minimum interval of 90 days between the first application and re-treatment. A maximum of 2 applications per season is permitted to a maximum seasonal use rate of 6.6 kg/acre per year
Spot treatment and small areas	Initial Treatment: 0.11 kg per 100 m^2 or 4.5 kg/acre Re-treatment: 0.165 kg per 100 m^2	
Restricted uses (requires authorization by provincial permit)		
Irrigation and drainage ditches	Initial treatment: 0.11 kg per 100 m^2 or 4.5 kg/acre in 100 - 200 L solution/acre Re-treatment: 0.165 kg per 100 m^2	Apply during the non-crop season and when ditch is not in use
Weed control in crop		
Asparagus (established)	Light sandy soils or soils in low organic matter: 0.45 - 0.9 kg/acre High clay soils or soils with high organic matter: 0.9 - 1.8 kg/acre	No earlier than 4 weeks before spear emergence or later than early cutting

Application information

Diuron or Karmex DF may be applied with ground sprayer, backpack sprayer or watering can.

Water volume: Use sufficient water (100 - 160 L/acre) to provide thorough and uniform coverage.

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Application tips

Non-crop areas: Do not use on sand, loam sand or gravelly soils with less than 1% organic matter. Do not apply to slopes as soil erosion may occur. **Irrigation and drainage ditches:** To minimize movement of Karmex XP/Diuron with irrigation water and avoid crop injury, it is essential that the herbicides be fixed in the treated soil by moisture. Apply before expected seasonal rainfall, if possible when soil in the ditch is still moist. If rainfall has not totalled at least 10 cm following treatment and before intended use of irrigation ditch, fill with water and allow to stand for 72 hours; drain off waste and remaining water before using ditch.

How it works

Diuron is readily absorbed through the root system and less readily absorbed through stem and foliage.

Expected results

Susceptible plants become chlorotic soon after treatment and then die. Degree of control and duration of effect will vary with the amount of chemical applied, soil type, rainfall and other conditions. Regrowth of plantain, thistle or wild carrot will indicate that retreatment is necessary. Poor control may be expected if inadequate rate or weeds too old or insufficient rainfall.

Restrictions

Rainfall: Rainfall needed to activate the chemical, carrying it into the root zone. **Grazing:** Do not graze the treated crops or cut for hay; sufficient data are not available to support such use. **Re-cropping:** Do not replant treated areas to any crop within 2 years after last treatment as injury to subsequent crops may result.
Re-entry interval: 12 hours.

Environmental precautions

Diuron is toxic to aquatic organisms. Do not apply directly to aquatic habitats, irrigation or drinking water supplies Use a 15-metre buffer between sprayed area and sensitive habitats.

Toxicity

Acute oral LD_{50} (rats) = 3,400 mg/kg.

Storage

Store in a cool, dry place.

Korrex II

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Korrex II A (PCP# 31405)	Corteva Agriscience	Florasulam: 25%	Water dispersable granules	0.45 kg
Korrex II B (PCP# 31205)		Dicamba: 480 g/L	Solution	7.76 L

1 case of Korrex II treats 80 acres in spring and 56 acres in fall, post-harvest.

Crops, staging and rates

Crop	Stage	Rate
Barley, durum wheat, oats, spring wheat, winter wheat	Prior to seeding. No later than 48 hours after seeding, prior to crop emergence	Spring: Korrex II A at 5.7 g/acre + Korrex II B at 97 mL/acre Fall: Korrex II A at 8.1 g/acre + Korrex II B at 139 mL/acre

Weeds and staging

Annual grasses 2- 4 leaf stage: Weeds listed below are controlled with a mix of Korrex + 180 gms active equivalent of glyphosate (consult individual glyphosate labels).

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Weeds

downy brome	green foxtail	volunteer barley	wild oats
giant foxtail	Persian darnel	volunteer wheat	

Broadleaf weeds 2 - 4 leaf stage

annual sow thistle[2]	flixweed	ragweed	stinkweed
Canada fleabane[3]	hemp-nettle	redroot pigweed	volunteer canola[1]
cleavers	kochia*	Russian thistle	volunteer flax
chickweed	lady's-thumb	scentless chamomile	wild buckwheat
cow cockle	lamb's-quarter	shepherd's-purse	wild mustard
dandelion	narrow-leaved hawk's-beard	smartweed	

* Including Group 2 and 9 resistant biotypes. [1] Including all herbicide-tolerant canola varieties. [2] Suppression only. [3] Less than 8 cm in height.

Above weeds plus those below WHEN MIXED WITH GLYPHOSATE AT 2.8 REL/ACRE (at 356 g/l AI). Consult glyphosate page for other formulation strengths.

annual sow thistle	Canada thistle (rosette stage)	quackgrass	foxtail barley

Tank mix partner[1]	Product rate
glyphosate	0.5 - 2.8 REL/acre

[1] Including all herbicide-tolerant canola varieties.

Application information

How to apply: Ground application only. **Water volume:** 20 - 40 L/acre.

Application tips

Korrex II, alone or in tank mix with glyphosate herbicides, controls weeds prior to seeding spring wheat (including durum), spring barley, winter wheat and oats. Korrex II can be applied in the fall or spring prior to planting, or as an initial treatment in summerfallow. Korrex II must be applied early post-emergence to the main flush of actively growing broadleaf weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of Korrex II by allowing maximum foliar uptake and contact activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and re-growth may occur. For best results, ensure thorough spray coverage of target weeds. Reduced control may also occur when applied to weeds heavily covered in dust. Fall stubble: Korrex II can be applied until late October, but active weed growth must be present.

How it works

Pre-seed herbicide. Korrex II A is absorbed through leaves and stops growth of susceptible weeds rapidly via inhibition of the ALS enzyme. Korrex II B is absorbed through roots and leaves and translocated through the phloem and xylem, disrupting plant metabolism.

Expected results

Weeds susceptible to Korrex II A will stop growing almost immediately. Newer leaves start to yellow and wilt, followed by a loss of green colour. Symptoms will spread to the rest of the plant with some weeds showing purpling or reddening. Under good growing conditions, complete control may occur within 7 to 10 days after application. Weeds susceptible to Korrex II B will exhibit proliferation of tissues in plant causing twisting and bending of stem and leaf petioles, cupping of leaves, increased size of root and increase in fibrous roots. Results may take 10 to 14 days to appear.

Restrictions

Rainfall: Product is rainfast in 30 minutes. **Grazing:** Livestock may be grazed on treated crops 7 days following application of Korrex. Do not harvest the treated crop within 60 days of application. Withdraw meat animals from treated field at least 30 days before slaughter. **Re-cropping:** The year following Korrex application, fields can be seeded to alfalfa, barley, mustard, canola, chickpea, faba bean, field bean, flax, lentil, pea, soybean, sunflower, wheat, corn, oats and potato or summerfallowed. **Re-entry interval:** 12 hours.

Environmental precautions

A buffer zone of 30 metres is required between sprayed area and sensitive habitat.

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Korrex II (cont'd)

Toxicity
Acute oral LD_{50} (rats) = 2,629 mg/kg.

Storage
Store in original containers in secure, dry storage area. Do not allow contamination of seeds, plants, fertilizers or other pesticides. Do not contaminate food, feedstuffs or domestic water supplies. If containers are damaged or spill occurs, use the product immediately or contain the spill with absorbent materials and dispose of waste.

Krovar 1

Group 5, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Krovar 1 (PCP# 22964)	AMVAC	Bromacil: 40% + diuron: 40%	Dry flowable	2 kg, 25 kg

Crops, staging and rates
Non-cropland areas: Railroad, pipeline, utility and highway rights-of-way, storage areas and industrial plant sites. Apply just before or during the period of active growth of weeds. Observe a minimum interval of 90 days between the first application and re-treatment.

A maximum of 2 applications per season is permitted to a maximum seasonal use rate of 13.5 kg/acre per year.

Weeds, rates and staging
Most annual and perennial grasses and broadleaved weeds.

Crop	Rate
Non-crop areas	Initial Treatment: Sandy or sandy loam: 5.5 kg/acre. Clay or high organic soils: 7.3 kg/acre Re-treatment: 2.75 - 3.6 kg/acre
Small areas	180 g per 100 m^{-2} or 7.3 kg/acre. Apply in a minimum water volume of 2 L per 100 g

Registered tank mixes

Tank mix partner	Krovar I plus tank mix partner rate	Additional weeds controlled and comments
Telar	Krovar I: 5.5 - 7.3 kg/acre + Telar: 48 g/acre + Non-ionic surfactant: 1% v/v	Weeds controlled by Telar

Application information
With: Boom spray, handgun, backpack or sprinkling can. Do not apply by air. **Water volume:** Minimum of 20 L/kg of Krovar 1. Use enough water to uniformly cover area to be treated.

Application tips
During spraying, Krovar 1 must be kept in suspension at all times by continuous agitation. Sufficient moisture from rainfall or artificial means is necessary after treatment to carry the chemical into the root zone of the weeds. If dense growth is present, results will be improved if vegetation is removed before treatment. Do not apply when ground is frozen. Do not treat ditches, wellheads, bridge approaches. Do not treat sites that are adjacent to and surrounding water supply reservoirs, supply streams, lakes and ponds.

How it works
Krovar 1 is readily absorbed through the roots, leaves and stems.

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Expected results

Plants become chlorotic and then die. The degree of control and duration of effect will vary with the amount of chemical applied, soil type, rainfall and other factors. Poor results occur if weeds are too mature or if insufficient rainfall.

Restrictions

Rainfall: Rainfall needed to move the chemical to the root zone. **Grazing:** Do not graze the treated crops or cut for hay; sufficient data are not available to support such use. **Re-entry interval:** Do not enter treated area until spray has dried.

Environmental precautions

Krovar I is toxic to aquatic organisms. Do not apply directly or indirectly to aquatic habitats. Use a buffer zone of 15 metres from sprayed area and sensitive habitat.

Toxicity

Bromacil: Oral LD_{50} (rats) = 5,200 mg/kg, Diuron: Oral LD_{50} = 3,400 mg/kg.

Storage

Store in a cool, dry place.

Liberty 150 SN/MPower Vigor/Interline/ Advantage Glufosinate 150/Justice/FBN Glufosinate 150

Group 10

Formulation

Product	Company	Active ingredient	Formulation	Container size
Liberty 150 SN (PCP# 28837)	BASF	Glufosinate-ammonium: 150 g/L	Solution	13. 5 L, 108 L, 432 L, 864 L
MPower Vigor (PCP# 30761)	NewAgco Inc	Glufosinate-ammonium: 150 g/L	Solution	13.5 L, 108 L, 500 L, 1000 L
Interline (PCP# 32860)	UPL AgroSolutions	Glufosinate-ammonium: 150 g/L	Solution	13.5 L, 108 L, 432 L, 864 L
Advantage Glufosinate 150 (PCP # 33472)	Advantage Crop Protection Ltd	Glufosinate-ammonium: 150 g/L	Solution	10 L, 500 L, 1000 L
Justice (PCP # 33615)	Winfield United Canada	Glufosinate-ammonium: 150 g/L	Solution	108 L, 500
FBN Glufosinate 150 (PCP # 33693)	Farmers Business Network	Glufosinate ammonium: 150 g/L	Solution	10 L, 500 L, 1,000 L

Note: To purchase Liberty 150 SN herbicide, farmers must have a signed and approved Liberty and Trait Agreement (LTA).

Crops, staging and rates

Crop	Stage	Rates
Liberty Link canola/glufosinate tolerant canola	Cotyledon stage up to the early bolting stage of canola	0.54 - 1.6 L/acre

Note: Temporary crop discolouration may be observed after application.

MPower Vigor/Advantage Glufosinate/FBN Glufosinate 150 only: Use as a pre-harvest desiccant in the following crops; not to be used for seed.

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Liberty 150 SN/MPower Vigor/Interline/Advantage Glufosinate 150/Justice/ FBN Glufosinate 150 (cont'd)

Crop	Stage	Rates
Lentil	40 - 60% pod colour change (yellow to brown)	0.81 - 1.09 L heavier rate for dense crop canopy or heavy weeds
Potato	14 - 21 days before harvest	1.21 L/acre
Alfalfa (for seed)*	50 - 75% pod colour change	1.09 L/acre
Canola (including triazine resistant varieties)***	30 - 40% seed turn (green to brown)	0.80 - 1.09 L/acre

* Interline registered for use on alfalfa for seed production. ** Advantage Glufosinate 150/FBN Glufosinate 150 only. *** Advantage Glufosinate 150 - for use on glyphosate tolerant pod shattering reduction canola.

Weeds, rates and staging

Liberty/Vigor/Interline/Advantage Glufosinate at 1.1 L/acre. Leaf staging 1 to 4 unless stated otherwise

barnyard grass
Canada thistle** (up to 10 cm)
chickweed
cow cockle
green foxtail (1 - 6 leaf)
hemp-nettle (1 - 3 leaf pairs)
kochia (up to 8 cm)
lady's thumb (1 - 6 leaf)
lamb's-quarter (1 - 6 leaf)
perennial sow thistle (1 - 8 leaf)
quackgrass**
redroot pigweed
round-leaved mallow
Russian thistle (up to 8 cm)
scentless chamomile (up to 10 cm)
shepherd's-purse (1 - 6 leaf)
smartweed (1 - 6 leaf)
stinkweed (1 - 8 leaf)
volunteer barley* (low populations)
volunteer flax (up to 6 cm)
volunteer wheat (low populations)
wild buckwheat (1 - 3 leaf)
wild mustard (1 - 5 leaf)

Liberty/Vigor/Interline/Advantage Glufosinate at 1.35 L/acre

With a tank mix of Centurion or Select at 75 mL/acre, can also control foxtail barley (1 - 4 leaf, 2 tillers), downy and Japanese brome (spring germinating only) to emergence of first tiller.

Canada thistle** (up to 10 cm)
cleavers (1 - 2 whorl)
dandelion (up to 15 cm rosette)
flixweed (up to 10 cm high)
jimsonweed (Liberty Only)
hemp-nettle
quackgrass***
stork's-bill (1 - 3 leaf)
volunteer barley* (heavy populations)
volunteer wheat (heavy populations)
wild buckwheat (heavy populations, 1 - 3 leaf)
wild oats (maximum 2 tillers)

Liberty/Vigor/Interline/Advantage Glufosinate at 1.62 L/acre

Canada thistle** (heavy populations, up to 10 cm)
quackgrass*** (heavy populations)

* Suppression. ** Top growth suppression. *** Improved top growth control.

Multiple Applications (Liberty 150 SN only): Liberty 150 SN is registered for up to 3 applications per year on all LibertyLink canola. Rate of 1.35 - 1.62 L/acre for all 3 applications (if required). Do not apply more than 4.86 L/acre/year. Apply when new weed growth is in the correct leaf stage and up to early bolting stage of canola. Interline is registered for 2 applications per year on glufosinate tolerant canola. Do not apply more than a total of 2.97 L/acre per year. For hybrid seed production, Interline may be applied 3 times during the growing season at the 1.35 L/acre rate.

Registered tank mixes

Tank mix partner	Liberty/Interline/Advantage Glufosinate MPower Vigor + tank mix partner rate	Additional weeds controlled and remarks
Centurion or Select	Liberty: 1.1 - 1.62 L/acre + Centurion or Select: 26 or 76 mL/acre + Adjuvant: 0.50% v/v. Mixing order is Amigo followed by Liberty/Interline/Advantage Glufosinate followed by Centurion or Select	Enhanced control of volunteer barley and wild oats. Apply when the weeds are in the 1 - 4 leaf stage with a maximum of 2 tillers. All above weeds plus foxtail barley at the 76 mL/acre rate (same weed leaf staging as above)
Facet L	Liberty/Interline: 1.35 L/acre + Facet L: 113 mL/acre. Merge: 0.2 - 0.4 L/acre.	Apply when the crop is in the 2 - 6 leaf stage. Enhanced and more consistent control of cleavers.

Advantage Crop Protection supports the following registered tank mixes: Advantage Cethodim, FBN Clehtodim, Clever, Ingenious.
BASF supports the following mixes that are not on the Liberty label. Apply mixes according to the most restrictive use limitations for either product.

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Tank mix partners	Crop	Crop stage/comments
Centurion + Decis	LibertyLink canola	Cotyledon up to early bolting
Centruion + Sevin XLR		
Decis		
Sevin XLR		
Facet L + Centurion		Cotyledon up to 6-leaf
Facet L + Decis		
Nexicor Fungicide		

Agricity supports the following mixes: Independence/Select, Quiz/Assure, Decis, Sevin XLR Plus.
BASF only supports applying up to 3 products total when tank mixing other products with Liberty (i.e., max of 3 products in the sprayer tank at 1 time). Please contact BASF for more information if more than 3 products are required at any application timing.

Application information

How to apply: Ground and aerial application for Liberty 150 SN/Vigor/Interline. **Water volume:** Ground: 45 L/acre minimum. Air: 22 L/acre minimum.

Application tips

For best results, apply to emerged, young actively growing weeds. Weeds that emerge after application will not be controlled. When a rate range is given, the higher rate should be used: (1) when weed or crop growth is dense, (2) when the weeds are large and/or mature (i.e., advanced leaf stages and plant height, and (3) when environmental conditions are cool and dry.

How it works

Liberty/MPower Vigor/Interline works primarily as a contact herbicide. Thorough coverage of the weeds to be controlled is essential. Absorbed by all leaf and stem surfaces. It interferes with plants' ability to detoxify ammonia. The speed of action of Liberty/MPower Vigor/Interline is influenced by environmental factors. At cool temperatures (below 10°C), poor moisture and low humidity, speed of action may be reduced.

Expected results

Generally, visual symptoms appear 2 to 4 days after application.

Restrictions

Rainfall: If rainfall occurs within 4 hours of application, effectiveness may be reduced. **Grazing:** Do not graze the treated crop or cut for hay; sufficient data are not available to support such use. **Re-entry interval:** 24 hours. **Re-cropping:** There are no cropping restrictions for field corn, canola, soybean, dry common bean (not grown for seed), alfalfa and potato. 70 days for buckwheat, barley, millet, oats, rye, sorghum, triticale and wheat. 120 days for all other crops.

Environmental precautions

Highly toxic to aquatic organisms and non-target terrestrial plants. Do not contaminate surface or ground water. Use a 15-metre buffer, with ground spraying, between the treated area and sensitive habitat.

Toxicity

Acute oral LD_{50} (rats) = 2,000 mg/kg.

Storage

Do not store below freezing. If stored for 1 year or longer, shake well before using.

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Lontrel XC/Pyralid Herbicide/Clobber/ Advantage Clopyralid 360/ FBN Cloypyralid/CT Mix 360

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lontrel XC (PCP# 32795)	Corteva Agriscience	Clopyralid: 600 g/L	Solution	2.67 L
Pyralid Herbicide (PCP#32265)	Sharda Cropchem Ltd	Clopyralid: 300 g/L	Solution	4.45 L
Clobber (PCP# 33114)	NewAgco Inc	Clopyralid: 360 g/L	Solution	8.9 L
Advantage Clopyralid 360 (PCP # 33795)	Advantage Crop Protection Inc	Clopyralid: 360 g/L	Solution	4.45 L
FBN Clopyralid (PCP # 33762)	Farmer's Business Network	Clopyralid: 360 g/L	Solution	4.45 L
CT Mix 360 (PCP # 33387)	Rotam North America	Clopyralid: 360 g/L	Solution	6.74 L

Crops, staging and rates

Crop	Staging	Rate per acre
Barley, oats, spring wheat	3-leaf to flag leaf emergence	Clobber/Advantage Clopyralid/FBN Clopyralid/CT Mix 360: 85 - 227 mL, Lontrel XC: 53 - 138 mL/acre, Pyralid: 136 - 272 mL/acre
Winter wheat		
Canola including glyphosate tolerant canola	2 - 6 leaf	Clobber/Advantage Clopyraild /FBN Clopyralid/CT Mix 360: 226 - 336 mL, Lontrel XC: 101 - 202 mL/acre, Pyralid: 204 - 403 mL/acre
Flax (including low linolenic acid varieties)	5 - 10 cm in height	
Seedling forage grasses*	2 - 4 leaf	
Established forage grasses*	Shot-blade stage, or in the fall after harvest or in early spring	
Field Corn for grazing, silage or grain only (Lontrel XC ONLY)	emergence to V6	Lontrel XC: 101 mL/acre
Summerfallow and non-crop farmland	Stage according to weeds	Clobber/Advantage Clopyraild/FBN Clopyralid/ CT Mix 360: 336 mL, Lontrel XC: 202 mL/acre, Pyralid: 403 mL/acre
Sugar beet	Cotyledon to 8-leaf stage	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 226 - 335 mL/acre, Lontrel XC: 138 - 202 mL/acre, Pyralid: 272 - 403 mL/acre
Shelterbelts**	Stage according to weeds	Clobber/Advantage Clopyraild/FBN Clopyralid/ CT Mix 360: 335 mL/acre, Lontrel XC: 202 mL/acre, Pyralid: 403 mL/acre
Strawberry (renovation)**	Immediately after harvest or before mowing	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 335 mL/acre, Lontrel XC: 202 mL/acre, Pyralid: 403 mL/acre

* Forage grasses: Kentucky bluegrass, smooth bromegrass, reed canary grass, creeping red fescue, meadow fescue, tall fescue, meadow foxtail, orchard grass, altai wild ryegrass, Russian wild ryegrass, timothy, crested wheatgrass, intermediate wheatgrass, slender wheatgrass streambank wheatgrass.
** Minor use registration. Corteva assumes no responsibility for performance or crop safety. Shelterbelt consisting of villosa lilac, acute willow, Colorado spruce, white spruce, buffaloberry and chokecherry.

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Weeds and staging

Canada thistle: Rosette to pre-bud stage. Others: Young and actively growing.

Weeds controlled at the following product rates. Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 170 mL/acre, Lontrel XC: 101 mL/acre, Pyralid: 204 mL/acre

alsike clover	Canada thistle*	vetch

Weeds controlled at the following product rates. Clobber /Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 227 mL/acre, Lontrel XC: 138 mL/acre, Pyralid: 272 mL/acre

Canada thistle (season long control)	ox-eye daisy**	volunteer alfalfa (5 - 50 cm)
common groundsel	perennial sow thistle*	wild buckwheat
common ragweed	scentless chamomile	
	sheep sorrel**	

* Top growth ** Suppression

Control of Canada thistle

For in crop control of top growth of Canada thistle, apply Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360 at the rate of 170 mL/acre or Lontrel XC at a rate of 101 mL/acre or Pyralid at 204 mL/acre. This will suppress top growth of Canada thistle for 6 to 8 weeks. Some re-growth may occur by the end of the season but this will not interfere with the harvesting of the crop.

For season long control of top growth of Canada thistle, apply Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360 at the rate of 227 mL/acre or Lontrel XC at 138 mL/acre. This rate will generally provide season long control of Canada thistle. Not all rhizomes will be killed and some re-growth may occur by the end of the growing season.

For season long control of top growth, with a reduction of Canada thistle population in the following year, apply Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360 at the rate of 336 mL/acre or Lontrel XC at 202 mL/acre. This rate will provide season long control of Canada thistle and suppression into the following season, resulting in a reduction of the total number of Canada thistle shoots in the treated area.

Registered tank mixes

Tank mix partner	Clopyralid product rate plus tank mix partner rate	Additional weeds controlled
Canola		
Poast Ultra + Merge Adjuvant	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 170 - 335 mL acre or Lontrel XC: 101 - 202 mL/acre or Pyralid: 204 - 403 mL/acre + Poast Ultra: 0.19 - 0.45 L/acre + Merge: 0.4 L/acre	Canada thistle, wild buckwheat, wild oats, green foxtail, volunteer barley, volunteer wheat, and volunteer oats
Select + Amigo adjuvant	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 170 - 335 mL acre or Lontrel XC: 101 - 202 mL/acre or Pyralid: 204 - 403 mL/acre + Select: 150 mL/acre + Amigo: 0.5% v/v	
Group 2 tolerant canola		
Odyssey	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 170 - 226 mL acre or Lontrel XC: 101 - 202 mL/acre or Pyralid: 204 - 403 mL/acre + Odyssey: 17.3 g/acre	Grasses plus Lontrel susceptible weeds
Roundup Ready canola		
Glyphosate	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 113 mL/acre or Lontrel XC: 69 mL/acre or Pyralid: 136 mL/acre + glyphosate: 505 mL/acre (356 - 360 g/L formulation)	Canada thistle (season-long top growth), dandelion <15 cm diameter (season-long top growth), dandelions >15 cm diameter (suppression), perennial sow thistle (season-long top growth), wild buckwheat
Roundup Ready corn		
Glyphosate	Lontrel XC: 69 mL/acre +glyphosate: 505 mL/acre (356-360 g ae/L)	Canada thistle (season long control), dandelion <15 cm diameter (season long), >15 cm (suppression), perennial sow thistle (season long control), wild buckwheat

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Lontrel XC/Pyralid Herbicide/Clobber/Advantage Clopyralid 360/ FBN Cloypyralid/CT Mix 360 (cont'd)

Tank mix partner	Clopyralid product rate plus tank mix partner rate	Additional weeds controlled
Flax		
MCPA amine or ester	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 170 mL/acre or Lontrel XC: 101 mL/acre or Pyralid: 204 mL/acre + MCPA 500 ester: up to 0.45 L/acre	Canada thistle (top growth) + MCPA susceptible weeds
	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 227 mL/acre or Lontrel XC: 138 mL/acre or Pyralid: 272 mL/acre + MCPA 500 ester: up to 0.45 L/acre	Canada thistle (season-long) + MCPA susceptible weeds
	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 336 mL/acre or Lontrel XC: 202 mL/acre or Pyralid: 403 mL/acre + MCPA 500 ester: up to 0.45 L/acre	Canada thistle (season-long with suppression into the following year), common groundsel, perennial sow thistle (top growth), scentless chamomile, wild buckwheat
Barley, oats and wheat		
2,4-D or MCPA amine or ester 500 formulation	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 113 mL or Lontrel XC: 69 mL/acre or Pyralid: 136 mL/acre + MCPA or 2,4-D: 113 mL/acre	Canada thistle (top growth, 6 - 8 weeks) plus MCPA or 2,4-D susceptible weeds
	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 170 mL or Lontrel XC: 101 mL/acre or Pyralid: 203 mL/acre + MCPA or 2,4-D: 113 mL/acre	Canada thistle (season-long) plus MCPA or 2,4-D susceptible weeds
Refine Extra + 2,4-D (600 g/L) or MCPA (500 g/L) amine or ester	Clobber/Advantage Clopyraild/FBN Clopyralid/CT Mix 360: 85 mL/acre or Lontrel XC: 53 mL/acre or Pyralid: 102 mL/acre + 2,4-D or MCPA amine: 339 mL/acre or 2,4-D: 283 mL/acre + Refine Extra 8 g/acre. Add Agral 90 at 0.2% v/v to this tank mixture.	Canada thistle (season-long), cleavers (suppression), lady's-thumb, perennial sow thistle, stinkweed, wild buckwheat, volunteer canola, wild mustard

Note: Do not use 2,4-D on oats due to the probability of crop injury.

Application information

How to apply: Ground application only. **Water volume:** 40 - 80 L/acre.

Application tips

Do not use products containing 2,4-D on oats due to probability of crop injury. Rates of MCPA ester of 170 grams active ingredients/acre or higher or MCPA amine of 200 grams active ingredient/acre may cause some delay in maturity of flax, resulting in yield reduction. Make sure the sprayer tank has been thoroughly cleaned before Lontrel XC/Pyralid is mixed. Treat crops during warm weather when weeds are actively growing. Best results are obtained when Canada thistle is actively growing and soil moisture is adequate for rapid growth. Under cool or dry conditions, control of Canada thistle may be severely reduced. Sow thistle plants emerging after spraying will not be controlled. Where contact herbicides are used, such as bromoxynil, that damage the leaves of the Canada thistle, apply Lontrel XC/Pyralid 14 days prior or after an interval of 14 days, which allows Canada thistle to recover and resume growth.

Forage grasses: For control of the weeds listed on the label plus alsike clover, apply Pyralid at the rate of 170 - 336 mL/acre (101 - 202 mL/acre Lontrel XC) in 45 - 90 L/acre of water. Make 1 application per season by ground sprayer. For seedling grasses, apply at the 3-leaf stage and beyond. For established grasses, apply in the fall after harvest or early spring.

How it works

Clopyralid is a systemic, hormone-type herbicide. It is absorbed by leaf and stem surfaces and is readily translocated. Maximum efficacy results from foliar application to young actively growing plants.

Expected results

Herbicide symptoms on affected plants include swollen growing points and roots, cupping of leaves, twisted and distorted stems and leaves. Plants will gradually stop growing and change colour, first to dark green and then to yellow before turning brown as they die. Maximum effectiveness results from foliar applications to young actively growing plants. Death of weeds may not occur until 14 to 21 days after application. With the lowest rate of Lontrel on Canada thistle, some regrowth may occur by the end of the season, but this will not interfere with harvesting of the crop.

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Restrictions

Rainfall: A rain-free period of 4 to 6 hours after application is required. **Grazing:** There are no restrictions on the grazing of crops or forages treated with Lontrel XC/Pyralid. If necessary, treated areas may be grazed immediately following application. **Pre-harvest intervals:** Sugar beets – do not apply within 90 days of harvest. Strawberry – P.H.I. = 200 days. **Re-cropping:** Fields treated with Lontrel can be seeded to barley, canola, forage grasses, flax, mustard, oats, rye, wheat or summerfallowed. Do not seed to crops other than those listed above for at least 1 year after treatment. If severe drought conditions are experienced during the months of June to August inclusive (less than 14 cm rainfall) in the year of application, delay seeding soybeans and field peas an additional 12 months (total 22 months following application). **Re-entry interval:** 12 hours.

Use of straw and manure from treated crops: Lontrel XC/Pyralid residues in straw may be harmful to susceptible plants. Do not use straw from treated crops for composting or mulching on susceptible broadleaf crops. Manure can be spread on fields that will be seeded to barley, flax, oats, canola (rapeseed), rye or wheat. Do not grow susceptible crops such as pea, bean, lentil, potato, sunflower or other sensitive crops on land that has been mulched with straw containing Lontrel/Pyralid residues within the last 12 months.

Environmental precautions

Small amounts of drift may damage sensitive plants such as legumes.

Toxicity

Acute oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in heated storage. If frozen, warm slowly to room temperature and mix thoroughly before use.

Lorox

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lorox L (PCP# 16279)	Tessenderlo Kerley Inc	Linuron: 480 g/L	Liquid	10 L

Crops, staging and rates

Crop	Staging	Rate per acre
		Lorox L
Post-emergent applications		
Shelterbelts (established)**	In the spring before buds open and weeds are less than 10 cm tall	1.82 L
Pre-emergent applications		
Potatoes: less than 2.0% OM	Apply just before crop emerges or when tops are completely covered by hilling	0.91 L
Potatoes: 2 - 5 % OM		1.50 L

** Established shelterbelts consisting of American elm, boxelder, caragana, Colorado spruce, green ash, poplar, scotch pine, Siberian elm, white spruce, willow. Apply only on stock planted for at least 1 year as a directed spray under the trees and bushes.

Weeds and staging

Apply before emerged grasses are 5 cm tall and before broadleaf weeds are 15 cm tall. Use high rates of LOROX L Herbicide for grass control.

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Lorox (cont'd)

Grassy weeds controlled

barnyard grass[1]	green foxtail	yellow foxtail	witchgrass
crabgrass			

Broadleaf weeds controlled

annual sowthistle	common ragweed	knotweed	purslane
redroot pigweed	smartweed	wild buckwheat	velvetleaf[1]
chickweed	goosefoot	lamb's-quarters	
shepard's purse	stinkweed (pennycress)	wormseed mustard	

[1] Partial control.

Note: LOROX L Herbicide will not control (1) established perennial weeds (2) triazine-resistant weeds in the above list (3)Powell's pigweed (*Amaranthus powellii*).

Application information

With: Ground equipment. **Water volume:** Potato – 120 L/acre.

Application tips

Do not use on sandy or coarse-textured soils, low in organic matter, as crop injury may result. Do not use when crops are under drought stress. Closed mixing/loading systems are required. During application, use a closed cab that provides both a physical barrier and respiratory protection (such as dust/mist filtering and/or vapour/gas purification system). The closed cab must have a chemical-resistant barrier that totally surrounds the occupant and prevents contact with pesticides outside the cab.

How it works

A systemic herbicide absorbed by leaves and roots. Yellowing (chlorosis), stunting and finally death occurs 10 to 14 days after treatment.

Expected results

Weeds: Yellowing starts 7 to 10 days after application. Effect greatest under excellent growing conditions. Weed control will vary depending on species, time of application and growing conditions. **Crop:** A slight yellowing of crop, leaf tip and leaf margin burn may be seen 7 to 10 days after application. Crop recovers within 14 to 18 days. Crop injury can occur if applied during period of high heat.

Restrictions

Limit the amount of product handled per day to 77 kg a.i. per person for groundboom application when mixing, loading and applying. **Rainfall:** Heavy rainfall within 2 hours may decrease activity. Pre-emergent treatment requires rainfall or irrigation for activation. Carrots or potatoes may be severely injured if unusually heavy rains follow application. **Grazing:** Do not graze or cut for hay; there are not sufficient data available to support such use. **Re-cropping:** With the exception of a stand failure do not plant carrots, parsnips and potatoes within 12 months of a previous application of Lorox L herbicide. Do not replant treated areas to other crops within 4 months after last application (or as otherwise directed) as injury to subsequent crops may result.
Re-entry interval/Pre-harvest interval/Buffer zones: Depends on crop and activity. Refer to label for specific details.

Toxicity

Acute oral LD_{50} (rats) = 3,600 mg/kg.

Storage

Store in a heated area. Do not freeze as settling may occur. If frozen, thoroughly mix to resuspend.

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MCPA

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
MCPA 600 amine (PCP# 31327)	IPCO	600 g/L	Solution	10 L
MPower MCPA 500 amine (PCP# 30461)	NewAgco Inc	500 g/L	Solution	10 L, 115 L
MCPA 600 amine (PCP# 28384)	Nufarm	600 g/L	Solution	10 L
MPower MCPA Ester 600 (PCP# 32912)	NewAgco Inc	500 g/L	Solution	10 L, 115 L, 500 L
MCPA amine 600 (PCP# 31432)	Loveland Products Canada	600 g/L	Solution	10 L
MCPA 500 ester (PCP# 30462)	NewAgco Inc.	500 g/L	Solution	10 L
MCPA 600 ester (PCP# 27802)	IPCO	600 g/L	Emulsifiable concentrate	10 L, 115 L, 450 L
MCPA 600 ester (PCP# 27803)	Nufarm	600 g/L	Emulsifiable concentrate	10 L, 115 L, 500 L
MCPA 600 ester (PCP# 27804)	Loveland Products Canada	600 g/L	Emulsifiable concentrate	10 L, 115 L
Co-Op MCPA 600 ester (PCP# 29001)	Federated Co-operatives Ltd.	600 g/L	Emulsifiable concentrate	10 L, 115 L, 450 L
MCPA 300 Sodium salt (PCP# 20306)	IPCO	300 g/L	Solution	10 L
MCPA 300 Sodium salt (PCP# 14718)	Nufarm	300 g/L	Solution	10 L
MCPA 300 Sodium salt (PCP# 9858)	Loveland Products Canada	300 g/L	Solution	10 L
MCPA ESTER 600 (PCP # 31669)	ADAMA Canada	600 g/L	Emulsifiable concentrate	10 L, 115 L
Media MCPA Ester 600 (PCP # 34293)	Sharda CropChem Ltd	600 g/L	Emulsifiable concentrate	10 L, 120 L
Media F 500 MCPA Ester (PCP # 34299)	Sharda CropChem Ltd	500 g/L	Emulsifiable concentrate	10 L, 120 L

Crops, staging and rates

Crop	Stage	Rate	
Wheat (spring and durum), barley, spring rye, oats, all not underseeded to legumes	From the 3-leaf expanded to the early flag-leaf (shot blade) stage	500 amine: 0.45 L/acre 600 amine or ester: 0.42 L/acre; MCPA ester 600 only - up to 0.42 L/acre (up to 0.36 L/acre for oats). Total in-crop application should not exceed 0.42 L/acre (0.36 L/acre for oats, 600 g/L formulation).	400 K salt: 0.53 L/acre 300 Na salt: 0.81 L/acre
Winter wheat (WW) and fall rye (FR)	Spring: from the time growth commences until flag leaf stage	500 amine: 0.45 L/acre 600 ester: 0.42 L/acre	400 K salt: WW 0.61 L/acre, FR: 0.40 L/acre 300 Na salt: 0.81 L/acre
Flax (excluding solin)	5 cm in height to pre-bud stage. Apply at 5 - 10 cm in height for maximum crop tolerance	500 amine: 0.4 L/acre 600 amine: 0.34 L/acre; 600 ester: 0.28 L/acre	400 K salt: 0.65 L/acre 300 Na salt: 0.71 L/acre
Corn	As a broadcast spray up to 15 - 18 cm tall or 6-leaf stage. Directed spray using drop nozzles: up to 3 weeks before tasseling	500 amine or ester: 0.45 L/acre 600 amine only: 0.37 L/acre	400 K salt: 0.51 L/acre 300 Na salt: 0.61 L/acre

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MCPA (cont'd)

Crop	Stage	Rate	
Peas (field and canning)	Vine 10 - 18 cm long. For short stature determinate varieties apply at the early stage within this range	500 amine: 0.135 - 0.22 L/acre 600 amine only: 0.17 L/acre	400 K salt: not registered 300 Na salt: 0.36 L/acre
Forages (established)	Apply in the spring up to the shot blade stage	500 amine only: 0.45 L/acre	
Seedling forage (not for grass production)	From the 3-leaf to early flag leaf	500 amine only: 0.45 L/acre	
Pasture, rangeland, turf	Spring or fall	500 amine or ester: 1.41 L/acre	600 amine: 1.41 L/acre; 600 ester: 1.13 L/acre
Red clover (seedling and established)	Seedling: 1 - 3 trifoliate stage Established: breaking of dormancy in the spring up to 7. 5 cm	500 amine: 0.23 L/acre 600 amine only: 0.19 L/acre	400 K salt: not registered 300 Na salt: 0.36 L/acre
Cereals underseeded to alfalfa (not Flemish)	Apply when alfalfa is in the 1 - 3 trifoliate stage	500 amine: 0.23 L/acre 600 amine only: 0.19 L/acre	400 K salt: not registered 300 Na salt: 0.4. L/acre
Cereals underseeded to alsike, ladino and red clover	Apply when clover is in the 1 - 3 trifoliate stage	500 amine: 0.28 L/acre 600 amine or ester: not registered	400 K salt: not registered 300 Na salt: 0.4. L/acre
Fairways and lawns	Apply early in the summer	500 amine: 0.4 - 1.0 L/acre 600 amine or ester: not registered	400 K salt: not registered 300 Na salt: 0.4. L/acre

Weeds, rates and staging

Apply when weeds are in 2 - 4 leaf stage. Use lower rate when weeds are small and growing conditions are good; use higher rate when weeds are in dry or cool conditions or under heavy infestation.

Weed listing and rate range for individual formulations may differ slightly; please consult the product label for specific weed controlled and rates for each formulation.

Susceptible weeds	Harder to control weeds		Top growth control only	
MCPA Amine 500: 0.28 - 0.45 L/acre MCPA Ester and amine 600: 0.24 - 0.36 L/acre MCPA 400 K: 0.61 - 0.67 L/acre MCPA 300 Na: 0.5 - 0.81 L/acre	MCPA amine 500: 0.45 - 0.71 L/acre MCPA amine and ester 600: 0.42 - 0.61 L/acre MCPA 400 K: 0.71 - 0.81 L/acre MCPA 300 Na: 0.81 - 1.1 L/acre		MCPA amine 500: 0.45 - 0.71 L/acre MCPA amine and ester 600: 0.42 - 0.61 L/acre MCPA 400 K: 0.71 - 0.81 L/acre MCPA 300 Na: 0.81 - 1.1 L/acre	
bluebur burdock (before 4-leaf stage) cocklebur common plantain flixweed (seedlings) Indian mustard lamb's-quarter prickly lettuce ragweed Russian pigweed shepherd's-purse stinkweed vetch wild radish wild mustard wormseed mustard wild sunflower	**Weeds listed under susceptible plus**		blue lettuce Canada thistle corn spurry chicory dog mustard field bindweed field horsetail gumweed hedge bindweed hoary cress	lady's-thumb leafy spurge perennial sow thistle Russian knapweed Russian thistle smartweed tartary buckwheat teasel wild buckwheat wormwood
	annual sow thistle biennial wormwood common chickweed curled dock (before the 4-leaf stage) daisy fleabane dandelion goat's-beard hairy galinsoga hawkweed heal-all hempnettle (before the 4-leaf stage) knotweed (before the 4-leaf stage)	mouse-eared chickweed oak-leaved goosefoot peppergrass pineapple weed, plantain purslane redroot pigweed sheep sorrel smartweed stinging nettle tansy mustard wild radish, yellow rocket (before the 4-leaf stage)		

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Registered tank mixes

Barley

MCPA 500 amine (400 mL/acre) + Squadron/Tricor (111 - 202 mL/acre)

MCPA 500 amine (344 mL/acre) + Engenia (74 mL/acre)

MCPA K-salt (404 mL/acre) + Engenia (74 mL/acre)

MCPA K-salt (270 - 550 mL/acre) + Pardner (404 mL/acre)

Wheat

MCPA 500 amine (400 mL/acre) + Squadron/Tricor (111 - 172 mL/acre)

MCPA 500 amine (344 mL/acre) + Engenia (74 mL/acre)

MCPA K-salt (404 mL/acre) + 117 mL/acre)

MCPA K-salt (270 - 550 mL/acre) + Pardner (404 mL/acre). Note: Do not exceed 270 mL/acre rate of MCPA K-salt in winter wheat using this tank mixture.

Oats

MCPA K-salt (270 - 550 mL/acre) + Pardner (404 mL/acre)

Cereals underseeded to alfalfa and bird's-foot trefoil

MCPA 500 amine (28 mL/acre) + Embutox (505 mL/acre)

Application information

How to apply: Ground and air. **Water volume:** Cereals, flax, pastures, forage grasses – 40 L/acre. Peas – minimum of 61 L/acre. Pasture, rangeland and turf – 180 L/acre. Cereals underseeded to legumes – 61 - 81 L/acre.

Application tips

Best weed control occurs when daytime temperatures are above 21°C and nighttime temperatures are at 10°C. Do not spray when air temperature is above 27°C. Extremely hard water may reduce performance. When applying to flax under hot and humid conditions, some crop injury and delay in maturity may result. Spraying in the evening and/or increased volumes of water (40 or more L/acre) may reduce the risk of flax injury.

How it works

A systemic, absorbed by leaf and stem surfaces and translocated to the actively growing regions. MCPA disrupts cell division, causing abnormal growth response, thereby affecting respiration and food reserves.

Expected results

Weeds start to twist between 2 to 20 days after spraying, depending on weather conditions, formulation and nature of weeds. Following the twisting and bending, plants will turn brown, and then die. Only emerged weeds will be controlled.

Restrictions

Rainfall: Rain within 6 hours of MCPA Na salt, or MCPA K-salt, 4 hours of MCPA amine, and 2 hours of MCPA ester application will decrease weed control. **Grazing:** Do not graze or cut for green feed until 7 days after spraying. **Re-cropping:** No restrictions the year after application. **Re-entry interval:** Do not enter treated area until spray has dried.

Environmental precautions

MCPA is toxic to aquatic organisms and non-target terrestrial plants and can readily leach in the soil.

Toxicity

Moderate acute mammalian toxicity.

Storage

If frozen, warm to 5°C and mix well before using.

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Mecoprop

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Mecoprop - P (PCP# 27891)	Loveland Products Canada	Mecoprop: 150 g/L	Liquid	10 L

Crops, staging and rates

Rate: small weeds (seedlings) – 2.2 L/acre. Mature weeds: 3.4 L/acre.

Crop	Staging	Remarks
Barley, oats and wheat	3-leaf expanded stage until the early flag leaf (shot-blade)	Apply under good growing conditions. Do not spray on grain underseeded with legumes

Weeds and staging

In barley, oats and wheat

Apply to weeds from 2 - 4 leaf stage.

black medick	cleavers	plantain	volunteer clover
Canada thistle (top growth only)	corn spurry	plantain	wild mustard
chickweed	lamb's-quarter		

Application information

With: Ground equipment only. Do not apply by air.

Water volume: Cereals – 80 - 120 L/acre.

Application tips

Recommended water volume is essential for optimum weed control. Cold weather and drought may cause a delay in weed control action.

How it works

A systemic that disrupts the plant's translocation system causing the accumulation of plant food in the shoots and subsequent starvation of the roots.

Expected results

Weeds: Leaf curling and stem twisting should be visible within 4 to 5 days after spraying. Weeds should be dead within 3 to 4 weeks of application. **Crop:** Deformed heads, missing florets and twisted awns could result if recommendations are not followed or if crop is under stress conditions.

Restrictions

Rainfall: Rain within 4 to 6 hours will reduce effectiveness. **Grazing:** Do not graze or feed treated crops to livestock. **Re-cropping:** No restrictions.

Environmental precautions

Leaching: Readily leached from soil. In dry soils, it has a longer residual.

Toxicity

Acute oral LD_{50} (rats) = 650 mg/kg.

Storage

Store above 0°C. If stored for 1 year or longer, shake well before using.

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Momentum/Inertia

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Momentum (PCP# 30456)	Loveland Products	Clopyralid: 90 g/L + fluroxypyr: 90 g/L	Emulsifiable concentrate	8.99 L, 108 L
Inertia (PCP # 34225)	Sharda CropChem Ltd	Clopyralid: 90 g/L+ fluroxypyr: 90 g/L	Emulsifiable concentrate	10 L

Crops, staging and rates

Crop	Staging	Rate
Spring wheat, durum wheat and spring barley	Apply to the crop from 3-leaf to just before the flag leaf	450 mL/acre

Weeds and staging

Momentum by itself controls a limited number of broadleaf weeds.

Weeds controlled		Weeds suppressed
Canada thistle* cleavers (1 - 4 whorl) kochia (2 - 8 leaf)	volunteer flax (1 - 12 cm) wild buckwheat (1 - 4 leaf)	stork's-bill (1 - 8 leaf)

* Season-long control with some regrowth in the fall. Apply from 10 cm to pre-bud stage.

Momentum should **ALWAYS** be applied with a broadleaf tank mix partner. There are 2 rates of MCPA Ester registered for use. Refer to the MCPA label for weed staging:

Low rate of MCPA: (MCPA Ester 600 – 250 mL/acre)

Weeds listed for Momentum PLUS:

burdock
cocklebur
field horsetail**
flixweed* (2 - 4 leaf)
lamb's-quarter
mustards (except dog and tansy)
plantain**
prickly lettuce
ragweed
shepherd's-purse*
stinkweed*
vetch
volunteer sunflower
wild radish
wild (annual) sunflower

High rate of MCPA: (MCPA Ester 600 – 375 mL/acre)

Weeds listed above PLUS:

common groundsel
dandelion*
redroot pigweed
Russian pigweed
scentless chamomile (2 - 4 leaf)
smartweed
sow thistle (annual)
sow thistle (perennial)**
tartary buckwheat
volunteer canola
wild buckwheat

* Spring rosettes only. ** Top growth only.

Registered tank mixes

Tank mix partner	Crops	Tank mix partner rate per acre	Weeds controlled
Axial 100EC	Spring wheat, barley	40 acres per case	Wild oats, green foxtail, yellow foxtail, barnyard grass, proso millet, volunteer canary seed, tame oats
Foothills NG **Horizon NG**	Spring wheat, durum wheat	20 acres per jug	Wild oats, green and yellow foxtail, volunteer (tame) oats, barnyard grass, volunteer canary seed
Marengo* **Liquid Achieve***	Spring wheat, durum wheat, barley	40 acres per case or jug	Wild oats, green foxtail, yellow foxtail, barnyard grass, Persian darnel, volunteer oats

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Momentum/Inertia (cont'd)

Tank mix partner	Crops	Tank mix partner rate per acre	Weeds controlled
Simplicity	Spring wheat, durum wheat	40 acres per jug	Wild oats, yellow foxtail, green foxtail (suppression), Japanese brome, downy brome*, barnyard grass, chickweed, hemp-nettle, redroot pigweed, smartweed, volunteer canola (excluding Group 2 tolerant)
Traxos	Spring wheat, durum wheat	20 acres per jug	Wild oats, green and yellow foxtail, barnyard grass, volunteer (tame) oats, volunteer canary seed, Persian darnel, proso millet
Puma Advance	Spring wheat, durum wheat, barley	Puma Advance - 20 acres/jug	Wild oats, green foxtail, yellow foxtail, barnyard grass

Loveland also supports Momentum with 2,4-D Ester and Refine SG. Apply mixes according to the most restrictive use limitations for either product. For more detailed instructions, please contact your local Loveland.

* Surfactant must be purchased when using Liquid Achieve. Marengo contains enough Turbocharge for 5 gallons of water per acre water rate.

Application information

With: Ground equipment only. **Water volume:** 40 L/acre minimum.

Mixing instructions

Grass tank mix partner	Step 1	Step 2	Step 3	Step 4
No Grass Tank Mix	Momentum	MCPA Ester		
Axial 100EC	Momentum	MCPA Ester	Axial	Adigor
Foothills NG Horizon NG	Momentum	MCPA Ester	Foothills/Horizon NG	
Marengo Liquid Achieve	Marengo/ Liquid Achieve	Momentum	MCPA Ester	Turbocharge
Simplicity	Water Conditioner	Simplicity	Momentum	MCPA Ester
Traxos	Momentum	MCPA Ester	Traxos	

Grass product	Tank mix instructions: Momentum must always be tank mixed with one broadleaf product. If also with a grass product, follow the order below. For example for Simplicity, Momentum and MCPA, follow the steps chronologically, skipping the unwanted products: steps 1, 2, 4 and 5					Comments
	Step 1	Step 2	Step 3	Step 4	Step 5	
No grass product	Refine SG	Momentum	MCPA Ester or 2,4-D Ester			
Axial	Refine SG	Momentum	MCPA Ester	Axial	Adigor	Do not mix Axial with 2,4-D
Foothills NG/ Horizon NG	Refine SG	Momentum	MCPA Ester or 2,4-D Ester	Foothills NG/ Horizon NG		
Marengo/Liquid Achieve		Marengo/Liquid Achieve	Momentum	MCPA Ester or 2,4-D Ester	Turbocharge	Tralkoxydim does not mix with Refine SG
Simplicity	Water Conditioner	Simplicity	Refine SG	Momentum	MCPA Ester or 2,4-D Ester	
Traxos	Refine SG	Momentum	MCPA Ester	Traxos		Do not mix Traxos with 2,4-D.
Puma Advance	Momentum	MCPA Ester or 2,4-D Ester	Puma Advance			Do not mix with Refine SG

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Grass product	Tank mix instructions: Momentum must always be tank mixed with one broadleaf product. If also with a grass product, follow the order below. For example for Simplicity, Momentum and MCPA, follow the steps chronologically, skipping the unwanted products: steps 1, 2, 4 and 5					Comments
Varro	Refine SG	Varro	Momentum	MCPA Ester or 2,4-D Ester		

Application tips

Best results are obtained when Momentum is applied to actively growing weeds in the seedling stage and when Canada thistle is between 10 cm and up to but not including the early bud stage. Poor weed control may result under cool or dry conditions. Recommended boom height must be 60 cm or less above the crop or ground.

How it works

Momentum is comprised of chemistries from the Group 4 herbicide group. When applied, it will move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected results

Weeds will start to twist shortly after being sprayed. The plants will continue to twist and bend, stop growing and eventually turn brown and die. When applied to more difficult to control weeds such as Canada thistle and wild buckwheat, the plants will stop growing but change colour more to a dark green and then yellow. Death may not occur for 14 to 21 days.

Restrictions

Rainfall: Do not apply if rain is expected within 6 hours. **Grazing:** Livestock may graze on treated crops 3 days following application. However, review all chemistries in the tank mix: follow the most restrictive label for determining when livestock can be grazed on treated crop. **Harvest:** Do not harvest the treated crop within 60 days after application. **Re-cropping:** Fields previously treated with Momentum can be seeded the following year to wheat, barley, oats and rye (not underseeded to forage legumes, clover or alfalfa), canola, flax, mustard, field pea, or fields can be summerfallowed. Seed only those crops listed in the year following treatment. **Re-entry interval:** 12 hours.

Note: do not seed field peas for at least 10 months following treatment. Very dry soil conditions following application can result in a risk of injury to field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive in the year of application, delay seeding field peas an additional 12 months (total 22 months following application). Contact the local Loveland Products representative or retailer for more information before seeding field pea following drought conditions in the previous year.

Environmental precautions

Avoid contamination of aquatic systems during application as Momentum contains petroleum distillate, which is moderately to highly toxic to aquatic organisms. Observe buffer zones as outlined on the label.

Toxicity

Acute oral LD_{50} (rats) > 5,000 mg/kg.

Storage

Store at temperatures above freezing. If product is frozen, bring to room temperature and agitate before use.

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MPower RX/Boost/Draft

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
MPower RX (PCP# 33520)	NewAgco Inc	Thifensulfuron methyl: 50% + tribenuron methyl: 25%	Water dispersible granules	320 g
Boost (PCP# 30377)	Nufarm Agriculture			
Draft (PCP # 31904)	Rotam North America	Thifensulfuron methyl: 50% + tribenuron methyl: 25%	Dry flowable	324 g

Crops, staging and rates

Apply when the cereals are in the 2-leaf to flag leaf (shot blade) stage of growth (prior to head emergence). For seedling or established grasses, apply when weeds are young and actively growing; no growth stage mentioned for grasses. **Rate:** MPower RX: 8 g/acre plus non-ionic surfactant (Agral 90, Agsurf, Citowett Plus, or Nufarm Enhance) at 0.2% v/v or 0.2 L per 100 L of spray solution.

Cereals	Seedling or established grasses for forages or seed production
Barley **Oats** **Wheat (spring, winter and durum)**	Meadow brome, smooth brome, creeping red fescue, tall fescue, orchard grass, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, tall wheatgrass, slender wheatgrass, streambank wheatgrass, northern wheatgrass, western wheatgrass
	Established grasses for forage or seed production: Kentucky bluegrass

Weeds and staging

Apply to emerged, young, actively growing weeds that are less than 10 cm tall or across.

Weeds controlled

- ball mustard
- chickweed
- common groundsel
- corn spurry
- cow cockle
- flixweed
- green smartweed
- hemp-nettle
- kochia
- lady's-thumb
- lamb's-quarter
- narrow-leaved hawk's-beard
- redroot pigweed
- Russian thistle
- shepherd's-purse
- stinkweed
- tartary buckwheat
- volunteer canola (excluding Group 2 tolerant)
- volunteer sunflower
- wild buckwheat (cotyledon to 3-leaf)
- wild mustard

Weeds suppressed

- Canada thistle (< 15 cm tall)
- cleavers (1 - 3 whorl)
- round-leaved mallow (2 - 6 leaf)
- scentless chamomile
- sow thistle (< 15 cm tall)
- stork's-bill (2 - 6 leaf)
- toadflax (< 15 cm tall)

Caution: Apply within 24 hours of mixing.

Registered tank mixes

Not all mixes are registered for all products.

Tank mix partner	Tank mix partner rate	Additional weeds controlled
Spring, winter and durum wheat, barley		
2,4-D Ester or Amine	MPower RX/Boost: 8 g/acre + non-ionic surfactant + 2,4-D 500: 340 - 445 mL/acre	Burdock (seedlings), cocklebur, false ragweed, giant ragweed, hare's-ear mustard, Indian mustard, prickly lettuce, Russian ragweed, tumble mustard, volunteer Group 2 tolerant canola
Spring wheat, winter and durum wheat, and barley		
MCPA	MPower RX/Boost: 8 g/acre +non-ionic surfactant + MCPA 500: 283 - 445 mL/acre	
Spring wheat (including durum) and barley		
Attain + surfactant**	MPower RX/Boost: 8 g/acre + Attain A: 121 mL/acre + Attain B: 202 mL/acre + Agral 90 or AgSurf: 0.2% v/v	

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Tank mix partner	Tank mix partner rate	Additional weeds controlled
Axial + Adigor	Boost: 8 g/acre + Axial: 162 - 243 mL/acre + Adigor: 283 mL/acre	Low rate: Persian darnel; high rate: wild oats, volunteer oats, green foxtail, yellow foxtail, volunteer canaryseed, proso millet
Axial + Adigor + MCPA Ester	Boost: 8 g/acre + Axial: 162 - 243 mL/acre + Adigor: 283 mL/acre + MCPA Ester 500: 227 - 283 mL/acre	Low rate: Persian darnel; high rate: wild oats, volunteer oats, green foxtail, yellow foxtail, volunteer canaryseed, proso millet
Spring wheat (excluding durum) and barley		
Curtail M + Surfactant	MPower RX/Boost: 8 g/acre + Curtail M: 0.61 L/acre + Surfactant: 0.2 % v/v	Control of listed weeds plus Canada thistle and wild buckwheat. Apply at 3-leaf to flag leaf stage of wheat and barley
Lontrel 360 + Surfactant	MPower RX/Boost: 8 g/acre + Lontrel 360: 84 mL/acre + Surfactant: 0.2 % v/v	
Lontrel 360 + 2,4-D + Surfactant	MPower RX/Boost: 8 g/acre + Lontrel 360: 84 mL + 2,4-D: 283 L/acre + Surfactant: 0.2 % v/v	Control of listed weeds plus Canada thistle, lady's-thumb, perennial sow thistle, stinkweed, volunteer canola, wild buckwheat, wild mustard, suppression of cleavers
Lontrel 360 + MCPA + Surfactant	MPower RX/Boost: 8 g/acre + Lontrel 360: 84 mL/acre + MCPA: 340 mL/acre + Surfactant: 0.2 % v/v	
Spring wheat only (excluding durum) not underseeded to legumes		
Everest + 2,4-D + Adjuvant	MPower RX/Boost: 8 g/acre + Everest: 17.3 g/acre + 2,4-D: 226 mL/acre + Agral 90: 0.25 % v/v	Wild oats (high infestations), green foxtail, tame oats
	MPower RX/Boost: 8 g/acre + Everest: 11.5 g/acre + 2,4-D: 226 mL/acre + Agral 90: 0.25 % v/v	Wild oats (low infestations), green foxtail, tame oats
Horizon 240 + Score	MPower RX/Boost: 8 g/acre + Horizon: 93 mL/acre. + Score: 0.8% v/v	Control of listed broadleaf weeds plus wild oats, green foxtail. Apply at 2-leaf to flag leaf of the crop
Spring wheat including durum		
Signal/Horizon 240EC + adjuvant	MPower RX/Boost: 8 g/acre + Signal/Horizon 240 EC: 93 - 117 mL/acre + adjuvant***	Wild oats with low rate of Signal/Horizon 240 EC, wild oats and green foxtail with high rate
Horizon 240 EC/Signal + MCPA adjuvant	MPower RX/Boost: 8 g/acre + Horizon/Signal: 93 mL/acre + MCPA: 340 - 445 mL/acre	Control of listed broadleaf weeds plus wild oats, green foxtail. Apply at 3-leaf to flag leaf of the crop

* **Note:** Check label for appropriate adjuvant product and amount for each herbicide product.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 22 L/acre minimum. **Caution:** Apply within 24 hours of mixing.

How it works

Absorbed through foliage. Inhibits cell development.

Expected results

Weed growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 to 3 weeks after application depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under stress. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and re-growth may occur.

Restrictions

Rainfall: Rainfall within 4 hours of application may lessen degree of weed control. **Grazing:** Barley, oats and wheat may be grazed or fed to livestock 7 days after application. **Re-cropping:** Do not plant to any crop until 2 months after application. **Maximum allowable application:** Do not exceed a total of 8 g/acre per crop year.
Re-entry interval: 12 hours.

Environmental precautions

Deploy/MPower RX are toxic to non-target terrestrial plants and aquatic organisms. Leave a 15-metre buffer zone between sprayed area and sensitive habitats.

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MPower RX/Boost/Draft (cont'd)

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in a cool, dry place.

Muster Toss-N-Go

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Muster (PCP# 23569)	FMC of Canada Limited	Ethametsulfuron-methyl: 75%	Dry flowable	320 g

320 gram package (4 x 80 gram water soluble pouches will treat 26.7 - 40 acres).

Crops, staging and rates

Crop	Staging	Rate
Canola, including rapeseed	2 leaf to beginning of bolting	Muster: 8 g/acre or 12 g/acre
Brown condiment mustard, oriental mustard	4 leaf to late rosette stage	Muster: 8 g/acre
Sunflower	2 - 8 leaf stage (14 - 45 cm in height)	Muster: 8 g/acre or 12 g/acre

Must use a surfactant with Muster. Use Agral 90, or Ag-Surf, or Super Spreader.

Caution: Application prior to the 2-leaf stage of canola or 4-leaf stage of brown condiment mustard and oriental mustard (condiment and oilseed types), or to sandy soil or low soil organic matter may increase the severity of injury.

Weeds, rates and staging
Apply from cotyledon to 6-leaf stage.

Rate: Muster: 8 g + non-ionic surfactant: 0.2% v/v.

flixweed (spring seedlings)
stinkweed (suppression) (1 - 4 leaf)
hemp-nettle
green smartweed
wild mustard

Rate: Muster: 12 g + non-ionic surfactant: 0.2% v/v.

Above weeds plus suppression of redroot pigweed and control of stinkweed.

Registered tank mixes

Tank mix partner	Muster + tank mix partner rate	Additional weeds controlled
Canola, brown and oriental mustard		
Assure II	Muster: 8 - 12 g/acre + Assure II: 150 - 200 mL/acre + SureMix: 0.5 % v/v	Grassy weeds (barnyard grass, green foxtail, quackgrass, volunteer cereals, wild oats) plus Muster susceptible weeds
Canola only		
Poast Ultra	Muster: 8 - 12 g/acre + Poast Ultra II: 130 - 190 mL/acre + Merge: 0.75 - 1.0% v/v	Grassy weeds (barnyard grass, green foxtail, quackgrass, volunteer cereals, wild oats) plus Muster susceptible weeds

FMC supports the following mixes that are not on the Muster label. Apply mixes according to the most restrictive use limitations for either product. Assure II + Lontrel, Lontrel, Lontrel + Poast. Assure II in sunflower. Check with each manufacturer for the products, rates and weeds they support.

Application information
With: Apply with ground sprayers. Do not apply by air. **Water volume:** 40 L/acre.

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Application tips
Good growing conditions enhance the activity of Muster following maximum foliar uptake and contact activity. Weed regrowth may occur in thin stands and where crops suffer from reduced vigour and under poor growing conditions. Apply before the crop canopy prevents thorough coverage of the small target weeds.

How it works
Absorbed by foliage and roots. Inhibits cell elongation.

Expected results
Muster is an ALS inhibitor herbicide and thus rapidly inhibits the growth of susceptible weeds; however, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application depending upon growing conditions and weed susceptibility. Degree of control and duration of effect depend on weed sensitivity, weed size, growing conditions, and spray coverage. Regrowth may occur if crop competitiveness is impaired by thin stands and/or reduced vigour or if weeds have hardened off from cold weather or drought.

Restrictions
Rainfall: Rainfall 4 to 6 hours after application may reduce effectiveness. Environmental conditions that slow the drying of Muster on the foliage, such as high relative humidity, cool air temperature or cloud cover, may increase the time required. **Re-entry interval:** 12 hours. **Grazing:** Do not graze or feed crop to livestock within 60 days of treatment. **Pre-harvest intervals:** Do not harvest within 60 days of treatment. **Re-cropping:** See chart on next page.

10 months	Spring wheat, durum wheat, barley, oats, flax
22 months	Canola, lentil, pea, faba bean, tame mustard, alfalfa, canary grass, dry bean, fescue, red clover
All other crops, field bioassay at 22 months to ensure no carryover damage	

Wherever Muster is used on land previously treated with Ally herbicide, read the rotational guidelines on both labels and follow the label with the longest interval stated for your situation.

Environmental precautions
Muster Toss-N-Go is toxic to aquatic organisms and non-target terrestrial plants. Muster is water soluble and mobile in the soil.

Toxicity
Acute oral LD_{50} (rats) > 5,000 mg/kg.

Storage
Store in a cool, dry place.

Navius® FLEX Herbicide/TruRange® Herbicide

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Navius® FLEX (PCP# 30922)	Bayer	Metsulfuron-methyl: 12.6% Aminocyclopyrachlor: 39.5%	Wettable granule	1.36 kg
TruRange® (PCP # 33964)	Bayer	Metsulfuron-methyl: 12.6% Aminocyclopyrachlor: 39.5%	Wettable granule	1.361 kg

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Crops, staging and rates

For use in rangeland and non-crop areas. Use the appropriate rate for the target weed(s). Do not apply more than a total of 202 g/acre per season.
Rate: Navius FLEX – 67.6 - 202 g/acre. TruRange – 67.6 - 202 g/acre.

Navius FLEX/TruRange: Weeds controlled at 67.6 g/acre. Mix with non-ionic surfactant at 0.25% v/v or Merge adjuvant or crop oil concentrate at 1.0% v/v.

Weeds controlled

annual sowthistle
ball mustard
bluebur
Canada goldenrod*
Chickweed
common groundsel
common tansy
common yarrow
corn spurry
cow cockle
dandelion
diffuse knapweed
flixweed
giant buttercup*
giant hogweed* (up to 4-leaf)
green smartweed
hemp-nettle
kochia
lady's-thumb
leafy spurge
Norwegian cinquefoil*
orange hawkweed
ox-eye daisy
perennial sow thistle
prostrate pigweed
redroot pigweed
Russian thistle
scentless chamomile
shepherd's-purse
spotted knapweed
stinkweed
stork's-bill
sumac (smooth, staghorn)
sweet clover (white, yellow)
tartary buckwheat
volunteer canola (except Group 2 tolerant)
western snowberry
white cockle
wild carrot
wild mustard
wild rose
yellow starthistle

* Season-long control.

Weeds suppressed

lamb's-quarter
toadflax
wild buckwheat

Navius FLEX/TruRange: Species controlled at 135 g/acre. Mix with non-ionic surfactant at 0.25% v/v or Merge adjuvant or crop oil concentrate at 1.0% v/v.

Tree species	Maximum height
Black tupelo	< 1 metre
Balsam fir, Douglas fir, black spruce, Norway spruce, white spruce	< 2 metres
Manitoba maple (box elder), red maple, sugar maple, common sassafras, green ash, white ash, plains cottonwood, balsam poplar, black poplar, sandbar/ditchbank willow, yellow poplar, large pussy willow, tree of heaven, hackberry	< 2.5 metres
Black cherry, chokecherry, pin cherry, trembling aspen	< 3 metres

Vine species
Dog-strangling vine

Navius FLEX/TruRange: Species controlled at 202 g/acre. Mix with non-ionic surfactant at 0.25% v/v or Merge adjuvant or crop oil concentrate at 1.0% v/v.

Tree species	Maximum height
Bitternut hickory, pignut hickory	2 metres
Black oak, northern red oak	2.5 metres
Eastern white pine, jack pine, red pine, western white pine	< 2 metres
Balsam fir, Douglas fir, black spruce, Norway spruce, white spruce	2 - 3 metres

Invasive species management: Navius FLEX has either been demonstrated to be efficacious on the invasive weed species listed below or on closely related weed species.
Common crupina (*Crupina vulgaris*), Iberian starthistle (*Centaurea iberica*) , South African ragwort (*Senecio inaequidens*), yellow starthistle (*Centaurea solstitialis*)

Application information

How to Apply: Ground or aerial application. **Water Volume:** Ground – Broadleaf weeds – 80 L/acre. Brush species – 202 L/acre. Brush/woody plants up to 2.5 metres in height (unless otherwise indicated) – up to 810 L/ac.
Aerial – 12-20 L/acre.

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Application tips

For best results, applications of Navius should be made when brush species and weeds are actively growing. Complete coverage of all foliage and stems is required for brush control. Applications should be made after the target species have leafed out, but before fall colouration has begun. Do not treat brush species that exceed 2.5 metre in height (unless otherwise indicated) or control may be decreased. Apply to brush species as a full coverage spray to foliage and stems using equipment that will ensure uniform coverage.

How it works

The most noticeable symptom is a bending and twisting of stems and leaves. Other advanced symptoms include severe chlorosis, necrosis, stem thickening, growth stunting, leaf crinkling, calloused stems and leaf veins, leaf-cupping and enlarged roots.

Restrictions

Rainfall: Navius FLEX/TruRange - rainfast in 4 hours. **Grazing:** There are no grazing or haying restrictions for non-lactating or lactating animals (including cattle, horses, sheep, and goats) when products are used as directed. Grazing animals do not have to be moved off the pasture or rangeland before, during or after applying these products. Aminocyclopyrachlor passes through an animal's digestive tract and is excreted in urine and manure at levels that may cause injury to susceptible plants. Do not transfer grazed animals from areas treated with Navius FLEX/TruRange to areas where sensitive crops occur without first allowing 3 days of grazing on untreated areas. **Re-cropping:** If rangeland or pasture or non-crop sites treated with Navius FLEX/TruRange are to be converted to a food, feed or fiber agricultural crop, or to a horticultural crop, a field bioassay should be completed before planting the desired crop. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants including coniferous and deciduous trees. Observe buffer zones specified on the product labels.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} = >5000 mg/kg

Storage

Store product in original container only, away from other pesticides, fertilizer, food or feed.

Ninja Master

Groups 1, 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Ninja Master co-pack of: Ninja (PCP# 32995) + Independence (PCP# 32851)	NewAgco Inc	Imazamox 35% + Imazethapyr 35%	Water dispersible granules	692 g
		Clethodim: 240 g/L	Emulsifiable concentrate	8 L

Note: Ninja Master requires a surfactant. **Assassin or Merge surfactant is sold separately.**

Crops, staging and rates

Crop	Stage	Rates
Field peas	1 - 6 true leaf	17.3 g/acre Imazamox + Imazethapyr, 0.15 L/acre clethodim Requires Assassin or Merge surfactant at 5 L/1000 L spray solution

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Ninja Master (cont'd)

Weeds, sates and staging

Broadleaf weeds: all weed cotyledon to 4-leaf stage unless otherwise noted

chickweed[1,2]	hemp-nettle[2]	shepherd's-purse[2]	volunteer canola[3]
cleavers[1,2]	kochia[1,2]	stinkweed[2]	volunteer tame mustard
flixweed	lamb's-quarter[1]	stork's-bill	wild buckwheat
green smartweed	redroot pigweed		

Note: [1] Suppression [2] Not including group 2 resistant biotypes [3] Not including Group 2 tolerant varieties [4] Not including Group 1 resistant biotypes.

Grassy weeds: 2 - 6 leaf stage unless noted otherwise

crabgrass (large and smooth)	quackgrass[1]	volunteer cereals	wild oats
green foxtail	Persian darnel	volunteer corn	witch grass
fall panicum	proso millet	volunteer canary grass	yellow foxtail

Application information

Apply with ground equipment only. **Water volume:**10 gallons/acre (40 L/acre).

Application tips

Early application is critical; weeds must be emerged but less than 4-leaf stage for optimum control. Use higher water volumes for dense weed populations and thick crop canopies.

How it works

Imazamox 35% + Imazethapyr 35% component is absorbed by foliage and roots and disrupts plant metabolism causing growth to stop. Clethodim is a systemic herbicide that translocates from treated foliage to the growing points of leaves, shoots and roots, causing growth to stop within 48 hours and causing plant yellowing and death within several weeks.

Expected results

Typical symptoms (yellow striping and discolouration at the growing point) may not be noticeable for several days to 2 weeks. Do not apply if temperatures of 5˚C or lower are forecast within 3 days of application. Crop injury or yellowing may occur if using when cold. Crop injury or poor weed control may occur when plants are stressed. The Imazamox + Imazethapyr component can be persistent in soil, especially under drought, extremes in soil pH and excessive cold. Do not grow Liberty Link® or Roundup Ready® canola the year after application of Ninja Master.

Restrictions

Rainfall: 3 hours. **Grazing:** Treated fields may be fed to livestock 30 days after application. Do not harvest forage or cut hay for forage. Harvest treated crops 60 days of application. **Re-cropping:** 1 year after application – barley, canary seed, chickpeas, Group 2 tolerant® canola, Group 2 tolerant lentil, durum wheat, field pea, spring wheat, tame oats. Conduct a field bioassay the year before growing any crop other than those listed above. For the Peace River region, wait a minimum of 3 years and perform a field bioassay prior to planting canola. **Environmental precautions:** TOXIC to non-target terrestrial and aquatic plants. Observe buffer zones on component product labels. **Runoff:** Prevent runoff into susceptible area. **Leaching:** Leaching may occur in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow. **Re-entry interval:** 12 hours.

Toxicity

Oral LD_{50} (rats) = 5,000 mg/kg.

Storage

Keep from freezing. Store above 5°C.

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Nortron® SC Herbicide

Group 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Nortron® SC (PCP# 17293)	Bayer	Ethofumesate: 480 g/L	Suspension concentrate	10 L

Crops, staging and rates

Fall: Apply before ground freezes. Apply in a band on the soil surface.

Spring: Apply before seeding and shallowly (2.5 - 5 cm) incorporate or pre-emergence.

Crop	Soil type	Method of application	
		Broadcast	18 cm band/55 cm row
Sugar beet	Light soils	1.38 - 1.83 L/acre	0.40 - 0.64 L/acre
	Medium soils (< 3 % OM)	1.83 - 2.73 L/acre	0.64 - 0.91 L/acre
	Heavy soils (> 3% OM)	2.73 - 3.32 L/acre	0.91 - 1.13 L/acre

Weeds and staging

Pre-emergence

- barnyard grass
- foxtail
- kochia
- lady's-thumb
- lamb's-quarter
- purslane
- redroot pigweed
- Russian thistle (suppression)
- shepherd's-purse
- volunteer barley
- volunteer oats
- volunteer wheat
- wild buckwheat (suppression)
- wild oats

Registered tank mixes

Tank mixes only on medium textured soils with an organic matter content < 3%. Do not use this mix on high organic soils or soils with sandy, loam sand or sandy loam soils.

Application information

With: May be applied with ground equipment. Do not apply by air. **Water volume:** 44 - 222 L/acre.

Application tips

Apply Nortron before or at planting time and incorporate into the soil to a depth of 2.5 - 5 cm. Deeper incorporation may reduce effectiveness. Nortron may be applied pre-emergence at the time of planting or shortly after, but prior to weed emergence.

Incorporation equipment: Hooded-power or ground-driven rotary tillers, rolling cultivators and harrows are most effective for incorporating Nortron into the soil. Do not apply Nortron through soil injector shanks. All existing vegetative growth should be thoroughly worked into the soil before treatment. Do not allow spray mixture to stand in tank overnight.

How it works

Uptake of ethofumesate occurs primarily via the emerging shoot as it passes upwards through treated soil. However, for certain broadleaf species, root uptake is more important. Ethofumesate is non-volatile, and in all cases, uptake occurs from aqueous solution.

Expected results

Ethofumesate applied pre-plant incorporated with proper activation will normally not permit weed emergence. If emergence should occur, uptake has occurred; seedling will show loss of vigour and eventual death.

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Restrictions

Rainfall: Normally 1.5 cm of rainfall is sufficient to activate Nortron. In areas where moisture can be marginal, incorporation is recommended. **Grazing:** Do not graze the treated crops or cut for hay; there are not sufficient data available to support such use. **Re-cropping:** Do not rotate with any crops other than sugar beets for 12 months after application. Thorough tillage should precede the planting of crops other than sugar beets. If crop is lost due to climatic or soil conditions following application of Nortron, do not plant crops other than sugar beets in Nortron-treated land during the same season. **Re-entry interval:** 12 hours.

Do not retreat field with Nortron. Wheat and barley may be injured if planted following a dry sugar beet year.

Environmental precautions

Nortron/Etho SC is toxic to aquatic organisms and non-target plants. Observe buffer zones of 1 metre for sensitive habitats.

Toxicity

Acute oral LD_{50} (rats) > 2,100 mg/kg.

Storage

Do not use or store near heat or open flames. Store Nortron in a cool place, above 0°C.

OcTTain XL/IPCO OcTTain XL/Co-op OcTTain XL

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
OcTTain XL (PCP# 30077)	Corteva Agriscience	Fluroxypyr: 90 g a.e./L 2,4-D ester: 360 g ae/L	Emulsifiable concentrate	9 L 108 L 576 L
IPCO OcTTain XL (PCP # 33891)	IPCO			
Co-op OcTTain XL (PCP # 33892)	IPCO			

Crops, staging and rates

Crop	Soil type	Rate
Barley and spring wheat (including durum)	4-leaf to flag leaf	450 mL/acre
Winter wheat (spring application)	3-tiller to just before flag leaf	
Seedling and established grasses* (seed production only): creeping red fescue, meadow bromegrass, timothy, crested wheatgrass, intermediate wheatgrass, smooth bromegrass, tall fescue	2 - 4 leaf	

* Seedling and established grasses for seed production registered under the user requested minor use registration.
Corteva Agriscience/IPCO assumes no responsibility with respect to performance and/or crop tolerance.
For OcTTain XL only: Rangeland, permanent pasture, industrial and other non-crop areas: For post emergent control of kochia, including ALS resistant biotypes, in non-cropland areas (including roadsides, right-of-ways, permanent grass covered areas, and industrial vegetation management areas). **Rate:** 1.24 L/acre.

Weeds and staging

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Weed stage: 2 - 4 leaf stage, unless otherwise noted

Weeds controlled

bluebur	field horsetail**	plantain	sunflower, annual
burdock	goat's-beard	prickly lettuce	vetch
canola, volunteer	hemp-nettle*	ragweed	wild buckwheat (1 - 6 leaf)
cleavers (1 - 8 whorl)*	hoary cress**	round-leaved mallow (1 - 6 leaf)	wild radish
clover, sweet	kochia*	shepherd's-purse	volunteer flax (1 - 12 cm)
cocklebur	lamb's-quarter	stork's-bill	
flixweed	mustards (except green tansy, dog and grey tansy)	stinkweed	

* Including biotypes resistant to Group 2 herbicides.
** Top growth control only.

Weeds suppressed

chickweed (up to 8 cm)*	perennial sow thistle	redroot pigweed

Weeds controlled or suppressed with the addition of 80 mL/acre of 2,4-D LV ester 700 herbicide

annual sow-thistle†	docks	eafy spurge (top growth)	Russian thistle
blue lettuce (top growth)	field bindweed (top growth)	oak leaved goosefoot	smartweed/lady's-thumb
Canada thistle (top growth)†	field peppergrass	perennial sow-thistle (top growth)†	tansy mustard
chickweed (up to 8 cm)*†	gumweed	redroot pigweed	tartary buckwheat
dandelion (spring rosettes)	hairy galinsoga		wild buckwheat (1 - 8 leaf)
dog mustards	hedge bindweed		

* Including biotypes resistant to Group 2 herbicides.
† Suppression.

Registered tank mixes

Follow the most restrictive use limitations on the label for either product in tank mix

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Adjuvant rate
Achieve Liquid*	Barley, spring wheat, durum wheat	0.2 L/acre	Carrier at 0.50% v/v
Everest 3.0	Spring wheat, durum wheat	39 - 58 mL/acre	Non-ionic surfactant: 0.25% v/v
Horizon, Signal, Foothills**	Spring wheat, durum wheat	93 mL/acre	Score: 0.8% v/v
Simplicity or Simplicity GoDRI***	Spring wheat, durum wheat	Simplicity: 0.15 - 0.20 L/acre Simplicity GoDRI: 21-28 g/acre	Bindem Utility Modifier at 60 mL/acre

* Add 7% ammonia (Finish) at 0.25% v/v prior to mixing. In addition, if spray water bicarbonates exceed 400 ppm add ammonium sulphate at 1% v/v prior to mixing.

** A reduction in wild oat control may occur.

*** The low rates of Simplicity/Simplicity GoDri is a registered use when wild oat populations are less than 75 wild oat plants /m2.

Application information

How to Apply: Ground or aerial application. **Water Volume:** Ground – 20 - 40 L/acre. Aerial – 12 - 20 L/acre.

Application tips

Herbicide activity is influenced by weather. Optimum activity requires active crop and weed growth. Temperature range for best results will be 8ºC to 24ºC. Frost 72 hours before or after application many reduce weed control and crop tolerance.

How it works

Systemic broadleaf herbicide activity. When applied to foliage the components move within the plant to control above and below ground plant tissues. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

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Expected results

Broadleaf weeds start to twist shortly after application. After twisting and bending, plants stop growing, turn brown and die.

Restrictions

Rainfall: Do not apply if rainfall is expected within 1 hour. **Grazing:** Do not permit lactating dairy cows to graze fields within 7 days of application. Withdraw meat animals from treated fields 3 days prior to slaughter
Re-cropping: Fields treated with OcTTain XL herbicide can be seeded the following year to alfalfa, barley, corn, dry beans, canola, flax, forage grasses, lentils, mustard, oats, pea, potato, rye, soybean, sugar beet, sunflower and wheat.

Pre-harvest Intervals: Do not harvest the treated crop within 60 days after application. Do not harvest forage or cut for hay within 30 days after application. **Re-entry interval:** 12-hours.

Environmental precautions

Toxic to aquatic organisms, birds, small wild mammals and non-target terrestrial plants. Observe the largest (most restrictive) buffer zone on label between the point of application and the closest downwind side of sensitive habitat. Avoid sites with characteristics which could lead to run-off or leaching (sandy soil or shallow water table).

Toxicity

Fluroxypyr: Acute oral LD_{50} = >2000 mg/kg. **2,4-D:** Acute oral LD_{50} = technical 639-764 mg/kg.

Storage

Store in a secure, dry heated area. If product is frozen, bring to room temperature and agitate before using.

Odyssey/Odyssey NXT/Duet/Ninja/Judo

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Duet (PCP# 32659)	Loveland Products Canada Inc	Imazamox: 35% + imazethapyr: 35%	Water dispersible granules	86.5 g
Odyssey (PCP# 25111)	BASF Canada			86.5 g
Odyssey NXT (PCP# 32303)				2 x 696 g jugs + 2 x 8.1 L jugs of Merge
Ninja (PCP# 32995)	NewAgco Inc			692 g
Judo (PCP # 33949)	Sharda Cropchem Ltd			86.5 g

Note: Odyssey/Duet/Ninja must be applied with Merge 0.5% v/v. The surfactant is not included in the package. Odyssey NXT includes the surfactant.

Crops, staging and rates

Crop	Stage	Rate
XCEED (*Brassica juncea)*	2 - 6 leaf stage	Odyssey/Ninja: 17.2 g/acre + Merge: 0.5% V/V (5.0 L/1,000 L spray solution)
CLEARFIELD tolerant lentil	1 - 9 above ground nodes (1 - 9 leaf) lentil	
Field pea*	1 - 6 above ground nodes (1 - 6 leaf) field pea	

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Crop	Stage	Rate
Fenugreek (seed production)	1 - 4 leaf	Odyssey: 17.2 g/acre + Merge: 0.5% V/V (5.0 L/1,000 L spray solution)
Alfalfa (seedling or established grown for seed)		
Bird's-foot trefoil (seed production)		
Soybean	1 - 3 true leaves	
Faba bean	1 - 6 leaf stage	

* Ninja only registered on field pea.

Weeds, rates and staging

Grasses: 1 to 4 main stem leaves, until tillers are visible.

Broadleaf weeds: Cotyledons to 4-leaf stage, unless otherwise stated.

Grassy weeds

barnyard grass
green foxtail
Persian darnel
volunteer barley
volunteer oats
volunteer wheat (except Group 2)
wild oats

Broadleaf weeds

chickweed
cleavers (up to 4 whorls)
flixweed
green smartweed
hemp-nettle*
lamb's-quarter**
redroot pigweed
Russian thistle***
shepherd's-purse
stinkweed
stork's-bill
volunteer canola (non-Group 2 tolerant canola only)
volunteer tame mustard (not XCEED varieties)
wild buckwheat*
wild mustard

* Suppression in field peas and Group 2 tolerant lentil. ** Suppression in field peas, Group 2 tolerant lentils, and Group 2 tolerant canola.
*** Suppression in Group 2 tolerant lentil.

Registered tank mixes

Tank mix partner	Odyssey + tank mix partner rate	Additional weeds controlled
Field pea, CLEARFIELD lentil, Group 2 tolerant canola, faba bean and soybean		
Poast Ultra	Odyssey: 17.3 g/acre + 129 - 190 mL/acre Poast Ultra	Japanese bromegrass, green foxtail, quackgrass suppression, volunteer corn, volunteer wheat, yellow foxtail

* Apply when Canada thistle plants are actively growing. Lontrel at 169 mL/acre will provide top growth control of Canada thistle for 6 to 8 weeks, while the 226 mL/acre rate will provide season long control of top growth. NewAgco supports the following mixes: Clobber, Independence, Centurion, Poast.

Application information

With: Apply with ground equipment only. **Water volume:** 40 L/acre.

Application tips

Water soluble bags will dissolve better when kept intact; do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Odyssey/Duet/Ninja if temperatures of 5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5°C) will prevent optimum herbicide performance, as weeds are not actively growing. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield. Use 50 mesh or coarser filter screens.

How it works

Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions. Residual activity of small seeded, shallow germinating flushing weeds (not wild oats) expected until crop flowering. Moist conditions result in better residual control.

Expected results

Susceptible weeds stop growing within 24 to 48 hours. Yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 to 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 to 3 weeks.

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Restrictions

Rainfall: Do not apply if rain is expected in 3 hours. **Grazing:** Do not graze treated XCEED canola or cut for hay; sufficient data are not available to support such uses. Field pea treated with Odyssey/Duet/Ninja may be fed to livestock 30 days after application. **Pre-harvest intervals:** After 60 days, bird's-foot trefoil, canola, field pea, fenugreek (for seed uses only) and lentils can be harvested. Only apply Odyssey/Duet/Ninja once per year. **Re-cropping (Odyssey/Odyssey NXT only):** Barley, CLEARFIELD canola, chickpea, field corn, field pea, lentil (including CLEARFIELD lentils), oats, soybean, spring wheat and XCEED can be grown safely the year following an application. Canary Seed and durum wheat may be grown safely 2 years following an Odyssey application. Research studies have shown that flax, non-CLEARFIELD tolerant canola and non-CLEARFIELD tolerant sunflower may be safely planted 2 years following an Odyssey application in all regions of Western Canada except the Peace River Region of Alberta and British Columbia. In the Peace River Region, wait a minimum of 3 years and perform a field bioassay the year prior to planting non-CLEARFIELD canola. WARNING: Certain environmental conditions may delay the breakdown of herbicide residues in soil. These conditions include but are not limited to drought, extremes in soil pH (less than 6.5), low organic matter soils (less than 3%), extremely coarse textured (sandy) soils, and excessive cold. Under these conditions, the level of phytotoxic herbicide residues present in the field the season following an application may result in an increased potential for injury to succeeding crops to occur. This potential for increased residues under these environmental conditions is not unique to any specific herbicide or herbicide group but is a property of those herbicides which persist in the soil and are dependent on soil microbial activity and other non-microbial processes (e.g. hydrolysis) to breakdown.

If drought conditions are experienced between June 1 and September 1 in the year of application, delay planting of tame oats by an additional year. If drought conditions are experienced between June 1 and September 1 in the year of application, OR between June 1 and September 1 in the year following application, delay planting of canola (non-Clearfield) by an additional year.

In the grey, black, and dark brown soil zones, drought is defined as less than 125 mm of total precipitation between June 1 and September 1. In the brown soil zone, drought is defined as less than 125 mm of total precipitation between June 1 and September 1, OR less than 15 mm of precipitation in any month between June 1 and September 1. **For other crops, call BASF at 1-877-371-2273. Conduct a field bioassay the year before growing any crops other than those listed above. In case of crop failure, replant only to** CLEARFIELD tolerant **canola or field pea. Re-entry interval:** 12 hours.

Environmental precautions

Odyssey/Duet/Ninja is highly toxic to non-target plants. A buffer zone of 14 metres is required between sprayed area and sensitive habitat.

Toxicity

Acute oral LD_{50} (rats) = 5,000 mg/kg.

Storage

Store at temperatures above 5°C. Keep unused water soluble bags in resealed, original container. Keep packages dry at all times.

Odyssey Ultra/Odyssey Ultra NXT

Group 1, 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Odyssey Ultra A (PCP# 31353)/ Odyssey Ultra NXT A (PCP# 32305)	BASF Canada	Imazamox: 35% + imazethapyr 35%	WDG	86.5 g, 692 g
Odyssey Ultra B (PCP# 31354)/ Odyssey Ultra NXT B (PCP #32304)		Sethoxydim: 450 g/L	EC	6.16 L
Merge (PCP# 24702)		Surfactant blend: 50%		8.1 L

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1 case of Odyssey Ultra and Odyssey Ultra NXT treats 40 acres.

Note: The Merge surfactant is included in the package.

Crops, staging and rates

Crop	Stage	Rate
CLEARFIELD tolerant lentils	1 - 9 above ground nodes (1 - 9 leaf) CLEARFIELD tolerant lentil	Odyssey Ultra A: 17 g/acre + Odyssey Ultra B: 154 mL/acre + Merge: 0.5% v/v (5.0 L/1,000 L spray solution)
Field pea	1 - 6 above ground nodes (1 - 6 leaf)	
XCEED canola	2 - 6 leaf stage	
Faba bean	1 - 6 leaf stage	
Soybean	1 - 3 true leaf	

Weeds and staging

Grasses: 1 to 6 main stem leaves, including 2 tillers.

Broadleaf weeds: Cotyledons to 4-leaf stage, unless otherwise stated.

Grasses

barnyard grass
crabgrass
fall panicum
green foxtail
Persian darnel
quackgrass (suppression 2 - 5 leaf)
volunteer barley, oats and wheat (including Group 2 tolerant varieties)
volunteer corn
wild oats
witchgrass
yellow foxtail

Broadleaf weeds

chickweed
cleavers (up to 4 whorl)
flixweed
green smartweed
hemp-nettle*
kochia**
lamb's-quarter***
redroot pigweed
Russian thistle****
shepherd's-purse
stinkweed
stork's-bill
volunteer canola (non-Group 2 tolerant canola only)
volunteer tame mustard (not XCEED varieties)
wild buckwheat*
wild mustard

* Suppression in field peas and Group 2 tolerant lentil. ** Note: 90% of surveyed fields in Alberta have Group 2 herbicide resistant kochia. Assume kochia in your field is resistant and another herbicide group will need to be used to control kochia. Not controlled in Group 2 tolerant lentils; suppression in field pea and Group 2 tolerant canola. *** Suppression in field pea, Group 2 tolerant lentils and Group 2 tolerant canola. **** Suppression in Group 2 tolerant lentils.

Registered tank mixes

Can be mixed with Poast Ultra for control of quackgrass and fall germinated Japanese brome.

Application information

With: Apply with ground equipment only. **Water volume:** 40 L/acre.Use 50 mesh or coarser filter screens.

Application tips

Water soluble bags will dissolve better when kept intact; do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Odyssey Ultra if temperatures of 5ºC or lower are forecast within 3 days of application. Temperatures near freezing (below 5ºC) will prevent optimum herbicide performance. Apply when weeds are small and actively growing. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield.

How it works

Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions. Residual activity of small seeded, shallow germinating flushing weeds (not wild oats) expected until crop flowering. Moist conditions result in better residual control.

Expected results

Odyssey causes susceptible weeds to stop growing within 24 to 48 hours. Yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 to 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 to 3 weeks. Sethoxydim is a systemic herbicide that causes growth to cease within 48 hours. Young leaves will turn yellow within 5 to 10 days and some grasses will then turn reddish. Necrotic spots will form on grass leaves.

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Restrictions

Rainfall: Do not apply if rain is expected within 3 hours. **Grazing:** Do not graze treated peas 60 days after application. **Pre-harvest intervals:** After 60 days, field pea, CLEARFIELD canola and Group 2 tolerant lentils can be harvested. **Re-cropping:** Re-cropping: Barley, CLEARFIELD canola, chickpea, , field corn, field pea, lentil (including CLEARFIELD lentils), oats, soybean, spring wheat and XCEED can be grown safely the year following an application. Canary seed and durum wheat may be grown safely 2 years following an Odyssey application. Research studies have shown that flax, non-CLEARFIELD tolerant canola and non-CLEARFIELD tolerant sunflower may be safely planted 2 years following Odyssey applications in all regions of Western Canada except the Peace River Region of Alberta and British Columbia. In the Peace River Region, wait a minimum of 3 years and perform a field bioassay the year prior to planting non-CLEARFIELD canola.

WARNING: Certain environmental conditions may delay the breakdown of herbicide residues in soil. These conditions include but are not limited to drought, extremes in soil pH (less than 6.5), low organic matter soils (less than 3%), extremely coarse textured (sandy) soils, and excessive cold. Under these conditions, the level of phytotoxic herbicide residues present in the field the season following an application may result in an increased potential for injury to succeeding crops to occur. This potential for increased residues under these environmental conditions is not unique to any specific herbicide or herbicide group but is a property of those herbicides which persist in the soil and are dependent on soil microbial activity and other non-microbial processes (e.g. hydrolysis) to breakdown.

If drought conditions are experienced between June 1 and September 1 in the year of application, delay planting of tame oats by an additional year. If drought conditions are experienced between June 1 and September 1 in the year of application, OR between June 1 and September 1 in the year following application, delay planting of canola (non-Clearfield) by an additional year. In the grey, black, and dark brown soil zones, drought is defined as less than 125 mm of total precipitation between June 1 and September 1. In the brown soil zone, drought is defined as less than 125 mm of total precipitation between June 1 and September 1, OR less than 15 mm of precipitation in any month between June 1 and September 1.

For other crops, call BASF at 1-877-371-2273. Conduct a field bioassay the year beforegrowing any crops other than those listed above. In case of crop failure, replant only to CLEARFIELD tolerantcanola or field pea

Re-entry interval: 12 hours.

Environmental precautions

DO NOT contaminate water supplies or aquatic habitats by application or cleaning of equipment or disposal of wastes.

Toxicity

Acute oral LD_{50} (rats) = 5,000 mg/kg.

Storage

Store at temperatures above 5°C. Keep unused water soluble bags in resealed, original container.

Olympus® Herbicide

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Olympus® (PCP# 32755)	Bayer	Propoxycarbazone-sodium: 70%	Wettable granule	463 g

Crops, staging and rates

Crop	Staging	Rate
Spring, durum and winter wheat	Pre-plant or post-plant pre-emergence	5.8 g/acre of Olympus + glyphosate* at 180 g ae/acre - 360 g ae/acre

* Present as isopropylamine, dimethylamine, mono-ammonium, diammonium, trimesium or potassium salt.

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Weeds, rates and staging

Weeds controlled up to 15 cm in height; rate of 5.8 g/acre Olympus + glyphosate* at 180 - 360 g ae/acre

barley, volunteer	hemp-nettle	Russian thistle
cleavers	kochia	stinkweed
downy brome	lady's-thumb	wheat, volunteer
flax, volunteer	lamb's-quarter	wild mustard
flixweed	Persian darnel	wild oats
giant foxtail	redroot pigweed	

Weeds controlled (less than 8 cm in height); 5.8 g/acre of Olympus + glyphosate* at 180 g ae/acre - 360 g ae/acre

Canada fleabane	common ragweed	wild buckwheat (less than 3-leaf stage)

Weeds controlled (other staging); 5.8 g/acre of Olympus + glyphosate* at 180 g ae/acre to 360 g ae/acre

volunteer canola (1 - 4 leaf stage)	Japanese brome (2-leaf stage)

* Present as isopropylamine, dimethylamine, mono-ammonium, diammonium, trimesium or potassium salt.

Registered tank mixes

Olympus must be applied with glyphosate at 180 - 360 g active ingredient/acre.

Application information

Water Volume: Ground – minimum 20 L/acre. Aerial – minimum 10 L/acre.

Application tips

Nozzles and pressure: For more consistent control of subsequent flushes of foxtail barley, volunteer canola, downy brome and Japanese brome, follow an application of Olympus + glyphosate with an in-crop application of Varro. Refer to Varro label for additional weeds controlled.

Restrictions

Rainfall: Rainfall within 4 hours may reduce control. **Re-entry interval:** 12 hours. **Pre-harvest interval:** Leave 71 days between application and harvest. **Grazing:** Must not be grazed or fed to livestock for 71 days after treatment. **Re-cropping:** Wheat – immediately. Barley, canola, lentils, field pea – 10 months. Soybean, dry bean – 11 months. Oats, flax – 12 months.

Toxicity

Acute oral LD_{50} (rat) > 2,000 ppm.

Storage

Store in a cool, dry place.

Paradigm PRE

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Paradigm PRE (PCP# 31304)	Corteva Agriscience	Halauxifen: 20% Florasulam: 20%	Wettable granule	600 g

Crops, staging and rates

Paradigm herbicide is applied at the following rates with a minimum 180 g ai/acre of any glyphosate product.

Crop	Stage	Rates
Barley, durum, winter or spring wheat and oat	Pre-seed burndown prior to planting	7.5 g per acre

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Paradigm PRE (cont'd)

Crop	Stage	Rates
Barley, durum, winter or spring wheat and oat	Post-harvest weed control prior to planting	10 g per acre

Weeds and staging

Weeds controlled when applied post harvest or pre-seed.

Paradigm PRE is not intended to be applied alone. Will control the following weeds at plus those controlled with glyphosate at 180 g ai/acre. Refer to glyphosate section of this guide.

wild buckwheat (1 - 2 leaf)
volunteer canola
chickweed (1 - 8 leaf)
cleavers (up to 9 whorl)
dandelion**
Canada fleabane***
flixweed
hemp nettle
kochia*
lamb's-quarter (1 - 8 leaf)
wild mustard
narrow-leaved hawk's-beard***
redroot pigweed (1 - 8 leaf)
common ragweed***
shepherd's purse
smartweed (1 - 8 leaf)
stinkweed
Russian thistle
stork's-bill

* 10 g per acre rate. ** Seedling and spring rosettes up to 15 cm diameter for mature plants up to 30 cm in diameter use the 10 g per acre rate.

***Less than 8 cm in height.

Weeds suppressed when applied post harvest or pre-seed

annual sow-thistle*
perennial sow-thistle*
white cockle*(spring seedlings and over-wintered plants up to the bud stage)

* 10 g per acre rate.

Registered tank mixes

Glyphosate.

Additional Glyphosate rates

Glyphosate rate Total active ingredient/acre	Additional weeds controlled
270 g ai/ acre	narrow-leaved hawk's-beard (8 - 15 cm)
330 g ai / acre	Crabgrass, annual blue grass, prickly lettuce, annual sow thistle
360 g ai/ acre	Foxtail Barley (light to moderate infestations); Quackgrass (light to moderate infestations); Canada thistle (rosette stage) †; Toadflax (vegetative stage chemfallow) ‡
690 - 1018 g ai/acre	Quackgrass (Long term control and heavy infestations); Foxtail Barley (heavy infestation or when plants are under stress); Canada Thistle (bud stage or beyond) ‡

† Allow 5 or more days after treatment before tillage; ‡ Allow 10 or more days after treatment before tillage.

Application information

How to apply: Ground only. **Water volume:** 20 - 40 L/acre.

Application tips

Do not apply during periods of dead calm or when winds are gusty. Do not apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE S572.1) coarse classification. Boom height must be 60 cm or less above the crop or ground.

How it works

Paradigm PRE is a mixture of a systemic auxin-type herbicide (Group 4) and an ALS enzyme inhibitor-type herbicide (Group 2). The product controls weeds by disrupting normal plant growth patterns and/or by inhibiting production of the enzyme essential for production of certain amino acids essential for plant growth.

Expected Results

Weeds start to twist between 2 to 20 days after spraying, dependent on weather conditions and nature of weeds. Following twisting and bending, plants will turn brown and die.

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Restrictions

Rainfall: Applications are rain fast within 1 hour of application. **Grazing**: Livestock may be grazed on treated crops 7 days following application. **Re-cropping:** Fields previously treated with Paradigm PRE can be seeded after a minimum of 10 months to alfalfa, spring wheat, spring barley, canola, faba bean, field corn, flax, Juncea canola, field pea, potato (except seed potato), oriental, brown and yellow mustard, soybean, oats, sunflower or dry bean (Phaseolus vulgaris species including pinto, kidney and white types). Lentils can be planted 22 months after application of Exhilarate. **Pre-harvest intervals:** Do not harvest the treated crop within 60 days after application. Do not cut the treated crop for hay or silage within 21 days after application. **Re-entry interval:** 12 hours.

Environmental precautions:

Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zone of 1 metre between terrestrial and water habitats.

Toxicity

Oral LD_{50} (rats) = >5000 mg/kg.

Storage

Store in original containers in a secure, dry, well ventilated storage.

Pardner® Herbicide/Koril/Bromotril /Brotex/IPCO Brotex 4AT/Co-op Brotex 4AT/Starbuck

Group 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pardner® (PCP# 18001)	Bayer	Bromoxynil: 280 g/L	Emulsifiable concentrate	8 L, 128 L
Koril (PCP# 25341)	Nufarm Agriculture	Bromoxynil: 235 g/L		9.7 L
Bromotril 240 EC (PCP# 28276)	ADAMA Canada	Bromoxynil: 240 g/L		9.7 L, 116.4 L
Brotex 240 (PCP# 28519)	IPCO	Bromoxynil: 240 g/L		9.7 L, 115 L
Brotex 480 (PCP# 31348)	IPCO	Bromoxynil: 480 g/L		9.7 L, 115 L
IPCO Brotex 4AT (PCP # 33554)	IPCO	Bromoxynil: 480 g/L		9.7 L, 115 L
Co-op Brotex 4AT (PCP # 33828)	Federated Cooperative Ltd	Bromoxynil: 480 g/L		9.7 L, 115 L
Starbuck (PCP # 33919)	Winfield United	Bromoxynil: 240 g/L		9.7 L, 115 L

Crops, staging and rates

Check label for registered crop uses. Not all products are registered on all listed crops.

Crop	Staging	Rate per acre		
		Brotex 480/ Brotex 4AT	Pardner	Koril/Bromotril/Brotex/ Starbuck
Barley, oats, spring wheat (including durum), triticale	2 leaf to early flag	244 - 284 mL	400 - 500 mL	487 - 567 mL
Winter wheat	Fall: 2 - 4 leaf. Spring: first growth to early flag leaf	244 - 284 mL	400 - 500 mL	487 - 567 mL

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Pardner® herbicide/Koril/Bromotril/Brotex/IPCO Brotex 4AT/Co-op Brotex 4AT/ Starbuck (cont'd)

Crop	Staging	Rate per acre		
		Brotex 480/ Brotex 4AT	Pardner	Koril/Bromotril/Brotex/ Starbuck
Corn	4 - 8 leaf	244 - 284 mL	400 - 500 mL	487 - 567 mL
Canaryseed (seed production)	3 - 5 leaf	244 mL	400 mL	487 mL
Seedling alfalfa	2 - 6 trifoliate leaf	244 mL	400 mL	487 mL
Established alfalfa (seed production)	From time growth begins until alfalfa is 25 cm tall	244 - 284 mL	400 - 500 mL	487 - 567 mL
Fall rye	Spring only: time growth begins to the early flag leaf stage	244 - 284 mL	400 - 500 mL	487 - 567 mL
Flax	5 - 10 cm tall	244 mL	400 mL	487 mL
Seedling grasses* (seed production)	2 - 4 leaf (establishment year only)	244 - 284 mL	400 - 500 mL	487 - 567 mL
Forage millet and sorghum	At or beyond the 4-leaf stage and less than 20 cm in height	244 mL	400 mL	487 mL
Pearl millet and sorghum**		244 mL	400 mL	487 mL
Pre-seed burndown (zero-tillage)	Apply according to weed stage	244 mL	400 mL	487 mL

* Seedling grasses include: bromegrass, creeping fescue, meadow fescue, red fescue, orchard grass, reed canary grass, Russian wild rye, timothy, crested wheatgrass, intermediate wheatgrass, slender wheatgrass and tall wheatgrass. ** Registered with Pardner and Bromotril.

Weeds and staging

Seedlings up to 4-leaf stage

American nightshade
annual smartweed
bluebur
cocklebur
common ragweed
cow cockle
kochia (5 cm tall)
lady's-thumb
redroot pigweed*
Russian thistle (5 cm tall)
stinkweed
volunteer canola
wild mustard

Seedlings up to 8-leaf stage

common groundsel
lamb's-quarter
tame buckwheat
tartary buckwheat
volunteer buckwheat
wild buckwheat
wild mustard

* Not controlled in alfalfa.

Registered tank mixes

Tank mix partner	Bromoxynil + tank mix partner rate	Additional weeds controlled by tank mix partner
Pre-seed/Pre-plant application prior to seeding canola		
Glyphosate (present as potassium or isopropylamine salt)	Rate: Bromoxynil 113 - 140 g active ingredient/acre + glyphosate at 448 - 1782 g ai/ha. Under adverse growing conditions or high populations of volunteer canola, the higher rate will improve control	Volunteer canola seedlings at the 1 - 4 leaf stage. DO NOT apply after seeding or crop emergence
Spring wheat, including durum and barley (not under-seeded to legumes)		
2,4D do not apply after seeding or crop emergence	Rate: Bromoxynil: 113 g active ingredient/acre + 2, 4-D: 111 - 170 g active ingredient. Timing: 4-leaf to early flag leaf	Flixweed, shepherd's-purse, volunteer sunflower and ball mustard
Achieve Liquid/ Nufarm Tralkoxydim/ Bison 400L	Rate: Bromoxynil: 113 g active ingredient/acre or Bromotril II: 485 - 566 mL/acre + Achieve Liquid: 200 mL/acre + Turbocharge: 0.5% V/V or Nufarm Tralkoxydim: 200 mL/acre + Nufarm Tralkoxydim adjuvant: 0.5% v/v or Bison 400L: 200m L/acre + Addit adjuvant: 0.5% v/v.Timing: 2 leaf until early flag leaf	Wild oats, volunteer oats, green foxtail foxtail, barnyard grass and Persian darnel
Everest + surfactant (not to be used on barley)	Rate: Bromoxynil: 113 g active ingredient/acre + Everest: 17 g/acre + Agral 90 or AgSurf: 0.25 % V/V or Ladder: 95 - 115 mL/acre + MANA 80 adjuvant: 0.25 - 0.32% v/v. Timing: 1-leaf to 4 leaves on main stem, plus 2 tillers	Wild oats (including Group 1 and Group 15 resistant biotype) and green foxtail (including Group 3 resistant biotype)

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Tank mix partner	Bromoxynil + tank mix partner rate	Additional weeds controlled by tank mix partner
Horizon + Score or Ladder + ADAMA adjuvant 80	Rate: Bromoxynil: 113 g active ingredient/acre + Horizon: 95 - 115 mL/acre + Score: 0.8 - 1.0 % V/V or Ladder: 95 - 115 mL/acre + ADAMA adjuvant 80 @ 0.25% v/v. Timing: 2 leaf to flag leaf	Barnyard grass, Persian darnel, green foxtail, volunteer tame oats, yellow foxtail, wild oats and volunteer canaryseed
Ladder All In	Bromotril 487 - 567 mL/acre + Ladder All In: 283 - 356 mL/acre	
MCPA	Rate: Bromoxynil: 113 g active ingredient/acre + MCPA: 111 - 222 g active ingredient/acre. Timing: 2-leaf until early flag leaf	Flixweed, shepherd's-purse, scentless chamomile*, volunteer sunflower, volunteer canola, hemp-nettle, Canada thistle, perennial sow thistle, ball mustard and wormseed mustard
Winter wheat		
2,4-D	Rate: Bromoxynil: 113 g active ingredient/acre + 2, 4-D: 111 - 170 g active ingredient. Timing: 4-leaf to early flag leaf	Flixweed, shepherd's-purse, volunteer sunflower and ball mustard.
Achieve Liquid/ Nufarm Tralkoxydim/ Bison 400L	Rate: Bromoxynil: 113 g active ingredient/acre + Achieve Liquid: 200 mL/acre + Turbocharge: 0.5% V/V or Nufarm Trakoxydim: 200 mL/acre + Nufarm Tralkoxydim adjuvant: 0.5% v/v or Bison 400L: 200 mL/acre + Addit adjuvant: 0.5% v/v. Timing: 2-leaf until early flag leaf	Wild oats, volunteer oats, green foxtail foxtail, barnyard grass and Persian darnel
MCPA	Rate: Bromoxynil: 113 g active ingredient/acre + MCPA: 111 - 222 g active ingredient/acre. Timing: 2 leaf until early flag leaf	Flixweed, shepherd's-purse, scentless chamomile*, volunteer sunflower, volunteer canola, hemp-nettle, Canada thistle, perennial sow thistle, ball mustard and wormseed mustard
Oats, fall rye, canary seed, seedling forage grasses and flax		
MCPA	Rate: Bromoxynil: 113 g active ingredient/acre + MCPA: 111 - 222 g active ingredient/acre	Flixweed, shepherd's-purse, scentless chamomile*, volunteer sunflower, volunteer canola, hemp-nettle, Canada thistle, perennial sow thistle, ball mustard and wormseed mustard
Corn		
Atrazine	Rate: Bromoxynil: 113 g active ingredient/acre + MCPA: 111 - 222 g active ingredient/acre	

* Suppression only.

Application information

With: Apply with ground equipment or by air in wheat and barley only. **Water volume:** Corn – 80 - 120 L/acre. All other crops – 40 L/acre. Air: wheat and barley 8 L/acre.

Application tips

Avoid spraying crops during adverse growing conditions, especially drought, high temperatures (>29°C) or in high humidity.

How it works

A contact herbicide so good coverage is essential. Inhibits respiration and photosynthesis causing death.

Expected results

Weeds turn brown and die within 3 to 5 days – more rapid under good growing conditions and when applied to seedling weeds. Poor results can be expected if weeds past 4-leaf stage, poor spray coverage or lower than recommended rate used. Injury to corn may occur if under stress.

Restrictions

Rainfall: Rainfall within 2 hours of application may reduce weed control. **Grazing:** Wheat, barley, oats and seedling alfalfa – do not use treated crops for grazing of livestock or green feed until 30 days after application. Do not cut treated crops for forage until 30 days after application. CAUTION: Do not graze other treated crops or cut for feed unless specified above; sufficient data are not available to support such use. **Re-cropping:** None.
Re-entry interval: 12 hours. See label for re-entry intervals for sweet corn.

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Environmental precautions

Bromoxynil is moderately to highly toxic to aquatic organisms and non-target terrestrial plants. Avoid contamination of aquatic systems during application.

Toxicity

Acute oral LD_{50} (rats) = 368 mg/kg.

Storage

Pardner/Koril/Bromotril/Brotex/Starbuck formulations will solidify at temperatures below -20°C, but will be usable again at temperatures above 0°C.

Permit WG

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Permit WG (PCP# 31210)	Gowan Canada	Halosulfuron-methyl: 72.6%	Water dispersable granules	567 g

Crops, staging and rates

Crop	Staging, rate and comments
Dry Beans	**Pre-emergent (surface):** 14.2 - 19 g/acre after seeding but prior to soil cracking **Post-emergent:** Apply 2 to 4 trifoliate leaves, prior to flowering. Maximum 1 application per year
Corn (sweet, popcorn)	**Post-emergent only:** Apply 19 - 28.3 g/acre up to 10 - 12 leaf stage. A second application of 19 g/acre may be applied with drop nozzles, avoiding the whorl. Maximum 2 applications per year
Field corn	Apply 19 - 37.6 g/acre up to 10 - 12 leaf stage. A second application of up to 37.6 g/acre may be applied with drop nozzles. Maximum 2 applications per year
Proso millet	Apply 14 - 19 g/acre from the 2 leaf up to prior to head emergence. Maximum 1 application per year

Weeds controlled

Weeds controlled both pre-emergent and from the 3-leaf stage. Refer to label for maximum leaf stage of individual weeds.

Weed controlled at 14 - 19 g/acre pre-seed	Weeds controlled at 28.3 - 37.6 g/acre
Annual sunflower, Canada fleabane, cocklebur, common chickweed, common groundsel, corn spurry, creeping yellowcress, hairy galinsoga, northern willowherb, lamb's-quarter**, broadleaf plantain, prickly lettuce, purslane*, common ragweed, redroot and smooth pigweed, round-leaved mallow, shepherd's-purse, smartweed, wild mustard, wild radish, yellow nutsedge, volunteer canola (not Group 2 tolerant varieties)**	Weeds to the left plus hedge bindweed, common milkweed*, horsetail*

* Applications to emerged weeds require the addition of a non-ionic surfactant with 80% or greater active ingredient content at the lowest labelled rate for the surfactant regardless of crop stage. ** Note: Certain weeds such as lamb's-quarter and Canada fleabane are not controlled when applied post-emergent.

Registered tank mixes

Dry beans: Eptam 1.72 - 2.12 L/acre at pre-emergent stage only. Requires incorporation.

Field corn: 2,4-D, Accent, Aatrex, Dicamba and glyphosate in glyphosate tolerant corn only.

Application information

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions.

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Application tips

Do not apply by air. **Water volume:** Minimum 40 - 55 L/acre. Use the higher volume when there is a heavy crop canopy or weeds are at an advanced stage.

How it works

Halosulfuron is a Group 2 herbicide that is absorbed by the foliage and roots, readily translocated throughout the plant and inhibits cell division. Symptoms on dying weeds may not be noticeable for 1 to 3 weeks after application depending on weed sensitivity, weed size, growing conditions and spray coverage.

Restrictions

Rainfall: Activity of foliar applications may be reduced if rainfall or irrigation occurs within 4 hours. Pre-emergent surface applications will benefit from some rainfall, but excessive rainfall (greater than 1 inch or 2.5 cm) shortly after application may result in injury, especially when seeding is shallow. **Re-entry interval:** 12 hours. **Grazing:** DO NOT graze or cut corn for livestock greenfeed within 30 days of the last application. Allow 30 days for sweet corn and 65 days for popcorn or grain corn from the last application to foliage and the harvesting of silage. Proso (crown) millet may be grazed immediately after treatment. DO NOT cut proso (crown) millet for hay within 37 days of application or feed straw within 50 days of application. **Pre-harvest interval:** DO NOT harvest dry beans within 30 days of post-emergent applications. DO NOT harvest proso (crown) millet within 50 days of application. There is no pre-harvest interval indicated for grain corn.

Re-cropping interval: Delay seeding the following crops for the interval indicated:

- dry common beans – no delay required
- field corn – 1 month;
- cereals (wheat barley and oats) – 2 months
- potato, pea, forage legumes and soybean – 1 year
- canola and sunflowers – 2 years
- sugar beets – 36 months (3 years)

Environmental precautions

TOXIC to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified under DIRECTIONS FOR USE.

Toxicity:

Acute oral LD_{50} (rats) = 1,287 mg/kg.

Storage

Store in a cool, secure place. Do not store for prolonged periods in direct sunlight.

Pinnacle SG Toss-N-Go/Volta

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pinnacle SG Toss-N-Go (PCP# 30741)	FMC of Canada Limited	Thifensulfuron-methyl: 50%	Soluble granule	96 g
Volta (PCP # 33178)	Rotam North America	Thifensulfuron-methyl: 75%	Dry flowable	324 g

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Pinnacle SG Toss-N-Go/Volta (cont'd)

Crops, staging and rates

Crops	Rate (g per acre) Pinnacle	Rate (g per acre) Volta	Staging and specific comments
Soybean	3.3 or 4.8 g/acre	2.2 or 3.2 g/acre	Apply after the first trifoliate leaf, fully expanded and before flowering intiates. Best results with young weeds, less than 10 cm tall (4 cm). Requires addition of non-ionic surfactant such as Agral 90, Agsurf at 1 L/1,000 L spray solution (0.1% v/v). Oil surfactants such as Assist at 0.4 - 0.8 L/acre or Sure-Mix at 0.5% v/v may be used as adjuvants
Thifensulfuron-methyl tolerant camelina (SE1154HR)*	4.8 g	NR**	For control of lady's-thumb, redroot pigweed, wild mustard, lamb's-quarter and velvetleaf. Requires a recommended non-ionic surfactant (AG-SURF, AGRAL 90) at 1.0 litre per 1,000 litres of spray solution (0.1% v/v) OR a crop oil concentrate (if applicable), such as SURE-MIX at 0.5% v/v or ASSIST at 0.4 - 0.81 litres per acre. Use a minimum spray volume of 40 L/acre. Apply after Camelina is established up to 60 days before harvest. Apply to actively growing young weeds less than 10 cm tall or across. Weeds that emerge after treatment will not be controlled. Do not make more than 1 application per year.
Cereals wheat (spring, durum, winter), barley, oats	NR**	8 g***	Apply to actively growing weeds that are less than 10 cm in height or width

*Minor use registration. ** Not registered. *** Add recommended surfactant (Agral 90, AgSurf, Cittowet Plus) at 0.2 L per 100 L spray solution.

Weeds controlled

Soybean:
Low rate: Lady's thumb, redroot pigweed, wild mustard. High rate: Low rate weeds plus lamb's quarters, velvetleaf****
**** The addition of a nitrogen-containing fertilizer such as 28% N, at 4 litres per 100 litres of spray solution, or an equivalent amount of nitrogen as urea (46-0-0) per ha may improve control of velvetleaf.

Thifensulfuron tolerant camelina (Pinnacle only): lady's-thumb, redroot pigweed, wild mustard, lamb's-quarter and velvetleaf.

Cereals (Volta only)

- annual smartweed (green, lady's-thumb)
- corn spurry
- redroot pigweed
- hemp nettle
- cow cockle
- stinkweed
- lamb's-quarter
- chickweed (1 - 6 leaf)
- volunteer canola (excluding Clearfield or SU)
- Russian thistle
- wild mustard tolerant varieties
- wild buckwheat (1 - 3 leaf)

Registered tank mixes

Soybean Tank mix partner	Tank mix rates
Assure II	(0.2 L/acre) plus Sure-Mix
Basagran	(0.71 or 0.91 L/acre) plus Assist adjuvant
Basagran Forte	(0.71 or 0.91 L/acre)[1]
Assure II	(0.25 L/acre) plus Basagran Forte (0.71 or 0.91 L/acre) plus Sure-Mix adjuvant[1]

[1] Refer to appropriate labels for rates of application.

FMC/Rotam supports the following mix not on the Pinnacle SG Toss-N-Go/Volta label. Apply mixes according to the most restrictive use limitations for either product: glyphosate on GT soybean.

Cereals (Volta only) Tank mix partner	Tank mix rates
MCPA Amine 500	0.4 L/acre

Application information

How to apply: Apply with ground equipment. Do not apply by air. **Water volume:** Ground sprayers – 45 L/acre.

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Application tips
Maximum 40 psi (275 kPa) when using conventional flat fan nozzles. Crops that have been under stress before application may result in crop injury. Stress conditions within 3 days of application may also result in crop injury. Weeds under stress conditions at time of application may not be adequately controlled. Injury symptoms can be crop discolouration (yellowing, purpling or reddening) or stunting.

How it works
Rapidly stops growth of susceptible weeds. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility.

Restrictions
Rainfall: Up to 1 inch of rain beginning 1 hour or more after spraying will not reduce Pinnacle effectiveness. **Grazing:** Do not graze or cut for feed. **Pre-harvest intervals:** Minimum time (PHI) between application and harvest is 60 days. **Re-entry interval:** 12 hours. **Re-cropping:** Do not plant any crop other than wheat or barley, soybean, tomato or Group 2 tolerant canola for 30 days after application.

Environmental precautions
Observe buffer zones specified under DIRECTIONS FOR USE.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store product in original container only, away from other pesticides, fertilizer, food or feed. Not for use or storage in or around the home. Keep container tightly closed and dry. Do not freeze.

Pixxaro

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pixxaro A (PCP# 31303)	Corteva Agriscience	Halauxifen, methyl ester: 16.25 g/L Fluroxypyr: 250 g/L	Emulsifiable concentrate	4.9 L, 9.8 L
Plus M (PCP# 29622)		MCPA Ester: 600 g.a.e/L	Emulsifiable concentrate	9.45 L, 75.1 L

Crops, staging and rates

Crop	Staging	Rate
Spring wheat (including durum), winter wheat and barley	3-leaf stage to just prior to flag leaf emergence	Pixxaro A at 125 mL/acre + Pixxaro B at 235 mL/acre

Weeds and staging
Weeds controlled (up to 10 cm in height or diameter unless otherwise specified), including Group 2 resistant biotypes.

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Pixxaro (cont'd)

Weeds controlled

American dragonhead
annual sunflower
barnyardgrass (up to 5-leaf, 2 tillers)
wild buckwheat (1 - 8 leaf)
burdock (before the 4-leaf stage)
Canada fleabane
Canada thistle[1]
volunteer canola (1 - 8 leaf)
chickweed (1 - 8 leaf)*
cleavers (1 - 9 whorl)*
cocklebur
cow cockle
dandelion[1]
field horsetail[1]
volunteer flax (up to 15 cm in height)
flixweed
hemp-nettle (1 - 8 leaf)
henbit
kochia (up to 15 cm in height)*
lambs-quarter (1 - 8 leaf)
wild mustard[1]
nightshade (eastern black, hairy and cutleaf, up to 6-leaf stage)
perennial sow thistle[1]
redroot pigweed (1 - 8 leaf)
prickly lettuce
ragweed (common, false, giant)
round-leaved mallow
shepherds-purse
smartweed/lady's-thumb[1]
stinkweed
stork's-bill
annual sow thistle[1]
vetch
volunteer alfalfa (up to 25 cm)
wild radish

[1] Suppression.

* Including Group 2 resistant biotypes.

Registered tank mixes

Combinations with Pixxaro co-pack for annual grass control

Tank mix partner	Crops registered	Rate/ha	Adjuvant rate	Additional weeds controlled
Liquid Achieve SC	Spring and durum wheat, barley	200 mL/acre	Intake at 0.66% v/v or Carrier at 0.5% v/v; Finish (7% ammonia) is also required at 0.25% v/v	wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, Persian darnel
Axial	Spring wheat, barley	500 mL/acre		wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed, proso millet
Horizon 240EC	Spring and durum wheat	93 mL/acre	Score at 0.8% v/v	wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed
Horizon NG	Spring and durum wheat	376 mL/acre	None required	wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed
Puma Advance	Spring and durum wheat, barley	413 mL/acre	None required	wild oats, green foxtail, yellow foxtail, barnyard grass
Traxos	Spring and durum wheat	500 mL/acre	None required	wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed, proso millet, Persian darnel
Simplicity/ Simplicity GoDRI	Winter, spring and durum wheat	Simplicity: 200 mL/acre. Simplicity GoDRI: 28 g/acre	No surfactant for Simplicity. Simplicity GoDRI requires. Bindem Utility Modifier at 60 mL/acre	Wild oats, green foxtail, yellow foxtail, Japanese Brome, downy brome (check label for timing), selected broadleaf weeds

Application information

How to apply: Ground or aerial application. **Water volume:** 20 - 40 L/acre by ground sprayer, 12 L/acre by air.

Application tips

DO NOT apply with spray droplets smaller than coarse classification. Boom height must be 60 cm or less above the crop or ground.

How it works

Pixxaro is a systemic herbicide that moves within the plant for control of exposed and underground plant tissues. The product controls weeds by disrupting normal plant growth patterns. Symptoms of weeds include epinasty (twisting of the stems) and swollen nodes. Warm, moist growing conditions promote active weed growth and enhance the activity of Pixxaro by allowing maximum foliar uptake and activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

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Expected results
Weeds start to twist between 2 to 20 days after spraying, dependant on weather conditions and nature of weeds. Following twisting and bending, plants will turn brown then die.

Restrictions
Rainfall: Rainfast within 1 hour of application. **Grazing:** Livestock may be grazed on treated crops 21 days following application. **Pre-harvest intervals:** Do not harvest the treated crop within 60 days after application. **Re-cropping:** Fields previously treated with Pixxaro can be seeded to fall rye and winter wheat 3 months after application. After a minimum of 10 months, can be seeded to spring wheat, spring barley, oats, alfalfa, canola, corn, faba bean, flax, field pea, mustard, commercial potato or fields can be summerfallowed. Lentil can be planted 22 months after application of Pixxaro. **Re-entry interval:** 12 hours.

Environmental precautions
For tank mixes, consult the labels of the tank mix partners and observe the largest (most restrictive) buffer zone of the products involved in the tank mixture.

Toxicity
Pixxaro A: Acute Oral LD_{50} (rats) 5,000 mg/kg. Pixxaro B: Acute Oral LD_{50} (rats) 1,793 mg/kg.

Storage
Store in original containers in a secure, dry heated storage.

Poast Ultra

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Poast Ultra (PCP# 24835)	BASF Canada	Sethoxydim: 450 g/L	Emulsifiable concentrate	7.7 L

Note: Merge adjuvant required for Poast alone or with any registered broadleaf herbicide.

Crops, staging and rates
No stage restriction.

Maximum application rate: 0.45 L/acre + Merge at 0.5% V/V
- alfalfa
- alsike clover*
- basil - fresh/dried***
- beans (white, kidney, pinto, adzuki, faba, lima, mung)
- Brussel sprouts
- canola (including Roundup Ready, Liberty Link and Group 2 tolerant canola)
- celery
- chickling vetch
- cicer milkvetch*
- creeping red fescue (for seed production only)
- dry field pea
- faba bean
- fenugreek
- flax (including low linoleic acid varieties)
- lentil
- lupins
- mustard
- onion, green***
- potato
- sainfoin*
- sunflower
- sweet clover
- sugar beet
- trees and shrubs consisting of spruce, colorado spruce, Scots pine, Douglas fir, caragana, cedar, juniper, green ash, lilac, buffalo berry, sea buckthorn, potentilla, spirea, maple, walnut

Maximum application rate: 0.26 L/acre + Merge at 0.5% V/V
- alsike clover**
- caraway
- cicer milkvetch**
- coriander
- dill
- safflower
- sainfoin**
- solin
- sweet clover**

Maximum application rate: 0.23 L/acre + Merge at 0.5% V/V
- tame buckwheat

Maximum application rate: 0.19 L/acre + Merge at 0.5% V/V
- chickpea

* Established stand. ** Seedlings only. *** Maximum two application per year. Minimum 14 days between applications. Ground application only. Do not apply by air.

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Poast Ultra (cont'd)

Weeds, rates and staging

Weeds	Stage	Rate	
		Poast Ultra	Merge (v/v)
Barnyard grass, fall panicum, green foxtail, large crabgrass, Persian darnel, proso millet, volunteer corn, witchgrass, yellow foxtail	1 - 6 leaf	0.13 L/acre	0.5 - 1.0 %
Volunteer cereals (barley, oats, wheat), wild oats in canola, flax (low linolenic varieties) and pea	1 - 4 leaf	0.13 L/acre	
Volunteer cereals (barley, oats, wheat), wild oats (suppression)	1 - 6 leaf	0.19 L/acre	
Quackgrass suppression	2 - 5 leaf	0.19 L/acre	
Quackgrass control plus annual grasses listed above	1 - 3 leaf	0.45 L/acre	
Foxtail barley suppression plus annual grasses listed above	1 - 4 leaf	0.45 L/acre	

Note: Merge adjuvant is sold separately.

Registered tank mixes

Tank mix partner	Poast Ultra + tank mix partner rate	Additional weeds controlled
Canola		
Lontrel 360	Poast Ultra: 0.13 - 0.19 + Merge: 0.75 - 1.0 % V/V + Lontrel 360:0.17 - 0.34 L/acre	Poast Ultra susceptible grassy weeds plus Canada thistle
Muster	Poast Ultra: 0.13 - 0.19 + Merge: 0.75 - 1.0 % V/V + Muster 8 - 12 g/acre	Poast Ultra susceptible grassy weeds plus flixweed, hemp-nettle, redroot pig weed stinkweed, wild mustard
Muster + Lontrel 360	Poast Ultra: 0.13 - 0.19 + Merge: 0.4 L/acre +Muster 88g/acre + Lontrel 360: 0.17 L/acre	Poast Ultra susceptible grassy weeds plus Canada thistle plus above weeds
Liberty Link canola		
Liberty 150 SN	Poast Ultra: 0.09 L/acre + Merge: 0.4 L/acre + Liberty 150 SN: 1.08 L/acre	Poast Ultra susceptible grassy weeds plus Liberty susceptible weeds
Flax		
Buctril M	Poast Ultra: 0.13 - 0.19 + Merge: 0.75 - 1.0 % V/V + Buctril M: 0.4 L/acre	Poast Ultra susceptible grassy weeds plus Bromoxynil susceptible weeds
Logic M	Poast Ultra: 0.13 - 0.19 + Merge: 0.75 - 1.0 % V/V + Logic M:`0.5 L/acre	
MCPA ester	Poast Ultra: 0.13 - 0.19 + Merge: 0.75 - 1.0 % V/V + MCPA ester 500: up to 0.45 L/acre	
Lontrel 360	Poast Ultra: 0.13 - 0.19 + Merge: 0.75 - 1.0 % V/V + Lontrel 360: 0.23 - 0.34 L/acre	Poast Ultra susceptible grassy weeds plus Canada thistle
Lontrel 360 + MCPA	Poast Ultra: 0.13 - 0.19 + Merge: 0.75 - 1.0 % V/V + Lontrel 360: 0.23 - 0.34 L/acre + MCPA ester 500: 0.34 - 0.45 L/acre	Poast Ultra susceptible grassy weeds plus Canada thistle and MCPA susceptible weeds
Field peas		
Pursuit	Poast Ultra: 0.19 L/acre + Merge: 0.4 L/acre + Pursuit: 40 mL/acre	Chickweed, stinkweed, cleavers, hemp-nettle, volunteer canola (non-Group 2 tolerant), redroot pigweed, wild buckwheat, smartweed, wild mustard

Application information

With: Apply with ground equipment or by air. **Water volume:** Ground – 20 - 45 L/acre. Dense foliage, heavy infestations and for quackgrass control – 45 - 80 L/acre. Air – 10 - 20 L/acre.

Application tips

For optimum control of grassy weeds, when grasses are actively growing, there is good soil moisture and crop is small enough to permit thorough spray coverage. Grasses growing in less than ideal conditions are more difficult to control. Do not spray Poast Ultra if temperatures of 5°C or lower are forecasted within 3 days of application. Temperatures near freezing (below 5ºC) will prevent optimum herbicide performance, as weeds are not actively growing. Escapes or re-tillering may occur under prolonged stress conditions or low fertility. Do not apply on grasses stressed longer than 20 days due to lack of moisture as unsatisfactory control can result.

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Quackgrass control: Apply when quackgrass is actively growing up to the 3-leaf stage (8 - 12 cm in height). Cultivation is necessary prior to spraying to stimulate even quackgrass growth and to obtain control. Where poor soil fertility (i.e., low nitrogen) exists, quackgrass control may not be satisfactory.

How it works

Poast Ultra is a contact and a systemic herbicide. Absorbed primarily by foliage and translocated to the growing points. Inhibits formation of fatty acids in these tissues. Thorough coverage of the foliage is important for consistent grass control.

Expected results

Susceptible grasses stop growing immediately, gradually turn yellow and then brown. The time required for complete control is normally 7 to 21 days (annual grasses). Control of quackgrass develops more slowly than control of annual grasses. Poast Ultra is translocated through the quackgrass plant to the rhizomes and kills actively growing rhizome buds, as well as above ground vegetation. Dormant rhizome buds will remain unaffected by the spray and regrowth can occur from these buds. The regrowth will not be significant until 6 to 8 weeks after treatment, depending on growing conditions, crop cultivation practices and crop competition.

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce the weed control. **Grazing:** Do not graze the treated crop or cut for hay; sufficient data are not available to support such use. Forage legumes indicated in the label may be cut for hay provided pre-harvest intervals are followed. **Re-entry interval:** 12 hours.

Pre-harvest intervals:

Crop	Pre-harvest interval	Crop	Pre-harvest interval
Alfalfa	70 days	**Forage legumes***	30 days
Beans, snap	15 days	**Lentil, chickpea**	65 days
Brussel sprouts	70 days	**Celery**	30 days
Buckwheat	85 days	**Lupin**	80 days
Canola	70 days	**Mustard**	76 days
Chickling vetch	70 days	**Potato**	80 days
Dry common bean	80 days	**Safflower**	90 days
Dry peas	60 days	**Solin**	86 days
Faba bean	70 days	**Sunflower**	105 days
Flax	60 days		

* Forage legumes includes Alsike clover, cicer milkvetch, sainfoin and sweet clover.

Re-cropping: A plant-back interval of 30 days is required for all crops other than those listed on the label.

Environmental precautions

Poast Ultra is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the label.

Toxicity

Acute oral LD_{50} (rats) = > 4,000 mg/kg.

Storage

Store product in a cool, dry place. Freezing will not reduce effectiveness.

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Predicade

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Predicade Broadleaf (PCP# 31713)	FMC of Canada Limited	Tribenuron-methyl: 25% + thifensulfuron-methyl: 25%	Soluble granules	486 g
Predicade Grass (PCP# 31735)		Thiencarbazone-methyl: 10 g/L	Suspension	8.0 L
Perimeter II (PCP# 30094)		Fluroxypyr: 333 gae/L	Emulsifiable concentrate	3.4 L
MCPA Ester 600 Liquid (PCP# 27803)	Nufarm Agriculture Inc	MCPA ester: 600 g/L	Emulsifiable concentrate	7.6 L

Crops, staging and rates

Crop	Staging	Rate
Wheat (spring, durum)	3-leaf stage to 6-leaf with 3 tillers, but prior to jointing (before the first node can be felt in the stem)	Predicade Broadleaf: 12 g/acre Predicade Grass: 200 mL/acre Perimeter II: 85 mL/acre MCPA Ester 600: 190 mL/acre
Winter wheat (spring application)	3 tiller to before the first node can be felt in the stem. **Do not apply after the presence of the first node**	Predicade broadleaf: 12 g/acre + Predicade grass: 200 mL/acre + MCPA Ester 600: 190 mL/acre Perimeter II: 85 ml/ac

1 case of Predicade treats 40 acres.

Weeds and staging

Grassy weeds: Apply at 1 to 6 leaves, up to emergence of third tiller unless otherwise noted.

- barnyardgrass
- green foxtail
- Japanese brome (control of spring germinated, suppression of overwintered)
- Persian darnel (suppression)
- volunteer canary seed (up to emergence of second tiller)
- wild oats (including Group 1 resistant)
- yellow foxtail (suppression)

Broadleaf weeds: Apply to apply to young, actively growing weeds that are less than 10 cm in height or diameter, unless otherwise indicated.

- annual smartweed (green smartweed, lady's-thumb)
- Canada thistle (top growth control - suppression)
- chickweed (1 - 6 leaf)
- cleavers (1 - 6 whorl)
- cow cockle
- dandelion (<15 cm in diameter)
- flixweed
- hemp-nettle
- kochia (including group 2 and 9 resistant, seedling to 10 cm)
- lamb's-quarter
- narrow-leaved hawk's-beard
- night-flowering catchfly
- pale smartweed (1 - 6 leaf)
- redroot pigweed
- round-leaved mallow (1 - 5 leaf)
- Russian thistle
- scentless chamomile
- shepherd's-purse (1 - 6 leaf)
- sow thistle (perennial)
- stinkweed
- stork's-bill (1 - 6 leaf)
- volunteer canola (including all herbicide resistant biotypes)
- volunteer flax (<12 cm)
- white cockle
- wild buckwheat
- wild mustard

Spring wheat only: For more consistent weed control including wild oats in areas of heavy infestation and/or advanced staging (greater than 1 tiller wild oats), add ammonium sulphate at 202 g/acre (99% solution), 0.4 L/acre (49% solution) or 0.5 L/acre (40% solution).

Durum wheat only: For more consistent weed control in areas of heavy infestation and/or advanced staging (greater than 1 tiller wild oats), add a non-ionic surfactant (Agral 90, AgSurf or Surf 92) at 0.25% v/v.

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Registered tank mixes
None.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 22 L/acre. Aerial application – 12 L/acre.

Mixing instructions
Start with a clean and empty spray tank. Fill tank to half full with clean water. With agitator running, add the required amount of Predicade Broadleaf. Continue agitation until completely dissolved. Follow by adding Predicade Grass, Perimeter II, MCPA Ester. Maintain continuous agitation. Add the rest of water.

Application tips
Higher spray volumes are needed with a dense crop canopy and/or large weeds. Predicade left in the tank for more than 24 hours might have reduced effectiveness. When crop is under stress, application may result in crop injury such as temporary crop colour lightening or a slight height reduction. Clean sprayer immediately after application and use ammonia. Under drought conditions, do not spray if time between seeding and spraying exceeds 35 days as drought hastens crop development. Do not spray 3 days prior to or following cold temperatures (3°C or lower).

Note: Perimeter II Herbicide activity is influenced by weather conditions. Optimum activity requires active crop and weed growth. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, (e.g., drought, heat or cold stress, or if weeds have initiated flowering, or if heavy infestations exist.)

How it works
Perimeter is absorbed through foliage and inhibits cell elongation. Causes stem elongation, leaf cupping or curling.

Expected results
Growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed species. Grassy plants develop chlorotic discolouration on the leaves, which sometimes turn red. Complete control may take 2 to 4 weeks. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under drought stress.

Restrictions
Rainfall: Rainfall within 2 hours of application may reduce weed control. **Grazing:** May not be grazed or fed to livestock within 7 days of application or cut for hay within 30 days after application. **Pre-harvest intervals:** Do not harvest spring or durum wheat for grain or straw within 60 days of application. **Re-cropping:** barley, canola, flax, lentils, mustard, oats, alfalfa, field corn, dry bean, soybean, sunflower, pea, spring wheat (including durum) can be seeded 10 months after application. **Re-entry interval:** 12 hours.

Environmental precautions
This product is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones of 15 metres with ground application and 125 metres for fixed wing aerial, 100 metres for rotary wing aerial application. Do not allow into surface water, drains and groundwater.

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store in a cool, dry place. Do not store below freezing. Shake well before using.

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PrePass XC/PrePass Flex

Group 2, 9

Formulation

Product	Company	Active ingredient	Formulation	Container size
PrePass XC A (PCP# 27395)	Corteva Agriscience	Florasulam SC: 50 g/L	Suspension concentrate	1.6 L, 12 L
PrePass XC B (PCP# 29652)		glyphosate: 480 g/L	Solution	7.5 L, 450 L
PrePass Flex (PCP# 31259)		Florasulam: 25%	Water dispersable granules	0.648 kg

Acres to treat

PrePass XC A: 1.6 L will treat 40 acres. PrePass XC B: 2 x 7.5 L jugs will treat 40 acres or as bulk treat 1,200 acres.

Prepass Flex: treat 80 acres per 0.648 kg jug and 640 acres per case. Prepass Flex is compatible with all glyphosate liquid formulations. Consult individual manufacturers.

Crops, staging and rates

When PrePass Flex is mixed with glyphosate at a rate of 180 gai/acre or VP 480 at 0.375 litres/acre.

Crop	Staging	Rate
Pre-seed weed burn-down	Apply prior to planting barley, oats, durum, winter and spring wheat to control emerged labelled weeds	PrePass XC A: 40 mL/acre PrePass XC B: 375 mL/acre PrePass Flex: 8.1 g/acre and may be mixed with all glyphosate salt formulations
Summerfallow	Apply for control of labelled weeds	
Fall stubble applications	Apply in the fall to control annual broadleaf weeds and grasses prior to spring seeding of wheat (including durum), winter wheat, barley and oats	

Weeds and staging

Grasses controlled at 2 - 4 leaf stage

- downy brome
- giant foxtail
- green foxtail
- Persian darnel
- volunteer barley
- volunteer wheat
- wild oats

Broadleaf weeds controlled at 2 - 4 leaf

- annual sow thistle*
- Canada fleabane**
- cleavers
- common chickweed
- common ragweed**
- dandelion: seedlings and overwintered rosettes, mature plant up to 30 cm
- flixweed
- hemp-nettle
- kochia
- lady's-thumb
- lamb's-quarter
- narrow-leaved hawk's-beard**
- perennial sow thistle*
- redroot pigweed
- Russian thistle
- scentless chamomile
- shepherd's-purse
- smartweed
- stinkweed
- volunteer canola (including Roundup Ready and Group 2 tolerant)
- volunteer flax
- wild buckwheat (1 - 5 leaf)
- wild mustard

* Suppression with PrePass. ** Up to 8 cm in height.

Application information:

With: Apply with ground equipment only. Do not apply by air.

Water volume: 20 - 40 L/acre.

Application tips

Pre-seed weed burndown/summerfallow: PrePass must be applied to emerged, actively growing weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of florasulam by allowing maximum foliar uptake and contact activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. For best results, ensure thorough spray coverage of target weeds. Reduced control may also occur when applied to weeds heavily covered in dust.

Fall stubble: Prepass can be applied until late October, but active weed growth must be present.

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How it works

PrePass A and PrePass Flex are taken up by leaves and stops growth of susceptible weeds rapidly via inhibition of the ALS enzyme. PrePass B is a non-selective systemic herbicide that moves through foliage into the roots, resulting in plant mortality.

Expected results

Weeds susceptible to PrePass A or PrePass Flex will stop growing almost immediately. Newer leaves start to yellow and wilt, followed by a loss of green colour. Symptoms will spread to the rest of the plant with some weeds showing purpling or reddening. Under good growing conditions, complete control may occur within 7 to 10 days after application. Annual weeds susceptible to Prepass B or glyphosate applied with PrePass Flex will wilt and yellow within 2 to 4 days. Perennials will show similar symptoms within 5 to 10 days after application.

Restrictions

Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage, reducing effectiveness. Do not apply if rainfall is imminent at time of application. **Grazing:** Do not graze treated areas within 7 days of application. **Re-cropping:** Pre-seed burn-down application – fields treated with PrePass herbicide tank mix can be seeded to barley, oats or wheat in the year of application. **Summerfallow application:** Fields treated with PrePass herbicide tank mix can be seeded to barley, canola, durum wheat, pea, wheat the following spring. Canola and peas can be grown if fallow application occurred prior to August 1 in the fallow year. **Re-entry interval:** 12 hours.

Environmental precautions

Overspray or drift to sensitive habitats should be avoided. A buffer zone of 30 metres is required near sensitive habitats.

Toxicity

Acute Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in dry, heated storage. If products are frozen, bring to room temperature and agitate before use.

Prestige XL/Foxxy CM/Esteem

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Prestige XL (PCP# 31428)	Corteva Agriscience	Fluroxypyr: 61.56 g/L + clopyralid: 42.72 g/L + MCPA: 239.5 g/L	Emulsifiable concentrate	9.5 L, 113.6 L
Foxxy CM co-pack of: Foxxy (PCP# 32952) + Clobber M (PCP # 34157)	NewAgco Inc	Fluroxypyr: 180 g/L		Foxxy 6.4 L, 230 L
		Clopyralid: 50 g/L + MCPA 280 g/L		Clobber: 2.23 L, 8 L MCPA: 576 L
Esteem co-pack of: Fluroxypyr 180 (PCP# 30815) + Clopyralid 360 (PCP# 33805) + MCPA (PCP# 31669)	ADAMA Canada	Fluroxypyr: 180 g/L		9.6 L
		Clopyralid: 360 g/L		3.34 L
		MCPA Ester 600: 600 g/L		11.01 L

Prestige XL all-in-one formulation: 120 - 160 acres/drum, 20 - 27 acres per case.

Crops, staging and rates

All 3 products are registered for barley and all wheats. Check individual labels for minor use applications as they may differ between products.

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Crop	Timing	Rate
Barley, canarygrass*, oats, wheat, including durum and winter wheat	3-leaf stage until flag leaf emergence 3-leaf to just before flag leaf - winter wheat	**Prestige/Foxxy CM/Esteem - low rate**: Prestige XL: 0.71 L/acre OR Foxxy: 240 mL/acre + Clobber M: 600 mL/acre OR Esteem: Fluroxypyr: 240 + Clopyralid: 84 mL/acre + MCPA: 281 mL/acre. **High rate:** Prestige XL: 0.95 L/acre OR Foxxy: 320 mL/acre + Clobber M: 800 mL/acre OR Esteem: Fluroxypyr: 320 mL/acre + Clopyralid: 110 mL/acre + MCPA: 365 mL/acre
Forage grasses (seedling or established stand) grown for seed production: creeping red fescue*, intermediate wheat grass*, crested wheat grass*, slender wheatgrass, meadow brome grass*, smooth brome grass*, tall fescue*, timothy*	4-leaf to flag leaf stage	

Caution: Do not apply to crops underseeded with legumes.
*Minor use registration. Corteva assumes no responsibility for performance or crop safety.

Weeds, rates and staging

Apply at 2 - 4 leaf stage, unless otherwise stated.

Low rate

- burdock
- Canada thistle* (low infestation)
- cleavers (1 - 4 whorl)
- cocklebur
- field horsetail[1] (top growth control)
- flixweed (rosettes only)
- kochia
- lamb's-quarter
- plantain (top growth control)
- prickly lettuce
- ragweeds
- shepherd's-purse
- stinkweed
- stork's-bill** (1 - 8 leaf)
- vetch
- volunteer flax (1 - 12 cm)
- volunteer sunflower
- wild buckwheat (1 - 8 leaf)
- wild mustard
- wild radish

High rate

- annual sow thistle[1]
- Canada thistle (medium to high infestation)
- common chickweed**[1] (up to 6 cm)
- common groundsel
- dandelion (rosettes only)
- hemp-nettle (2 - 6 leaf)
- perennial sow thistle*
- redroot pigweed
- round-leaved mallow (1 - 6 leaf)
- Russian pigweed
- scentless chamomile
- smartweed[1]
- stork's-bill
- tartary buckwheat
- volunteer canola

* Season-long control of thistle with some regrowth in the fall (top growth control). ** Suppression [1]Including biotypes resistant to Group 2 herbicides.
[1] Prestige XL/Esteem only.

Registered tank mixes

Does not include Esteem mixes.[1]

Tank mixes	Tank mix partner rate	Additional weeds controlled
Barley, spring wheat, including durum		
Achieve Liquid + Intake Nufarm Tralkoydim	200 mL/acre + Intake at 0.66% v/v or Carrier at 0.5% v/v; also include Finish (7% ammonia) at 0.25% v/v to this tank mix	Green foxtail, wild oats
Puma Advance	413 mL/acre	Green foxtail, wild oats and barnyard grass
Spring wheat, including durum		
Everest + non-ionic surfactant	17.4 g/acre+ Agral 90 or AgSurf: 0.25 % v/v	Green foxtail, wild oats
Horizon + Score	93 mL/acre + Score: 1.0 v/v	Green foxtail, wild oats
Bengal	156 mL/acre	Green foxtail
	312 mL/acre	Green foxtail, wild oats
Simplicity or Simplicity GoDRI	Simplicity: 150 - 200 mL/acre or Simplicity GoDRI: 21 - 28 g/acre. When mixing Prestige XL with Simplicity GoDRI, Bindem Utility Modifier is required at 60 mL/acre + 7% ammonia (Finish) at 0.25% v/v. If water has bicarbonates >400 ppm, add AMS first at 2% v/v	Wild oats, Japanese brome, downy brome (suppression), barnyard grass, yellow foxtail, green foxtail (suppression). Consult label for added broadleaf weeds
Spring wheat and barley excluding durum		
Axial	500 mL/acre	Wild oats and green foxtail

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[1] ADAMA Canada supports the following mixes not on the Esteem Label: Bengal, Bison, Axial for wheat and barley. For wheat only, Broadband, Ladder, Ladder All-In and Varro.

Application information

With: Apply with ground equipment or by air. **Water volume:** Ground – 20 - 40 L/acre. Air –12 - 20 L/acre.

Application tips

Will control only emerged weeds. Temperature range for optimum activity and control is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions. Wet foliage at time of application may result in reduced weed control. Common chickweed control: Prestige will only control chickweed that is emerged at time of application. Chickweed plants which emerge after application will not be controlled.
To improve the reduction in chickweed population at the end of season, delay the timing of application as late as possible to when the majority of chickweed plants have emerged.

How it works

The components move within the plant to control exposed and underground plant tissue. The herbicide mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected results

Weeds start to twist shortly after being sprayed. After twisting and bending, plants stop growing, turn brown and die. Difficult-to-control weeds such as Canada thistle and wild buckwheat stop growing, change colour to dark green and then turn yellow. Death may not occur for 14 to 21 days. Some weak Canada thistle regrowth may occur by the end of season

Restrictions

Rainfall: Do not apply if rain is expected within 4 hours. **Grazing:** Do not permit any grazing within 7 days after application. Do not harvest forage or cut hay within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Pre-harvest intervals:** Do not harvest the treated crop within 60 days after application. **Re-entry interval:** 12 hours.

Re-cropping: Treated fields can be seeded the following year to barley, canola, corn, flax, forage grasses, mustard, oats, pea, rye, sugarbeet, wheat or summerfallowed. Very dry soil conditions following application can result in a risk of injury to field pea grown in the following year. If severe drought conditions are experienced during the months of June to August inclusive in the year of application (less than 140 mm rain between June 1 and August 31 or less than 175 mm rain in the whole year), delay seeding field pea an additional 12 months (22 months following application). Contact your local Corteva Agriscience representative or retailer for more information before seeding field pea following drought conditions in the previous year.

Do not seed crops other than those listed above for at least 1 year after treatment.

Environmental precautions

This product is highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application or cleaning. Observe buffer zones specified on the label.

Toxicity

Prestige A: Acute oral LD_{50} (rats) = >2,000 mg/kg.

Prestige B: Clopyralid: Acute LD_{50} (rats) = > 2,000.
MCPA: Acute oral LD_{50} (rats) = technical 700 - 800 mg/kg.

Storage

Store in a dry, heated area. If product is frozen, bring to room temperature and agitate before use.

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Primextra II Magnum

Group 5, 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Primextra II Magnum (PCP# 25730)	Syngenta	S-Metolachlor: 400 g/L + atrazine: 320 g/L	Flowable	10 L

Crops, staging and rates

Crop	Staging	Rate
Corn, (field, silage, sweet)	Pre-plant incorporated or pre-emergence (only if irrigated within 10 days of application)	1.21 - 1.62 L/acre

Weeds and staging

Pre-emergence

American nightshade	giant foxtail	purslane[1]	yellow foxtail
annual smartweed	green foxtail	ragweed[1]	yellow nutsedge
barnyard grass	green smartweed[1]	redroot pigweed[1]	wild mustard[1]
crabgrass	lady's-thumb	tall waterhemp	
eastern black nightshade	lamb's-quarter[1]	wild buckwheat	
fall panicum	prostrate pigweed	witch grass	

[1] Some naturally occurring triazine tolerant biotypes of these weeds may not be controlled by Primextra II Magnum. Refer to company label for specific tank mix options.

Rate

Weed populations	Rate
Light infestation	1.2 L/acre
Medium infestation	1.4 L/acre
Heavy infestation	1.6 L/acre

Caution: Do not apply to soils with less than 1% or more than 10% organic matter.

Application information

With: Apply with ground sprayers. Do not apply by air. **Water volume:** 60 - 120 L/acre.

Application tips

For best results, apply Primextra II Magnum herbicide/fertilizer mixtures uniformly to the soil with properly calibrated equipment immediately after blending and incorporate according to label directions.

How it works

Absorbed by roots and inhibits photosynthesis.

Expected results

Weeds die at germination, or under dry conditions, die back soon after emergence.

Restrictions

Rainfall: Moderate rainfall after application will enhance activity. Heavy rainfall reduces weed control.
Re-cropping: Follow corn with corn only. **Re-entry interval:** 12 hours.

Environmental precautions

This product is toxic to non-target terrestrial plants and aquatic organisms. Use buffer zones to reduce the possibility of drift or damage to sensitive aquatic and terrestrial habitats.

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Toxicity
Atrazine: Acute oral LD_{50} (rats) = 3,080 mg/kg, Metolachlor: Acute oral LD_{50} = 2,780 mg/kg, Primextra: Acute oral LD_{50} = 4,680 mg/kg.

Storage
Dry, heated storage preferred.

Princep Nine-T

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Princep Nine-T (PCP# 16370)	Syngenta	Simazine: 90%	Water dispersible granules	5 kg

Crops, staging and rates

Crop	Rate per acre	Staging
Alfalfa (1 year or older)	0.45 kg	Apply in the fall after last cutting but prior to permanently frozen ground conditions. 1 application per season
Bird's-foot trefoil	0.45 kg	For stands at least 1 year old, apply from September to November before permanently frozen ground conditions. Apply in year of seeding if population is at least 5 plants per 10 cm^2 and if plants are at least 15 cm high
Corn	0.6 - 1.0 kg	Apply 1 week prior to seeding; incorporate to a depth of 2.5 cm. Use low rate on sandy soils, and the high rate on loams and clays
Raspberries	0.8 - 1.0 kg	Apply in early spring but not on young shoots
Shelterbelts consisting of caragana, green ash, Siberian elm, American elm, boxelder maple	2.0 - 2.8 kg	Apply in the fall or early spring, pre-emergent to weeds. Injury may occur to trees grown in saline soils

Weeds and staging
Apply prior to emergence of weeds in spring.

barnyard grass
crabgrass
lamb's-quarter*
lady's-thumb
perennial species starting from seed
purslane
ragweed*
smartweed
volunteer clovers
wild buckwheat
wild oats
yellow foxtail

* Some biotypes of these weeds may not be controlled by these products.

Application information
With: Apply with ground equipment only. **Water volume:** 120 L/acre. **Shelterbelts:** 200 L/acre.

Application tips
Gentle agitation required during mixing and spraying. After any break in the spray application, agitate thoroughly. Do not overlap application. Alfalfa, bird's-foot trefoil: Do not apply to same field for more than 3 consecutive years. Do not apply Gramoxone within 1 year after the Princep application.

How it works
Acts through the roots of germinating weeds and inhibits photosynthesis, preventing emergence.

Expected results
Weed-free ground.

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Princep Nine-T (cont'd)

Restrictions

Rainfall: Princep Nine-T requires rainfall to be activated. **Grazing:** Allow 30 days between application and grazing to dairy and beef cattle and sheep, and 60 days between application and cutting for hay. **Re-cropping:** Only corn may be planted during the season of application. If rates greater than 0.8 kg/acre are used, only corn may be planted the following year. Injury may occur to succeeding crops of white bean, onion, pea, tomato and turnip if dry weather occurs during the year of application. Sugar beet should not be planted the year following Princep Nine-T application. **Re-entry interval:** 12 hours.

Environmental precautions

The active ingredient, simazine, is non-toxic to birds, insects (bees), and aquatic invertebrates and slightly toxic to fish. Do not use this product within 10 metres of the water sources.

Toxicity

Acute oral toxicity: Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in dry area; heating not required.

Priority/Blitz/FirstPass/Battlefront/ Flora Herbicide/FBN Florasulam 50 SC

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Priority (PCP# 30831)	ADAMA Canada	Florasulam: 50 g/L	Suspension concentrate	6.4 L
Blitz (PCP# 31687)	Loveland Products Canada Inc			3.2 L
FirstPass (PCP# 31671)	WinField United Canada			6.4 L
Battlefront (PCP# 33003)	NewAgco Inc			6.4 L
Flora Herbicide (PCP # 33610)	Sharda CropChem Ltd			6.4 L
FBN Florasulam 50 SC (PCP # 34186)	Farmers Business Network			1.6 L, 6.4 L

Crops, staging and rates

Rate: 40 mL/acre + 0.5 L glyphosate (360 g ai/L). Note: not all products are registered for all uses. Check label for registered uses.

Pre-seed burn down	Apply prior to planting barley, oats or wheat to control emerged labelled weeds
Summerfallow	Apply for control of labelled weeds
Fall stubble applications	Apply in the fall to control annual broadleaf weeds and grasses prior to spring seeding of wheat (including durum) barley and oats
Early post emergence*	Apply early post emergence in spring wheat (including durum), barley and oats (tank mixes only), to the main flush of actively growing broadleaf weeds

* In crop application – not mixed with glyphosate.

Weeds, rates and staging

All weeds below at 2 - 4 leaf stage.

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Weed species

annual sow thistle*
cleavers
common chickweed
cow cockle
hemp-nettle*
narrow-leaved hawks-beard*
perrenial sow thistle*
redroot pigweed*
shepherd's-purse
smartweed
stinkweed
volunteer canola (except Group 2 tolerant)
wild buckwheat (1 - 5 leaf)
wild mustard

* Suppression. [1] Weeds controlled or suppressed with Priority, Blitz.

Registered tank mixes

Consult product label for registered tank mixes.

Tank mix partner Priority	Tank mix partner rate	Additional weeds controlled (see above)
glyphosate* (isopropylamine or dimethylamine salts only)	330 - 500 mL/acre depending on glyphosate formulation	Weeds listed on glyphosate label
Curtail M*	607 mL/acre	Canada thistle, annual sow thistle, stork's-bill, lamb's-quarter, perennial sow thistle, flixweed (spring rosettes only), dandelion (suppression)
2,4-D 600*	404 mL/acre	Weeds on 2,4-D label

* Tank mix partners only for Battlefront.

Application information

With: Ground Equipment only. Do not apply by air. **Water volume:** Ground application – 20 - 40 L/acre.

Mixing instructions

Mix florasulam herbicide, then add chosen glyphosate.

Application tips

Pre-seed weed burndown/summerfallow: Priority and others must be applied to emerged, actively growing weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of florasulam by allowing maximum foliar uptake and contact activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and regrowth may occur. For best results, ensure thorough spray coverage of target weeds. Reduced control may also occur when applied to weeds heavily covered in dust.

How it works

Priority and others are taken by leaves and stops growth of susceptible weeds rapidly via inhibition of the ALS enzyme. Glyphosate is a non-selective systemic herbicide that moves through foliage into the roots, resulting in plant mortality.

Expected results

Weeds: Weeds susceptible to florasulam will stop growing immediately. Newer leaves start to yellow and wilt, followed by a loss of green colour. Symptoms will spread to the rest of the plant with some weeds showing purpling or reddening. Under good growing conditions, complete control may occur within 7 to 10 days after application. Annual weeds susceptible to glyphosate will wilt and yellow within 2 to 4 days. Perennials will show similar symptoms within 5 to 10 days after application.

Restrictions

Rainfall: Heavy rainfall immediately after application may reduce effectiveness. Do not apply if rainfall is imminent at time of application. **Grazing:** Do not graze treated areas within 7 days. **Pre-harvest interval:** Do not harvest the treated crop within 60 days of application.
Re-cropping: Pre-seed burn down – fields treated with Priority/glyphosate tank mix can be seeded to barley, oats or wheat in the year of application.

Toxicity

Acute Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in dry, heated storage. If products are frozen, bring to room temperature and agitate before use.

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Prominex

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Prominex (PCP# 34021)	Corteva Agriscience	Halauxifen: 4.7 g/L Fluroxypyr: 122.2 g/L Clopyralid: 97.8 g/L	Micro emulsion	8.3L, 99.4 L

Crops, staging and rates

Crop	Stage	Rate per acre
Spring wheat (including durum), winter wheat and barley	3 leaf to just prior to flag leaf emergence	414 mL

Weeds, rates and staging

Weeds controlled at the 1 - 8 leaf stage unless otherwise specified by the Prominex label.

Weeds Controlled

- alfalfa, volunteer (up to 25 cm tall)
- American dragonhead
- barnyard grass (up to 5-leaf, 2 tiller)
- buckwheat, wild
- chickweed†
- cleavers (1 - 9 whorl)†
- cow cockle
- flax, volunteer (up to 15 cm tall)
- fleabane, Canada (up to 15 cm tall)
- flixweed (up to 8 leaf and 8 cm tall)
- hemp-nettle†
- henbit (to bud stage and 15 cm tall)
- kochia
- lamb's-quarter
- nightshade species (eastern black, hairy and cut-leaf (up to 6-leaf)
- ragweed, common (up to 6-leaf)‡
- ragweed, giant‡
- redroot pigweed
- round-leaved mallow (up to 6-leaf)
- shepherd's-purse (up to bolting/20 cm tall)
- stork's-bill
- thistle, Canada (rosette to pre-bud stage)
- velvetleaf (up to 5-leaf)

Weeds Suppressed

- mustard, wild (1 - 4 leaf stage, up to 10 cm in height)
- sow-thistle, annual (up to 4 leaf)

† Including group 2 resistant biotypes; ‡ including group 2 and 9 resistant biotypes

Registered Tank Mixes

Weeds controlled or suppressed by Prominex Herbicide + MCPA ester or 2,4-D ester.

Tank mix partner	Tank mix partner rate	Additional weeds controlled
MCPA Ester 600	186 to 283 ml/acre	volunteer canola, annual sow-thistle, Canada thistle (up to bolting, 30 cm tall), dandelion* (seedlings and overwintered rosettes up to 30 cm diameter), burdock, cocklebur, false ragweed, field horsetail (top growth), perennial sow thistle*, plantain, prickly lettuce, smartweed*, stinkweed, vetch, wild radish, wild (annual) sunflower
2,4-D LV Ester 700	174 to 323 ml/acre	volunteer canola, annual sow thistle, bluebur, burdock, cocklebur, daisy fleabane, false flax, false ragweed, goat's beard, mustards (except tansy and dog), narrow-leaved hawk's-beard (seedling), plantain, prickly lettuce, Russian pigweed, Russian thistle, stinging nettle, stinkweed

* Suppression.

Weeds controlled or suppressed by Prominex Herbicide + MCPA ester or 2,4-D ester + other herbicides for annual grass control.

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Tank mix partner	Tank mix partner rate		Additional weeds controlled
Simplicity or Simplicity GoDRI +	Simplicity: 200 mL/acre Simplicity GoDRI: 28g/acre	For Simplicity GoDRI only: Bindem Utility Modifier at 60 ml/acre	Wild oats, Japanese brome, yellow foxtail, green foxtail, downy brome, spreading atriplex, corn spurry, field violet*, white cockle*
Liquid Achieve	200 mL/acre	Carrier at 0.5%; also include Finish (7% ammonia) at 0.25% v/v to this tank mix	Wild oats, yellow foxtail, green foxtail, volunteer oats, Persian darnel
Axial	500 mL/acre	Not Required	Wild oats, yellow foxtail, green foxtail, volunteer oats, volunteer canary seed, volunteer proso millet
Trondus	243 mL/acre	Adigor 280 mL/acre	Wild oats, yellow foxtail, green foxtail, volunteer oats, volunteer canary seed, volunteer proso millet
Horizon 240 EC[1]	95 mL/acre	Score 0.8% v/v	Wild oats, yellow foxtail, green foxtail, volunteer oats, volunteer canary seed
Puma 120 Super[2]	93 mL/acre	Not Required	Wild oats, yellow foxtail, green foxtail
Everest 2.0[3]	20 to 29 mL/acre	Ag-Surf or Agral 90 at 0.25% v/v	wild oats, green foxtail, yellow foxtail, Japanese brome, volunteer oats, volunteer canary seed, proso millet, Persian darnel
Traxos	500 mL/acre	Not Required	wild oats, green foxtail, yellow foxtail, volunteer oats, volunteer canary seed, proso millet, Persian darnel

[1] Horizon 240EC may be substituted with any equivalent product delivering 22.7 g ai/acre clodinafop-propargyl at the label use rate. [2] Puma 120 Super may be substituted with any equivalent product delivering 37 g ai/acre fenoxaprop-p-ethyl [3] Everest 2.0 may be substituted with any equivalent product delivering 9.7 g ai/acre flucarbazone
* suppressed

Application information

How to Apply: Ground or aerial application. **Water Volume:** Ground: 20 - 40 L/acre. **Aerial:** 12 L/acre minimum.

Application tips

Do not apply during periods of dead calm. Avoid application of this product when winds are gusty. Do not apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE S572.1) coarse classification. Boom height must be 60 cm or less above the crop or ground.

How it works

Prominex is a mixture of a systemic auxin-type herbicides (Group 4). The product controls weeds by disrupting normal plant growth patterns. Symptoms include twisting, bending and yellowing; weeds will turn brown, resulting in plant mortality.

Expected results

Weeds start to twist between 2 - 20 days after spraying, dependent on weather conditions and nature of weeds. Following twisting and bending, plants will turn brown and die.

Restrictions

Rainfall: Applications are rain fast within 4 hours of application. Grazing: Livestock may be grazed on treated crops 7 days following application. **Re-cropping:** Fields previously treated with Prominex herbicide can be seeded after a minimum of 10 months to spring wheat, barley, oats, canola, corn, soybeans, flax, field peas, mustard and timothy or fields can be summer-fallowed. Very dry soil conditions following application can result in a risk of injury to soybeans or field peas grown in rotation. If severe drought conditions are experienced during the months of June to August inclusive (less than 14 cm rainfall) in the year of application, delay seeding soybeans and field peas an additional 12 months (total 22 months following application).

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Prominex (cont'd)

Pre-harvest Intervals: Do not harvest the treated crop within 60 days after application. Do not cut the treated crop for hay or silage within 21 days after application. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zone of 1 metre between terrestrial and water habitats. When tank mixing consult grass partner product label and follow the most restrictive guidelines.

Toxicity

Oral LD_{50} (rats) >2000 mg/kg;

Storage

Store in original containers in a secure, dry, well ventilated storage.

Prospect

Group 4, 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Prospect (PCP# 33635)	Corteva Agriscience	Halauxifen 15 g/L	Emulsifiable concentrate	10.8 L
		Carfentrazone 27.97 g/L		

Crops, staging and rates

Crop	Staging	Rate
Canola	Prior to planting	135 mL/acre

Weeds, rates and staging

Weeds controlled by Prospect at 135 mL/acre + 180 g ai/acre of any glyphosate product. Prospect is intended to be tank mixed with glyphosate. The following weeds are controlled by the tank mix.

Annual grasses (2 - 4 leaf)

barnyard grass
downy brome
giant foxtail
green foxtail
Persian darnel
wild oats
volunteer barley
volunteer wheat

Broadleaf weeds (1 - 8 leaf unless otherwise specified, includes Group 2 resistant biotypes)

American dragonhead
Canada fleabane (8 cm tall)
cleavers* (up to 25 cm in size)
chickweed
common ragweed (8 cm tall)
cow cockle
dandelion* (up to 15 cm diameter)
eastern black nightshade
flixweed* (up to 20 cm tall)
hemp-nettle
kochia**
lady's-thumb
lamb's-quarter
morning glory
narrow-leaved hawk's-beard†
red-root pigweed
round-leaved mallow
Russian thistle
shepherd's-purse
stinkweed*
stork's-bill
tall waterhemp (up to 5 cm tall)
velvetleaf (up to 5-leaf)
volunteer alfalfa (up to 25 cm tall)
volunteer canola***
volunteer flax (up to 15 cm tall)
wild buckwheat (1 - 6 leaf)
wild mustard

* Seedlings and overwintered plants up to the bud stage. ** Light to moderate infestations of kochia (up to 150 plants/m^2; up to 15 cm in height). *** Including all herbicide tolerant canola varieties up to 5-leaf stage and 10 cm in size. † Narrow-leaved hawk's-beard seedlings and overwintered plants up to early stem elongation and no more than 15 cm tall.

Additional glyphosate rates

Glyphosate rate active ingredient per acre	Weeds controlled
328 g ai/acre	All weeds listed above plus annual bluegrass, annual sow thistle, narrow-leaved vetch

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Glyphosate rate active ingredient per acre	Weeds controlled
364 g ai/acre	All weeds listed above plus quackgrass (light to moderate infestations), foxtail barley (light to moderate infestations, Canada thistle[1] (rosette), toadflax[2] (vegetative stage in summer fallow)
728 g ai/acre	Foxtail barley (heavy infestations or when plants are stressed)
364 - 1017 g ai/acre	Quackgrass (long-term control and heavy infestations)
364 - 1017 g ai/acre	Canada thistle[2] (bud stage or beyond)

[1] Allow 5 or more days after treatment before tillage. [2] Allow 10 days after treatment before tillage.
Note: Refer to the active ingredient chart in glyphosate section of this manual for the correct volume and formulation strength.

Registered tank mixes
Glyphosate

Application information
With: Ground equipment only. **Water volume:** 20 - 40 L/acre.

Application tips
Must be applied to emerged, actively growing weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of Prospect herbicide applied alone or as a tank-mix with glyphosate herbicides. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. For best results, ensure thorough spray coverage of target weeds.

How it works
Prospect herbicide has 2 different herbicide modes of action: a systemic auxin-type herbicide (Group 4) that moves within the plant for control of exposed and underground tissues; a PPO inhibitor herbicide (Group 14) that inhibits an enzyme within the plant.

Expected results
Normal plant growth is disrupted. Symptoms of affected weeds include twisting of stems, swollen nodes and rapid leaf yellowing, followed by foliar desiccation and necrosis.

Restrictions
Rainfall: Do not apply if rainfall is forecast at time of application. **Grazing:** Livestock can be grazed on treated canola fields 7 days after application. **Pre-Harvest interval:** Canola can be harvested 60 days after application, or cut for fodder 21 days after application. **Recropping:** Fields previously treated with Prospect herbicide can be seeded after a minimum of 10 months to spring wheat, spring barley, oats, canola, field corn, soybean, sunflower, flax, field pea, potato (except for field potato), mustard, alfalfa, dry bean (*Phaseolus vulgaris* species including pinto, kidney and white types) and timothy or fields can be summerfallowed. Lentils can be planted 22 months after application of Prospect herbicide. Fall rye and winter wheat can be planted 3 months after application of Prospect herbicide.
Re-entry interval: 12 hours.

Environmental precautions
Acute oral LD_{50} (rats) >2,000 mg/kg.

Storage
Store in original containers in a secure, dry heated storage.

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Pulsar/DiFlux

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pulsar (PCP# 29450)	Syngenta	Fluroxypyr: 113.3 g/L Dicamba: 86.9 g/L	Emulsifiable concentrate	9.825 L, 78.6 L
DiFlux (PCP # 33988)	Sharda Cropchem Ltd	Fluroxypyr: 113.3 g/L Dicamba: 86.9 g/L	Emulsifiable concentrate	

Crops, staging and rates

Crop	Staging (Zadoks growth stage)	Rate
Spring and durum wheat, barley	2 - 5 leaf crop stage	Low rate: 246 mL/acre High rate: 371 mL/acre

Weeds controlled

Low rate

cleavers	kochia (up to 9-leaf stage)	wild buckwheat (1 - 4 leaf)	

High rate

All of the above plus lamb's-quarter (suppression)	redroot pigweed (suppression) Russian thistle	stork's-bill (suppression) volunteer flax	wild buckwheat (up to 9-leaf)

+ MCPA Ester 600 Tank mix: 240 mL/acre

all of the above PLUS burdock cow cockle	flixweed mustards (except dog and green tansy)	prickly lettuce ragweeds Russian pigweed	shepherd's-purse stinkweed volunteer canola

Registered tank mixes

Herbicide tank mix partner	Crops registered	Rate of herbicide tank mix partner	Remarks, additional weeds
MCPA Ester 600	Barley, spring and durum wheat	240 mL/acre	Burdock, cow cockle, flixweed* mustard, (except dog and green tansy), prickly lettuce, ragweeds, Russian pigweed, shepherd's-purse, stinkweed, volunteer canola
Horizon NG	Spring and durum wheat	376 mL/acre	Barnyard grass, green foxtail, Persian darnel, wild oats, vol. oats, yellow foxtail, volunteer canaryseed
Traxos	Spring and durum wheat	486 mL/acre	Barnyard grass, green foxtail, Persian darnel, wild oats, volunteer oats, yellow foxtail, green foxtail, volunteer canaryseed, proso millet

* Flixweed susceptible at seedling stage only, top growth control only.

Application information

With: Apply with ground equipment. Do not apply by air. **Water volume:** Ground (45 L/acre). Do not apply by air.

Mixing instructions

Use mixing instructions "a" on page 15.

Application tips

Do not tank mix with any other adjuvant, chemical additives, pesticides or fertilizers unless recommended on the label. For optimum results, apply Pulsar to actively growing weeds. Weed control after application of Pulsar may be less than ideal under conditions where plants are stressed.

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How it works

Pulsar is a systemic, post-emergence herbicide for the selective control of the above mentioned weeds. Pulsar moves within the plant to control both exposed and underground plant tissues. The product controls weeds by disrupting normal plant growth patterns. Symptoms include epinasty (twisting of the stems) and swollen nodes.

Expected results

Weeds: Can take up to 7 to 10 days depending on weather and growing conditions. Leaves curl, leaf edges turn brown, petioles twist, plant ceases growth and turns brown and dies. **Crop:** Improper or untimely application can result in abnormal bending at the nodes of grain stalks, difficulty in head emergence from sheath, curled awns, malformed kernels and sterile florets. Under certain conditions, straw shortening may occur but yield will not be affected.

Restrictions

1 application per year is permitted.

Re-cropping: Fields previously treated with Pulsar can be seeded the following year to barley, canola, flax, forage grasses, lentils, mustard, oats, pea, rye or wheat or fields can be summerfallowed. **Grazing:** Do not graze cattle on treated crop, or harvest for silage until 7 days following the application of Pulsar. With tank mixes, graze or silage crop at least 12 weeks following treatment. **Pre-harvest intervals:** 60 days after application. **Drift:** Reduce drift and buffer zones by using either individual nozzle shields or a boom shield. **Re-entry interval:** 12 hours.
Rainfall: Pulsar alone can be used 1 hour before rainfall.

Toxicity

Oral LD_{50} > 5,000 mg/kg.

Storage

Does not require heated storage.

Puma® Advance Herbicide/Vigil WB/ Hellcat

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Puma® Advance (PCP# 29615)	Bayer	Fenoxaprop-p-ethyl: 90 g/L	Emulsifiable concentrate	8.25 L, 123.8 L, 412.5 L
Vigil WB (PCP# 30844)	Interprovincial Cooperative Ltd.	Fenoxaprop-p-ethyl: 120 g/L	Emulsifiable concentrate	6.2 L
Hellcat (PCP# 30055)	NewAgco Inc	Fenoxaprop-p-ethyl: 120 g/L	Emulsifiable concentrate	12.4 L, 99 L, 500 L

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Puma Advance/Vigil WB/Hellcat (cont'd)

Crops, staging and rates

Crops	Recommended stage	Rate
Spring and durum wheat	1 - 6 leaves on main stem plus 3 tillers. (Zadoks 11-16,23)	Low rate: 271 mL/acre for Vigil WB, Hellcat 412 mL/acre Puma Advance High rate: 312 mL/acre for Vigil WB, Hellcat 412 mL/acre Puma Advance Green foxtail only: 156 mL/acre for Vigil WB, Hellcat 206 mL/acre for Puma Advance
Barley[1]	1 - 5 leaves on main stem plus 2 tillers. (Zadoks 11-15,22) (1 - 6 leaf plus 3 tillers with Puma Advance)	
Perennial rye grass (seed production only)	2 - 4 leaf stage	
Meadow bromegrass[2] (seedling and established) Grown for forage or seed production	2 - 4 leaf stage	

[1] Do not apply fenoxaprop-p-ethyl alone in barley. Always tank mix with a registered broadleaf partner (except Puma Advance – however, expect some temporary crop injury on barley without a broadleaf tank mix partner). **Note:** Initial crop injury may be observed after application, but this is temporary and should not affect yield. This injury is most likely to occur when applications are made under stress conditions or when applications are made past the recommended leaf stage. Severe crop injury will occur as a result of spray overlap. [2] Initial crop injury may be observed after application, but this is temporary and should not affect yield. Severe crop injury will occur as a result of spray overlap.

Weeds and staging

Grassy weeds	Stage
Wild oats (low infestation)	1 - 6 leaf (up to emergence of 3rd tiller)
Wild oats (moderate to heavy infestation) Green foxtail (wild millet) Yellow foxtail Barnyard grass	1 - 6 leaf (up to emergence of 3rd tiller)
Green foxtail (wild millet)	1 - 6 leaf (up to emergence of 3rd tiller)

Registered tank mixes

Check individual labels for exact tank mix partners. Some products are registered for individual mixes not listed below.

Tank mix partner	Tank mix partner rate	*Hellcat, IPCO Vigil WB rate (Puma Advance rate in brackets)	
		Wild oats, green foxtail, yellow foxtail, barnyard grass	Green foxtail alone
Spring wheat, durum wheat and barley			
2,4-D 600 ester	283 mL/acre	312 mL/acre (412 mL/acre)	156 mL/acre, (206 mL/acre)
2,4-D 700 LV ester	243 mL/acre		
Ally	2.0 - 3.0 g/acre	312 mL/acre (412 mL/acre)	156 mL/acre, (206 mL/acre)
Buctril M/Badge II	Buctril M: 405 mL/acre Badge II: 500 mL/acre		
Curtail M	606 - 808 mL acre		
Dichlorprop D	708 mL/acre		
DyVel	500 mL/acre	No	156 mL/acre, (206 mL/acre)
Estaprop XT	485 mL/acre	312 mL/acre (412 mL/acre)	156 mL/acre, (206 mL/acre)
Enforcer DX	0.50 L/acre	312 mL/acre (412 mL/acre)	156 mL/acre (206 mL/acre)
Enforcer M	0.50 L/acre	312 mL/acre (412 mL/acre)	156 mL/acre (206 mL/acre)
Express Pack: Express + 2,4-D 700 LV	4.0 g/acre + 243 mL/acre	No	156 mL/acre, (206 mL/acre)
Frontline: Frontline A + Frontline B	40 mL/acre + 335 mL/acre	No	156 mL/acre, (206 mL/acre)

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Tank mix partner	Tank mix partner rate	*Hellcat, IPCO Vigil WB rate (Puma Advance rate in brackets)	
		Wild oats, green foxtail, yellow foxtail, barnyard grass	Green foxtail alone
Infinity	335 mL/acre	312 mL/acre (412 mL/acre)	156 mL/acre, (206 mL/acre)
MCPA 500 amine	340 mL/acre		
MCPA 500 ester	340 mL/acre		
Prestige XC A + Prestige XC B	170 mL/acre + 800 mL/acre	(412 mL/acre)	(206 mL/acre)
Refine SG	12 g/acre	312 mL/acre (412 mL/acre)	156 mL/acre, (206 mL/acre)
Refine SG + Buctril M	4.0 g/acre + 400 mL/acre		
Refine SG + MCPA 500 ester	12 g/acre + 340 mL/acre		
Thumper/Thrasher II	Thumper: 405 mL/acre, Thrasher II: 500 mL/acre	312 mL/acre (412 mL/acre)	156 mL/acre, (206 mL/acre)
Triton: Refine SG + Accord	8 g/acre + 27 g/acre	312 mL/acre (412 mL/acre)	No
Trophy: Trophy A + Trophy B	243 mL/acre + 453 mL/acre	312 mL/acre (412 mL/acre)	No
Spring and durum wheat only		**Vigil WB/Hellcat rate (Puma Advance rates in brackets)**	
Attain XC A + Attain XC B	130 mL/acre + 340 mL/acre	412 mL/acre	156 mL/acre, (206 mL/acre)
DyVel DSp	440 mL/acre	Not registered at wild oat rate	
Leader	500 mL/acre	312 mL/acre (412 mL/acre)	
Logic M	500 mL/acre		
Lontrel 360	170 mL/acre		
Lontrel 360 + MCPA 500 ester	170 mL/acre + 340 mL/acre	312 mL/acre (412 mL/acre)	No
Mecoprop-p	2.2 - 2.8 L/acre		No

Bayer supports the following mixes that are not on the Puma Advance label. Mixable herbicides are OcTTain (in spring and durum wheat), BarricadeTilt, Momentum and Sevin XLR in spring,durum wheat and barley. Apply mixes according to the most restrictive use limitations for either product. Viterra supports the following unregistered mixes: Broadside; Retain; Propel, Pivot or Tilt on spring and durum wheat and barley. OcTTAin on spring and durum wheat. ADAMA supports the addition of ForceFighter M as a tank mix partner with Bengal WB. NewAgco supports the following mixes: Buck M, Clobber M, Foxxy Pro, Foxxy M, Foxxy CM, MP MCPA Ester and Amine, MP 2,4-D ester, Infinity, Infinity FX, Momentum, Pixxaro, Refine SG, Thumper.

Application information

How to apply: Apply with ground sprayers or by air. **Water volume:** Ground – 22 - 45 L/acre. Use higher water volume for dense canopies. Air: 13.5 L/acre.

Mixing instructions

Use mixing instructions "c" on page 15.

Application tips

Application beyond the 6-leaf stage in spring wheat, durum wheat or barley may result in injury. Early application is important to maintain crop safety. Initial crop injury may occur in the form of crop shortening or discolouration and is more likely when fenoxaprop is applied alone and not tank mixed or is applied past the recommended leaf stage or under stressful growing conditions. Barley tends to be more susceptible to this injury than wheat. This condition is temporary and should not affect yield.

Under stressed conditions and/or heavy crop canopy, early application will result in improved grassy weed control. If another pesticide has already been applied, wait 7 days before applying fenoxaprop, or following application of fenoxaprop, a 4 day interval is required before applying another pesticide, except for those recommended on the label.

How it works

Fenoxaprop-p-ethyl is a contact as well as systemic herbicide. It has no soil residual activity. Regions of high meristematic activity, such as root and shoot tips, are known to be affected.

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Expected results
Reduction of leaf growth and chlorosis blotching within 1 to 3 days after application. Initial development of leaf chlorosis within 5 to 8 days after application and complete death within 14 to 21 days.

Restrictions
Rainfall: Do not apply if rain is expected within 1 hour after spraying. **Grazing:** Do not graze the treated crops or cut for hay within 25 days of application or harvest for grain within 65 days of application. Do not graze treated perennial ryegrass or cut for straw within 65 days of application. **Re-cropping:** No restrictions the year after application. Do not graze treated meadow bromegrass or use for hay within 25 days of application.
Re-entry interval: 12 hours.

Environmental precautions
Fenoxzprop-p-ethyl is toxic to fish, daphnids, aquatic plants, terrestrial plants and some terrestrial invertebrates. Leave a 3 to 10 metres buffer zone around sensitive aquatic or terrestrial habitats.

Toxicity
Moderate acute mammalian toxicity. May cause burns upon contact with skin and eyes, and it can be absorbed through the skin.

Storage
If stored for 1 year or longer, shake well before using.

Pursuit 240/Kamikaze/Phantom 240 SL

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Continer size
Pursuit (PCP# 23844)	BASF Canada	Imazethapyr: 240 g/L	Aqueous solution	3.3 L
Kamikaze (PCP # 30127)	NewAgco Inc			
Phantom 240 SL (PCP# 30017)	ADAMA Canada			

Note: Surfactant is not included in the package.

Crops, staging and rates

Crop	Timing	Rate per acre
Alfalfa (newly seeded pure stand) for forage or seed production or established for seed production*	Apply after the first trifoliate leaf stage. For new stands, before the alfalfa reaches 30 cm in height for established stands.	85 mL/acre plus non-ionic surfactant such as Agral 90 or AgSurf: 0.25% v/v. Non-ionic surfactant should contain at least 80% active ingredient
Chickling vetch/grass pea (seed production only)*	Apply at the 5 - 7 leaf stage.	
Dry beans (pinto, pink, red)*	Up to and including the second trifoliate leaf stage.	
Field pea	May be applied up to the 6th above-ground node stage (6 true leaves).	

Caution: Pursuit/Gladiator/Kamikaze/Phantom are only registered in the Black and Grey Wooded soil zones of the Prairie Provinces. Pursuit/Gladiator/Kamikaze/Phantom are NOT registered for use in the Brown and Dark Brown soil zones with the exception of dry beans and alfalfa (newly seeded pure stand for forage or seed production) under irrigation.
* Kamikaze not registered for use on these crops.

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Weeds and staging

Apply early post-emergence (up to and including the 4-leaf stage), unless otherwise indicated.

Field peas/chickling vetch, grass pea	Newly seeded pure stand alfalfa for forage or seed production	Dry bean (pinto, pink, red)
chickweed* cleavers* green foxtail hemp-nettle redroot pigweed shepherd's-purse* smartweed stinkweed* volunteer canola wild buckwheat (suppression) wild mustard* wild oats (suppression)	common groundsel (suppression) green foxtail (suppression) green smartweed redroot pigweed (suppression) stinkweed* volunteer canola wild mustard*	hairy nightshade

* Excluding Group 2 resistant biotypes.

Registered tank mixes

NewAgco supports the following mixes: Independence.

Application information

With: Ground equipment only. Do not apply by air. **Water volume:** 40 - 160 L/acre.

Mixing instructions

Use mixing instructions "a" on page 15.

Application tips

Do not spray if temperatures of 5ºC or lower are forecasted within 3 days of application. Temperatures near freezing (below 5ºC) will prevent optimum herbicide performance, as weeds are not actively growing.

How it works

Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions.

Expected results

Susceptible weeds stop growing within 24 to 48 hours. Yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 to 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 to 3 weeks.

Restrictions

Rainfall: Rainfall within 6 hours of application may reduce activity. **Grazing:** Alfalfa – may be grazed or harvested for forage 14 days after application. Field pea – may be fed to livestock 30 days after application. Other crops – do not graze treated crops or cut for feed prior to crop maturity. **Pre-harvest intervals:** Field pea and chickling vetch – do not apply within 60 days of harvesting. Alfalfa – do not harvest within 14 days after application. Beans – do not harvest within 75 days after application. Soybeans – do not apply within 85 days of harvesting. **Re-cropping:** Black, Grey Wooded and Irrigated Brown soil zones – spring wheat, Group 2 tolerant canola, field pea, lentil and alfalfa may be planted the season following an imazethapyr application. Barley may be planted in the Black and Grey Wooded soil zones the season following application. For other crops, call BASF at 1-877-371-2273. Perform a field bioassay on other crops prior to planting them on a field-scale. In case of crop failure, replant only to Group 2 tolerant canola or field pea the year of application. **Re-entry interval:** 12 hours.

Environmental precautions

Imazethapyr is toxic to aquatic and non-target terrestrial plants. Do not apply within 15 metres of shelterbelts, water bodies, wetlands and woodland lots.

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Toxicity
Acute Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store at temperatures above 0°C. If product is exposed to temperatures below 0°C during shipment or storage, make sure the product has thawed completely and shake container vigorously.

Quasar

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Quasar (PCP # 32929 + 30017)	ADAMA Canada	Imazamox: 80 g/L Imazethapyr: 240 g/L	Aqueous solution	6.47 L 2.08 L

Crops, staging and rate

Crop	Rate	Stage
Soybean	80 ml/ac Davai 80 SL + 26 ml/ac Phantom 240 SL	1 - 3 leaf
Field pea		1 - 6 true leaves
Dry bean		1 - 2 leaf

Weeds controlled and staging
Grass weeds

Stage: 1 - 4 true leaf stage or early tillering:

Green foxtail (including Group 1 resistant)[1], tame oats, wild oats (including Group 1 resistant)[1], yellow foxtail

Broadleaf weeds

Stage: cotyledon to 4-leaf stage

chickweed, green smartweed, lamb's-quarter, redroot pigweed, stinkweed, wild mustard.

Weeds suppressed:

Barnyard grass, volunteer barley, volunteer canola (non-Clearfield®), wild buckwheat.

[1] The QUASAR® tank mix will not control weed biotypes that are resistant to Group 2 biotypes.

Registered Tank Mixes
The following tank mixes are registered and supported by ADAMA Canada.

Arrow 240 EC, Arrow All In, glyphosate, Leopard, Python B

Application information
How to apply: Ground application only. **Water volume:** 40 L/acre minimum.

Application tips
For Quasar an adjuvant is required. Merge® at 0.5% v/v, Norac MSO at 0.5% v/v, Hasten® NT Ultra at 0.5% v/v or Agral® 90 at 0.25% v/v

Cool weather conditions or drought may result in poor weed control. Use in hot, humid weather may result in temporary leaf yellowing, leaf flecking, bronzing or burning. The crop usually outgrows this condition within 10 days. When weeds are stressed, control can be reduced or delayed. Weeds escapes or regrowth may occur under prolonged stress conditions or low fertility. Do not make applications to weeds stressed longer than 20 days due to lack of moisture, as unsatisfactory control can result.

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How it works
Upon application the active ingredients are readily absorbed through both leaf and root uptake and are translocated in the plant to inhibit amino acid production and cell division.

Expected results
Plant growth is inhibited, and a few days after application, chlorosis and terminal bud injury become evident. Leaves and stems become yellow and purple, and root growth may be inhibited.

Restrictions
Rainfall: Rainfast in 3 hours. **Grazing:** Do not graze treated crop. Field peas may be fed to livestock 30 days after application. **Re-cropping:** There is the possibility of residual soil activity the year following application. The following crops may be safely grown in Black and Grey Wooded soil zones the year following DAVAI® 80 SL and PHANTOM® 240 SL applications: barley, spring wheat, lentil, field pea, Clearfield canola. Conduct a field bioassay (a test strip grown to maturity) the year before growing any other crop than those listed above. **Re-entry interval:** 12 hours.

Environmental precautions
This product is toxic to aquatic organisms and non-target terrestrial plants. Follow label buffer zones between application area and sensitive habitat.

Toxicity
Imasamox: Acute oral LD_{50} (rats) = 5,000 mg/kg. Imazethapyr: Acute Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store at temperatures above 5°C in original, tightly closed container. Keep from freezing. If the product is exposed to temperatures below 0°C during shipment or storage, make sure the product has thawed completely, and shake the container vigorously.

Reclaim II

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Reclaim II A (PCP# 30062)	Corteva Agriscience	Aminopyralid: 52.5% + metsulfuron-methyl: 9.45%	Wettable granules	1.84 kg jug
Reclaim II B (PCP# 30063)		2,4-D Ester: 660 g/L	Emulsifiable concentrate	2 x 6.84 L

1 case treats 20 acres.

Crops, staging and rate

Crop	Staging	Rate per acre
Permanent grassland and pasture	Weeds sprayed may be controlled for up to 24 months. A non-ionic surfactant is required, such as Gateway adjuvant, at 0.2% v/v	Reclaim II A: 55 - 92 g/acre Reclaim II B: 680 mL/acre

On soils classified as sands and loamy sands, crop injury can occur if the organic matter is less than 3%.

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Reclaim II (cont'd)

Weeds controlled and staging

Application rates: Reclaim II A: 56 g/acre + Reclaim II B: 680 mL/acre. Season long control.

- absinthe wormwood
- annual smartweed
- annual sow thistle
- ball mustard
- biennial wormwood
- bluebur
- burdock
- Canada fleabane
- Canada golderod
- Canada thistle
- chickweed
- clover common groundsel
- cocklebur
- common ragweed
- common tansy
- corn spurry
- cow cockle
- dandelion
- field bindweed (top growth control)
- field peppergrass
- field scabious
- flixweed
- goat's-beard
- gumweed
- hawkweed
- hedge bindweed
- hemp-nettle
- hoary cress
- horsenettle
- kochia (non ALS resistant biotypes)
- lamb's-quarter
- narrow-leaved hawk's-beard
- nodding thistle
- oak-leaf goosefoot
- ox-eye daisy (pre-bud)
- pasture sage
- perennial sow thistle
- plaintain
- plumeless thistle
- prickly lettuce
- prostrate pigweed
- red root pigweed
- Russian knapweed
- Russian thistle
- scentless chamomile
- shepherd's-purse
- silverberry
- spotted knapweed
- stinkweed
- stork's-bill
- sweet clover
- tall buttercup
- tumbleweed
- vetch
- volunteer canola
- western snowberry (buckbrush)
- wild buckwheat
- wild mustard
- wild radish
- yellow starthistle

Reclaim II A: 68 g/acre + Reclaim II B: 680 mL/acre. Above weeds plus season long control of prairie sage, cudweed, curly dock, fireweed, perennial pepperweed, pussy toes, hoary alyssum, wild carrot, shrubby cinquefoil, prairie wildrose.

Reclaim II A: 81 g/acre + Reclaim II B: 680 mL/acre. Additional weeds controlled: baby's-breath, black henbane, wild caraway and wild parsnip.

Reclaim II A: 92 g/acre + Reclaim II B: 680 mL/acre. Above weeds plus brown knapweed, diffuse knapweed, orange hawkweed*, yellow hawkweed*, Japanese knotweed, purple loosestrife.

* Apply herbicide at bolting stage of development.

The use of the highest rate structure improves the level and duration of weed control and is recommended when weed populations are dense.

Application information

Water: Ground equipment – 80 L/acre. Aerial – 20 L/acre.

A non-ionic surfactant is required, such as Gateway adjuvant, at 0.2% v/v.

Mixing instructions

Fill tank to ¾ full with water; use continuous agitation; add Reclaim A or Reclaim II A. Pre-slurrying with water may be necessary where there is little or no agitation, or an injection system is being used or where herbicide is first added to a tank other than the spray tank. Add Reclaim B or Reclaim II B, then non-ionic surfactant and then an anti-foaming agent (if required) then finish filling the tank.

Application Tips

Application timing is critical for weed control. For optimum weed control, target weeds must be emerged and actively growing for proper translocation and systemic weed activity. Conditions such as drought or periods of slow growth may reduce the level of efficacy. Drift of even small amounts of Reclaim II onto sensitive plants or into areas where sensitive crops may be grown can cause injury. Do not apply under conditions prone to drift (i.e., high winds and temperature inversions).

How it Works

Reclaim II is a herbicide that interferes with cell division causing leaf cupping, stem distortion and eventually the death of the plant. Reclaim II is absorbed through the leaves and roots of the plant.

Expected Results

Perennial weeds show distorted stems and cupped leaves, which turn yellow and then brown. Usually, native grass increases in abundance as result of reduced competition. Poor results may be expected if weeds are not actively growing in late summer or as a result of environmental stress such as frost or drought.

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Restrictions

Rainfall: No effect. Effectiveness may be reduced if rain occurs within 4 hours of application. **Grazing**: Do not allow lactating dairy animals to graze treated areas within 7 days of application. There is no restriction on livestock (except lactating dairy animals) grazing in treated areas. Withdraw meat animals from treated fields at least 3 days before slaughter. Do not harvest forage or cut hay within 30 days of application. **Cropping restrictions**: If legumes are desired in a pasture, do not use Reclaim II. Do not plant to sensitive broadleaf crops for at least 3 years after application of Reclaim II. **Re-entry interval:** 12 hours.

Environmental Precautions

Runoff: Aminopyralid, 1 of the components in Reclaim, may move with water in very coarsely textured soils.

Toxicity

Aminopyralid: Acute oral LD_{50} = > 2,000 mg/kg; metsulfuron-methyl: Acute oral LD_{50} = > 5,000 mg/kg; 2,4-D ester: Acute oral LD_{50} = 300 - 1,200 mg/kg.

Storage

Store in a cool, dry place. Do not freeze.

Refine M/BroadSide

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size*
Refine M: Refine SG (PCP# 28286)	FMC of Canada Limited	Thifensulfuron methyl: 33.35% + tribenuron methyl: 16.65%	Soluble granules	486 g
MCPA Ester LV 600 (PCP# 32311)		MCPA ester: 600 g/L	Concentrate	7.6 L
BroadSide: Refine SG (PCP# 28285)	Loveland Products	Thifensulfuron methyl: 33.35% + tribenuron methyl: 16.65%	Soluble granules	486 g
BroadSide: MCPA (PCP# 27804)		MCPA ester: 600 g/L	Concentrate	7.6 L

Crops, staging and rates

Crop	Staging	Rate
Barley, oats, spring wheat, including durum, winter wheat	full 3-leaf to flag leaf stage	Refine SG: 12 g/acre + 190 mL/acre of MCPA ester.

Weeds and staging

Apply to apply to young, actively growing weeds that are less than 10 cm in height or diameter, unless otherwise indicated.

annual smartweed (green smartweed, lady's-thumb)
ball mustard
chickweed (1 - 6 leaf)
common groundsel
corn spurry
cow cockle
dandelion
flixweed
hemp-nettle,
kochia (excluding Group 2 resistant biotypes)***
lamb's-quarter
narrow-leaved hawk's-beard
redroot pigweed
Russian thistle
shepherd's-purse
stinkweed
tartary buckwheat
volunteer canola*
volunteer sunflower
wild buckwheat (up to 5-leaf)
wild mustard

Weeds suppressed

Canada thistle**
cleavers (1 - 3 whorl)
round leaved mallow (1 - 6 leaf)
scentless chamomile
sow thistle**
stork's bill (2 - 6 leaf)
toadflax (<15 cm tall)

* Including Group 2 tolerant canola ** Apply when the majority of thistles have emerged and are actively growing. For best top growth control, apply before bud stage when thistles are no larger than 15 cm in height and before crop canopy prevents thorough coverage of weeds. *** Note. A recent weed survey in Alberta shows 90% of fields have kochia resistant to Group 2 herbicides. Without testing, assume kochia in your fields are resistant and another broadleaf herbicide from another herbicide group will be needed to control kochia.

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Registered tank mixes

Tank mix partner	Tank mix partner rate per acre	Weeds controlled
Wheat (including durum) and barley		
Axial + Adjuvant	Axial: 243 mL/acre +Adgior: 0.8 %v/v	Broadleaf weeds controlled or suppressed by Refine M/BroadSide alone, plus wild oats, volunteer oats, green foxtail, yellow foxtail, volunteer canary seed, and proso millet
Fenoxaprop-p-ethyl	Fenoxaprop-p-ethyl r: 0.16 - 0.31 L (Puma Advance: 206 - 412 mL/acre)	Refine M/BroadSide susceptible weeds plus wild oats, green foxtail, barnyard grass and yellow foxtail
Spring wheat (excluding durum) and barley		
Axial Xtreme	Axial Xtreme: 0.5 L/acre	Wild oats plus other grassy and broadleaf weeds from Axial Xtreme label
Spring wheat (including durum)		
Clodinafop propargyl (Horizon, Foothills, Signal, Ladder, NextStep, Legend) + adjuvant	Clodinafop propargyl: 93 - 115 mL/ acre + adjuvant: 0.8 % v/v. (Use 1.0% v/v at high rates. NG formulations: (Horizon, Foothills) 376 - 474 mL/acre)	Refine M/BroadSide susceptible weeds plus wild oats, green foxtail.
Fenoxaprop-p-ethyl (Puma Advance)	Fenoxaprop-p-ethyl: 93 - 115 mL/acre	Refine M/BroadSide susceptible weeds plus wild oats, green foxtail, barnyard grass and yellow foxtail
Everest + surfactant	Everest: 17.3 g/acre + non ionic surfactant: 0.25% v/v	All weeds controlled by Refine M/BroadSide plus wild oats, green foxtail, volunteer tame oats
Spring wheat only		
Varro	Varro: 200 mL/acre	Wild oats plus weeds from Varro label

FMC Corporation supports the following mixes that are not on the Refine M label. Apply mixes according to the most restrictive use limitations for either product. Traxos, clodinafop, Everest 3.0 AG, Simplicity, Simplicity GoDRI, Lontrel, Puma Advance , Epic, Sierra 3.0 AG and Traxos.

Loveland Products will also support BroadSide with Axial Xtreme, Epic, Sierra 3.0 and Traxos. Apply mixes according to the most restrictive use limitations for either product.

Application information

With: Ground and aerial equipment. **Water volume:** Ground – 22 L/acre (minimum). Aerial – 11 - 20 L/acre.

Mixing instructions

Use mixing instructions "b" on page 15.

Application tips

Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Refine SG may be reduced if it remains in the tank for more than 24 hours.

How it works

Absorbed through foliage. Refine SG inhibits cell elongation. MCPA ester is a systemic herbicide absorbed by leaf and stem and translocated to actively growing regions. It disrupts cell division causing abnormal growth.

Expected results

Weeds: Growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 to 3 weeks after application depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under drought stress.

Restrictions

Rainfall: Rainfall within 2 hours of application may lessen degree of weed control with Refine M. **Grazing:** Barley, wheat and oats may be grazed or fed to livestock 7 days after application of Refine M. Do not graze the treated crop or cut for hay within 7 days of application of Refine SG. **Re-cropping:** All crops the following year.
Note: Do not exceed a total of 12 g/acre per crop year for the Refine SG part of Refine M.
Re-entry interval: 12 hours.

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Environmental precautions

Refine SG is toxic to aquatic organisms and non-target terrestrial plants. For ground applications, maintain a 15-metre buffer zone between sprayed area and sensitive habitats.

Toxicity

Thifensulfuron methyl: Oral LD_{50} (rats) = > 5,000 mg/kg. Tribenuron methyl: Low oral toxicity.Oral LD_{50} (rats) = > 5,000 mg/kg.

MCPA: Acute oral LD_{50}(rats) = 900 - 1,400 mg/kg.

Storage

Store in a cool, dry place.

Refine SG

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Refine SG (PCP# 28285)	FMC of Canada Limited	Thifensulfuron methyl: 33.35% + tribenuron methyl: 16.65%	Soluble granules	486 g

One 480 gram package treated 40 acres.

Crops, staging and rates

Crop	Timing	Rate
Cereals: barley, oats, spring wheat, including durum, winter wheat	2 leaf to flag leaf stage	Refine SG:12 g/acre
Seedling or established grasses for forages or seed production: meadow bromegrass smooth bromegrass creeping red fescue, tall fescue (seedling only), Kentucky bluegrass (established stand only), orchard grass, crested wheatgrass, intermediate wheatgrass, northern wheatgrass, pubescent wheatgrass, slender wheatgrass, streambank wheatgrass, tall wheatgrass, western wheatgrass	Apply post-emergence	

Weeds and staging

Apply to apply to young, actively growing weeds that are less than 10 cm in height or diameter, unless otherwise indicated.

annual smartweed (green smartweed, lady's-thumb)
ball mustard
chickweed (1 - 6 leaf)
common groundsel
corn spurry
cow cockle
flixweed
hemp-nettle,
kochia**
lamb's-quarter
narrow-leaved hawk's-beard
redroot pigweed
Russian thistle
shepherd's-purse
stinkweed
tartary buckwheat
volunteer canola (excluding Group 2 tolerant varieties)
volunteer sunflower
wild buckwheat (up to 5-leaf)
wild mustard

Weeds suppressed

Canada thistle*
cleavers (1 - 3 whorls)
round leaved mallow (1 - 6 leaf)
scentless chamomile
sow thistle*
stork's-bill (2 - 6 leaf)
toadflax (< 15 cm tall)

* Apply when the majority of thistles have emerged and are actively growing. For best top growth control, apply before bud stage when thistles are no larger than 15 cm in height and before crop canopy prevents thorough coverage of weeds. ** Prairie-wide surveys of kochia fields have found approximately 90% of kochia populations are resistant to Group 2 herbicides. Without testing, assume kochia in your field is resistant and will not be controlled by this product alone.

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Refine SG (cont'd)

Registered tank mixes

Tank mix partner	Tank mix partner rate per acre	Weeds controlled in addition to those controlled by Refine SG
Wheat (spring, durum, winter) and barley		
2,4-D amine or ester + surfactant	2,4-D 500: 0.34 - 0.45 L + surfactant: 0.2% of spray solution 2,4-D Ester LV 700: 0.24 - 0.32 L 2,4-D Ester LV600: 0.28 - 0.36 L	Apply when crop stage is at full 3-leaf to expanded shot blade. Burdock (seedling), cocklebur, common plantain, dandelion, ragweed, hare's-ear mustard, Indian mustard, prickly lettuce, tumble mustard, wild radish, wormseed mustard. (2,4-D Ester - control on stork's-bill)
Spring wheat (including durum) and barley		
Fenoxaprop-p-ethyl	Fenoxaprop-p-ethyl: 0.16 - 0.31 L/acre	Wild oats, green foxtail, barnyard grass and yellow foxtail
Spring wheat (including durum), winter wheat, oats and barley		
MCPA amine or ester	MCPA 500: 0.28 - 0.45 L/acre OR MCPA 600: 0.23 - 0.36 L/acre	Apply when crop stage is full 3-leaf to expanded shot blade. Burdock (seedling), cocklebur, common plantain, dandelion, ragweed, hare's-ear mustard, Indian mustard, prickly lettuce, tumble mustard, wild radish, wormseed mustard
Spring wheat (excluding durum) and barley		
Attain + surfactant	Attain A: 120 mL + Attain B: 202 mL/acre + surfactant: 0.2% of spray solution.	Cleavers (excluding Group 2 resistant cleavers)
Curtail M + surfactant	Curtail M: 600 mL/acre + surfactant: 0.2% spray solution	Canada thistle and wild buckwheat
Lontrel 360 + adjuvant	Lontrel 360: 85 mL/acre + surfactant: 0.2% spray solution	Broadleaf weeds controlled or suppressed by Refine SG alone, as well as Canada thistle (seasonal control) and wild buckwheat
Lontrel 360 + 2,4-D ester 600 + adjuvant	Lontrel 360: 85 mL + 2,4-D ester 600: 283 mL/acre + surfactant: 0.2% spray solution	All other weeds controlled by Refine SG alone, as well as Canada thistle (seasonal control), lady's thumb, perennial sow thistle, stinkweed, volunteer canola, wild buckwheat, wild mustard
Lontrel 360 + MCPA ester 600 + adjuvant	Refine: 12.0 g/acre + Lontrel 360: 85 mL + MCPA ester 600: 283 mL/acre + surfactant: 0.2% spray solution	All other weeds controlled by Refine SG alone, as well as Canada thistle (seasonal control), lady's thumb, perennial sow thistle, stinkweed, volunteer canola, wild buckwheat, wild mustard
Axial Xtreme**	Axial Xtreme: 0.5 L/acre	Wild oats plus other grassy and broadleaf weeds from Axial Xtreme label
Axial 100 EC + Adigor**	Axial: 242 mL/acre + Adigor: 283 mL/acre.	Wild oats, volunteer oats, green foxtail, yellow foxtail, volunteer canary seed, proso millet
Axial 100 EC + MCPA ester 500/600 + Adigor**	Axial: 242 mL/acre + MCPA ester 500: 0.28 - 0.45 L/acre OR MCPA ester 600: 0.19 - 0.23 L/acre + Adigor: 283 mL/acre.	Broadleaf weeds controlled by MCPA, plus wild oats, volunteer oats, green foxtail, yellow foxtail, volunteer canary seed, proso millet
Spring wheat (excluding durum)		
Everest + surfactant	Everest: 17.4 g/acre + surfactant: 0.25% v/v	Wild oats, green foxtail, volunteer tame oats
Everest + 2,4-D + surfactant	Everest: 17.3 g + 2,4-D ester 600: 283 mL/acre + surfactant: 0.25% v/v	All weeds controlled by 2,4-D plus wild oats, green foxtail, volunteer tame oats
Spring wheat (including durum)		
Clodinafop propargyl (Horizon NG, Nextstep NG, Foothills NG	Horizon: 376 - 474 mL/acre (no adjuvant needed	Wild oats, green foxtail
Simplicity + surfactant	Simplicity: 200 mL/acre + surfactant: 0.25% v/v	Barnyardgrass, cleavers, downy brome, green foxtail (suppression), Japanese brome, wild oats, yellow foxtail
Clodinafop propargyl* + MCPA + adjuvant	Clodinafop propargyl: 93 mL + MCPA ester 600: 282 - 371 mL/acre + adjuvant: 0.8 % v/v	MCPA susceptible weeds plus wild oats, green foxtail.

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Tank mix partner	Tank mix partner rate per acre	Weeds controlled in addition to those controlled by Refine SG
Fenoxaprop-p-ethyl (Bengal WB, Vigil WB)	See under fenoxaprop above	See under fenoxaprop above
Varro	Varro: 200 mL/acre	Wild oats, green foxtail, barnyard grass, yellow foxtail (suppression), Persian darnel (suppression), volunteer canary seed, Japanese brome (suppression)
Varro + MCPA	Varro: 200 mL/acre + MCPA Ester 600: 230 mL/acre	Wild oats, green foxtail, barnyard grass, yellow foxtail (suppression), Persian darnel (suppression), volunteer canary seed, Japanese brome (suppression)
Varro+ 2,4-D Ester	Varro: 200 mL/acre + 2,4-D Ester 600: 230 mL/acre	Wild oats, green foxtail, barnyard grass, yellow foxtail (suppression), Persian darnel (suppression), volunteer canary seed, Japanese brome (suppression)

* Clodinafop propargyl - Products not of the NG formulation – Legend, Signal, Ladder, Aurora, Nufarm Clodinafop, Slam'R clodinafop.

FMC supports the following mixes that are not on the Refine SG label. Apply mixes according to the most restrictive use limitations for either product. Puma Advance, Traxos, Everest 3.0 AG, Everest 3.0 AG + 2,4-D ester or Amine, Lontrel 360 XC, Epic, Sierra 3.0 AG, Axial, Simplicity GoDRI and Acapela fungicide.

Application information

With: Ground and aerial equipment. **Water volume:** Ground – 22 L/acre (minimum). Air – 11 L/acre.

Mixing instructions

Use mixing instructions "b" on page 15.

Application tips

Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Refine SG may be reduced if it remains in the tank for more than 24 hours.

How it works

Absorbed through foliage. Inhibits cell elongation.

Expected results:

Weeds: Growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 to 3 weeks after application depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under drought stress.

Restrictions

Rainfall: Rainfall within 1 hour of application may lessen weed control. **Grazing:** Barley, wheat and oats may be grazed or fed to livestock 7 days after application of Refine SG. **Re-cropping:** Canola, flax, lentils and alfalfa – 2 months after application; any crop the following year. There are no restrictions on next crop year. Note: Do not exceed a total of 12 g/acre per crop year for Refine SG. **Re-entry interval:** 12 hours.

Environmental precautions

Refine SG is toxic to aquatic organisms and non-target terrestrial plants. Follow label buffer zones between application areas and sensitive habitat.

Toxicity

Thifensulfuron methyl: Oral LD_{50} (rats) = > 5,000 mg/kg. Tribenuron methyl: Low oral toxicity. Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, dry place.

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Reglone Ion Desiccant/Reglone Desiccant/Stage Desiccant/Dessicash Desiccant/Craven/Armory 240/DriFast Desiccant/Bolster II/Clone/Desica/ Advantage Diquat 240/FBN Diquat 240

Group 22

Formulation

Product	Company	Active ingredient	Formulation	Container size
Reglone Ion (PCP# 31058)	Syngenta	Diquat: 200 g/L	Solution	10 L, 115 L, 450 L
Reglone (PCP# 26396)	SyngentaCanada	Diquat: 240 g/L	Solution	10 L, 450 L
Stage Desiccant (PCP# 31597)	Loveland Products Canada			10 L, 115 L
Dessicash Desiccant (PCP# 31406)	Sharda Cropchem Ltd			10 L, 115 L, 600 L, 1,000 L
Craven (PCP# 32231)	WinField United Canada			10 L, 115 L, 450 L
Armory 240 (PCP# 32726)	ADAMA Canada			10 L, 120 L
DriFast Desiccant (PCP# 32648)	Nufarm Agriculture Inc.			10 L, 115 L, 500 L
IPCO Bolster II (PCP#33743)	IPCO			10 L, 115 L
Desica (PCP#30488)	Syngenta			10 L, 115 L
Clone (PCP#32997)	NewAgco Inc			10 L, 115 L, 500 L, 1,000 L
Co-op Bolster II (PCP#33744)	Federated Co-operatives Ltd			10 L, 115 L
Advantage Diquat 240 (PCP # 33731)	Advantage Crop Protection Inc			10 L, 115 L, 500 L, 1,000 L
FBN Diquat 240 (PCP # 33649)	Farmer's Business Network			10 L, 115 L, 500 L, 1,000 L

Crops, staging and rates

Rate: Reglone Ion – 0.61 L - 1.31 L/acre. All others – 0.51 - 1.09 L/acre. Check label for recommended adjuvant for all products other than Reglone Ion.

Crop	Staging
Beans (Adzuki, red and white), soybean	Apply when 80 - 90% natural leaf defoliation and when at least 80% of the pods have turned yellow
Canola	This treatment does not mature canola. Reglone Ion is an effective desiccant aiding in the harvest of canola. Speed of pod and stem drydown will vary. However, pod and stem kill will take place 7 - 10 days after application. Apply when 90% or more of seed has turned brown; application of diquat prior to this stage can result in high levels of green seed in the sample. Reglone can cause shatter losses in canola. It should only be used on Argentine canola to assist in harvesting severely lodged crops
Chickpea	Desi Type: Apply when the majority of plants are yellow and most pods are mature and seeds have turned from green to yellow or brown. Kabuli Type: Apply when the majority of plants and pods are ripe and dry with seeds turned from green to white or tan and detached from the pods
Flax, solin	Apply when 75% of bolls turn brown (normal swathing time)
Faba bean	Apply when the majority of plants are ripe and dry. Pods will be fully filled and the bottom pods will be tan or black in colour

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Crop	Staging
Legumes: Alfalfa, bird's-foot trefoil, red and white clover (for seed production only)	Prior to seed harvest. To prevent seed pods from shattering and subsequent loss of seed, the interval between spraying and harvest should not exceed 7 days Note: Do not use Reglone on forage legumes that have been treated with a residual herbicide in the past 12 months
Lentils	Apply at the time swathing would normally commence. This is when the lower-most pods are yellow-brown and seeds rattle
Mustard (condiment type)	Spray when the crop is at the 75% seed turn brown stage
Pea (field and dry)	Apply when bottom pods of the majority of the plants are ripe and dry with the seeds detached from the pods. Seeds in less mature pods will split when squeezed
Potato – vine kill (Reglone 240 and Diquash only)	Reglone Ion contains a built in surfactant and should not be used on pototo
Sunflower	When the seeds reach maturity (20 - 50% moisture in the seed and hull). Combine 15 - 20 days after spraying

Rates and water volume

Crop	Crop condition	Ground application		Aerial application	
		Rate per acre	Water volume per acre	Rate per acre	Water volume per acre
Beans (Adzuki, red and white), soybean, chickpea*, flax, lentils, mustard, sunflower	Full canopy, few weeds Higher rate with very dense canopy, weedy crop or secondary growth	0.61 - 0.83 L (Reglone Ion) 0.5 - 0.69 L (all others)	90 - 220 L	0.83 - 1.12 L (Reglone Ion) 0.69 - 0.93 L (all others)	18 L
Peas, faba bean and canola	Full canopy, few weeds. Higher rate for dense canopy, weedy crop or secondary growth	0.61 - 0.83 L (Reglone Ion) 0.5 - 0.69 L (all others)			
Legumes: Alfalfa, bird's-foot trefoil, red and white clover	Full canopy, few weeds Very dense canopy weedy crop, secondary growth	0.83 - 1.31 L (Reglone Ion) 0.69 - 1.09 L (all others) 1.31 L (Reglone Ion) 1.09 L (all others)		0.83 - 1.31 L (Reglone Ion) 0.69- 1.09 L (all others) 1.31 L (Reglone Ion) 1.09 L (all others)	
Potato - vine kill (all products except Reglone Ion)	Top growth light, little weed growth Top growth heavy or weedy field	0.69 - 0.93 L/acre 1.42 L/acre	220 - 440 L/acre	0.69 - 0.93 L/acre	at least 18 L/acre

* Chickpea at high rate of Reglone Ion, ground application, 0.83 L/acre; 0.69 L/acre other products.

Application information

How to apply: Ground and aerial application. **Water volume:** See above table. Reglone Ion has a built-in surfactant.

Application tips

Application should be made immediately ahead of sunny weather as sunshine activates the herbicide. Ground sprayer application will facilitate the use of higher water volumes and provide more complete coverage. Aerial application may be used with aircraft fitted to apply uniform spray coverage. Muddy water will reduce effectiveness. Applications made on cloudy days or just prior to or during periods of darkness will increase effectiveness. Immature weeds may require higher application rates to increase effectiveness.

How it works

Diquat is a contact type herbicide; therefore, thorough spray coverage with high water volumes is essential. Absorbed by all leaf and stem surfaces, non-systemic and interferes with photosynthesis.

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Expected results

Weeds: Fast and virtually complete top kill of annual weeds. Yellowing starts within a few hours of application. Desiccation of the plant will continue rapidly till death. **Crops:** Leaf kill will occur within a few days of application. Stem dry-down will take longer depending on the crop; however, harvesting should normally commence within 7 to 14 days. Crop losses can occur due to pod drop and pod shatter from handling and if unfavourable weather conditions occur. **Warning**: During adverse weather (heavy rain, hail or strong winds), the resultant damage to crops may be enhanced.

Restrictions

Rainfall: No effect once the spray solution has dried. **Grazing:** Crop waste remaining after harvest (e.g., pea and lentil vines, alfalfa stems, etc.) may be used as a feed supplement for livestock. **Pre-harvest intervals:** For most crops, harvest can normally commence within 4 to 10 days after desiccation. Alfalfa, bird's-foot trefoil, red clover, white clover – to prevent pod shattering and loss of seed, the interval between spraying and harvest should not exceed 7 days. Canola/mustard – Combine no later than 14 days after application. Diquat should only be used on argentine varieties to facilitate a harvest of lodged crops.
Losses can occur due to pod drop and pod shatter from handling or if unfavourable weather conditions occur as described under product information.Flax and pea – harvest when seed tests "dry." **Re-entry interval:** 24 hours.

Environmental precautions

Reduce chance of drift and contamination of any aquatic or sensitive terrestrial habitat by using a 15-metre buffer around the edges of water bodies.

Toxicity

Acute oral LD_{50} (rats) = 886 mg/kg.

Storage

Heated storage is required. Store in original container.

Restore II

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Restore II (PCP# 30632)	Corteva Agriscience	Aminopyralid: 50 g/L + 2,4-D as DMA salt: 400 g/L	Emulsifiable concentrate	9.7 L

Crops, staging and rates

Crop	Staging	Rate
Permanent grass pasture and rangeland	Apply based on a weed stage	0.57 - 0.97 L/acre

Weeds and staging

Apply in spring or early summer, after weeds have fully emerged and when weeds are actively growing in the vegetative state. The use of the highest rate improves the level and duration of weed control and is recommended when weed populations are dense.

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Restore II - 0.57 L/acre

- annual sow thistle
- bluebur
- bull thistle*
- burdock (<4-leaf)
- Canada fleabane
- Canada Thistle
- cocklebur
- common ragweed
- common plantain
- daisy fleabane
- false flax
- flixweed
- goat's-beard
- hairy buttercup
- kochia
- lamb's-quarter
- musk or nodding thistle
- mustards except dog or tansy
- ox-eye daisy
- perennial sow thistle
- plumeless thistle
- prickly lettuce
- redroot pigweed
- Russian pigweed
- Russian Thistle
- shepherd's-purse
- spotted knapweed
- stinging nettle
- stinkweed
- sweet clover
- tall buttercup
- volunteer canola
- wild radish
- wild sunflower
- yellow star thistle

Restore II - 0.86 L/acre (plus all weeds listed above)

- Canada golden rod*
- common chickweed
- common purlsane
- cudweed
- curled dock (<4-leaf)
- dog mustard
- hairy fleabane
- hawkweed
- heal all
- knotweed (<4-leaf)
- narrow-leaved hawk's-beard
- oak-leaved goosefoot
- groundsel
- peppergrass
- pineappleweed
- prostate pigweed
- scentless chamomile
- sheep sorrel
- smartweed (Pennsylvania and green)
- sulfur cinquefoil*
- tansy ragwort
- western ragweed
- yellow rocket (<4-leaf)

Restore II - 0.97 L/acre (plus all weeds listed above)

- absinth wormwood
- Fuller's teasel
- biennual wormwood
- blue lettuce
- burdock
- common yarrow***
- common tansy***
- diffuse knapweed***
- dandelion
- field bindweed
- gumweed
- hedge bindweed
- hoary cress
- leafy spurge**
- mouse-eared chickweed
- tartary buckwheat
- yellow rocket
- Russian knapweed***

* Top growth control only. ** Season long control. *** Suppression. Note: the use of the highest rate structure improves level and duration of weed control and is recommended when weed populations are dense.

Application information

With: Apply with ground equipment or by air. **Water volume:** Ground application – 80 L/acre minimum. Aerial application requires 20 L/acre minimum water volume.

Application tips

Application timing is critical for weed control. For optimum weed control, target weeds must be emerged and actively growing for proper translocation and systemic weed activity. Conditions such as drought or periods of slow growth may reduce the level of efficacy.

How it works

Restore II is a herbicide that interferes with cell division causing leaf cupping, stem distortion and eventually death of the plant. Restore II is absorbed through the leaves and roots of the plant.

Expected results

Perennial weeds show distorted stems and cupped leaves, which turn yellow and then brown. Usually, native grass increases in abundance as result of reduced competition. Poor results may be expected if weeds are not actively growing in late summer or as a result of environmental stress such as frost or drought.

Restrictions

Rainfall: If rainfall occurs within 4 hours of application, effectiveness may be reduced. **Grazing:** Do not allow lactating dairy animals to graze treated areas within 7 days of application. There is no restriction on livestock (except lactating dairy animals) grazing in treated areas. Withdraw meat animals from treated fields at least 3 days before slaughter. **Pre-harvest intervals:** Do not harvest forages or cut hay within 30 days of application.
Re-cropping: If legumes are essential in a pasture, do not use Restore II. Do not break up treated pasture and plant to sensitive broadleaf crops for at least 3 years after application of Restore II. **Re-entry interval:** 12 hours.

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Restore II (cont'd)

Environmental precautions

Restore II is toxic to small wild mammals, birds, aquatic organisms and non-target terrestrial plants. When applying by ground sprayer, leave a 10-metre buffer zone between application area and sensitive terrestrial and aquatic habitats. When apply by air, leave a 70 - 175 metre buffer zone. Restore II is mobile in water and subject to leaching and ground movement.

Toxicity

Acute oral LD_{50} = > 2,000 mg/kg.

Storage

Store in a cool, dry place. Do not freeze. If frozen, warm to room temperature and mix thoroughly before using.

Retain SG/Foxxy Pro Rx

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Retain A (PCP# 30129)	Loveland Products	Thifensulfuron methyl: 33.35% + tribenuron methyl: 16.65%	Soluble granule	486 g
Retain B (PCP# 29557)		Fluroxypyr: 180 g/L	Emusifiable concentrate	4.8 L
Salvo 2,4-D ester (PCP# 27818)		2,4-D LV ester: 660 g/L	Emusifiable concentrate	6.8 L
Foxxy Pro Rx co-pack of: MP Rx (PCP# 33520) + Foxxy (PCP# 32952) + MP 2,4-D Ester (PCP# 30460)	NewAgco Inc	Thifensulfuron: 50% + tribenuron: 25%	Wettable granules	320 g
		Fluroxypyr: 180 g/L	Emulsifiable concentrate	9.6 L, 230 L
		2,4-D Ester: 660 g/L	Emulsifiable concentrate	9.8 L, 240 L

Crops, staging and rates

Crop	Stage	Rate: Retain SG	Rate: Foxxy Pro Rx
Spring wheat	Post-emergent application; 4 - leaf to flag leaf (shot blade)	Retain: 8 g/acre	MPower Rx: 8 g/acre
Durum		Attain A: 120 mL/acre	Foxxy: 240 mL/acre
Barley		Attain B: 200 mL/acre	2,4-D: 245 mL/acre

Weeds controlled

Retain SG: Apply Retain when weeds are less than 10 cm in height or in diameter, unless otherwise noted.

Broad-leaved weeds controlled

ball mustard
Canada thistle[2]
chickweed (emerged only; 1 - 6 leaf)
cleavers
common groundsel
cow cockle
corn spurry
hemp-nettle
kochia
lady's-thumb
lamb's-quarter
narrow-leaved hawk's-beard
redroot pigweed
Russian thistle
shepherd's-purse
smartweed
sow-thistle[2]
stinkweed
volunteer flax
volunteer sunflowers
wild buckwheat
wild mustard

Broad-leaved weeds suppressed

round-leaved mallow (2 - 6 leaf)
scentless chamomile
stork's-bill (2 - 6 leaf)
toadflax

[1] Apply when chickweed is small (1 - 6 leaf) and actively growing, but before canopy prevents thorough herbicide coverage of weeds. [2] Apply when the majority of thistles have emerged and are actively growing. For best top growth control, apply before bud stage when thistles are no larger than 15 cm in height. A single application will effectively inhibit the ability of emerged thistles to compete with the crop. [3] If the product is used without a wild oat herbicide, add a non-ionic surfactant such as Ag-Surf at a rate of 0.2% v/v (2 L/1000 L of spray solution).

Foxxy Pro Rx: Apply Foxxy Pro Rx when weeds are less than 10 cm in height or diameter, unless otherwise noted.

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Broad-leaved weeds controlled

annual sow-thistle	corn spurry	lamb's-quarters	stinging nettle
annual smartweed	cow cockle	mustards (except dog and	stinkweed
ball mustard	daisy fleabane	tansy)	tartary buckwheat
bluebur[1]	false flax	narrow-leaved hawk's-beard	thyme-leaved spurge
burdock[1]	false ragweed	plantain	volunteer canola[4]
chickweed[2,3]	flixweed	prickly lettuce	volunteer flax (1-12 cm)
cleavers	goat's-beard	redroot pigweed	volunteer sunflower
cocklebur	giant ragweed	Russian pigweed	wild buckwheat[5]
common ragweed	hemp-nettle[3]	Russian thistle	wild mustard
common groundsel	kochia	shepherd's purse	

Broad-leaved weeds suppressed

Canada thistle[6]	round-leaved mallow (2 - 6	scentless chamomile	stork's-bill (2 - 6 leaf)
toadflax[8]	leaf)[7]		

[1]Up to 4 leaf stage. [2]Apply when chickweed is small (1 - 6 leaf) and actively growing, but before canopy prevents thorough coverage. Chickweed emerging after application will not be controlled [3]Not including Group 2 resistant biotypes [4]Including all HT biotypes. [5]Apply to actively growing wild buckwheat at the cotyledon to 3-leaf stage. Large plants may regrow after treatment. [6]Top growth control only. For best results, apply before bud stage when thistles are no larger than 15 cm tall. [7]Apply to actively growing mallow, plants will be stunted only. [8]Apply when plants are less than 15 cm. in height.

Registered tank mixes

Retain SG: wheat (spring and durum) only – Foothills NG, Horizon NG, Everest 2.0. Barley and wheat (spring and durum) – Wildcat Enhanced, Puma Super, Puma Advance. Foxxy Pro Rx: AgraCity supports the following herbicide mixes not on the label: Aurora, Aurora Extreme, HellCat, Himalaya, Simplicity.

Application information

How to apply: Ground equipment only. Do not apply by air. **Water volume:** 20 - 40 L/acre.
Tank mixing order: Check label for tank mix instructions.

If the product is used without a wild oat herbicide, add a non-ionic surfactant such as Ag-Surf at a rate of 0.2% v/v (2 L/1000 L of spray solution).

Mixing instructions

Use mixing instructions "b" on page 15.

Application tips

Effectiveness may be reduced if it remains in the tank for more than 24 hrs. Application to crops that are stressed by severe weather conditions or environmental stress, disease or insect damage may result in crop injury. Under certain conditions, such as heavy rainfall, prolonged cool weather, frost or wide fluctuations in day/night temperatures, temporary lightening in crop colour and occasionally, a slight reduction in crop height may occur.

Restrictions

Rainfall: Rainfall within 4 hours of application will result in reduced weed control. **Grazing:** Livestock may graze treated areas 7 days after application. Withdraw meat animals from treated areas at least 3 days before slaughter.
Pre-harvest intervals: Mature crops may be harvested 60 days after application **Re-entry interval:** 12 hours.
Re-cropping: All major crops may be grown the year after application.

Environmental precautions

This product contains a petroleum distillate which is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems. Toxic to small mammals, birds, aquatic organisms and non-target terrestrial plants.

Toxicity

Thifensulfuron methyl: Acute oral LD_{50} (rats) = > 5,000 mg/kg. Tribenuron methyl: Acute oral LD_{50} (rats) = > 5,000 mg/kg. Fluroxypyr: Acute oral LD_{50} > 2,000 mg/kg. 2,4-D: Acute oral LD_{50} (rats) = technical 300 - 1,200 mg/kg.

Storage

Store product in original container. If product is frozen, bring to room temperature and agitate before use.

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Revenge E

Group 2, 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Revenge E co-pack of: Revenge (PCP#33716) + MP Extra (PCP#33143)	NewAgco Inc	Carfentrazone: 240 g/L	Emulsifiable concentrate	4.8 L
		Tribenuron:75%	Dry flowable	320 g

Must be mixed with glyphosate, which is sold separately

Crops, staging and rates

Crop	Stage	Rate
Spring wheat, durum wheat, barley	Up to 1 day prior to seeding	Revenge: 30 mL/acre + MP Extra: 4 g/acre

Weeds, rates and staging

Revenge E should be mixed with glyphosate at a rate of 180 - 360 g ae/acre. See glyphosate page for product rates to control targeted weeds.

Grassy weeds	Stage	Rate
green foxtail[1]	Up to 8 cm in height	Revenge 30 mL per acre + MP Extra 4 g per acre + glyphosate 180 - 360 g ae per acre
wild oats[1]		
volunteer barley[1]		
volunteer wheat[1]		
downy brome[2]	Up to 15 cm in height	
giant foxtail[1]		
Persian darnel[2]		

Broadleaf weeds	Stage	Rate
volunteer canola- all biotypes	Up to 10 cm in height	Revenge 30 mL per acre + MP Extra 4 g per acre + glyphosate 180 - 360 g ae per acre
lamb's-quarter		
kochia (including group 2, 4, 9 resistant biotypes)		
tall waterhemp		
wild buckwheat[1]	Up to 3 leaves	
morning glory		
Eastern black nightshade		
velvetleaf		

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Broadleaf weeds	Stage	Rate
cow cockle		
Canada Thistle[1] (Suppression)	Rosette	
Canada fleabane[2]	Up to 8 cm in height	
common ragweed		
cleavers[2]		
narrow-leaved hawk's-beard		
hempnettle[2]		
annual sow thistle[3]		
prickly lettuce[3]	Up to 15 cm in height	
shepherd's-purse[3]		
lady's-thumb[1]		
flixweed[2]		
dandelion[1]		
Russian thistle[2]		
volunteer flax[2]		
redroot pigweed		
stinkweed[1]		
wild mustard[1]		

[1]Controlled with 180 g ae glyphosate. [2]Controlled with 180-275 g ae glyphosate. [3]Controlled with 325 g ae glyphosate.

Registered Tank Mixes

Glyphosate at a rate of 180 - 360 g ae per acre.

Application information

How to apply: Ground application only. **Water volume:** 40 L/acre minimum.

Application tips

Due to rapid absorption by the leaves, translocation of the contact herbicide active is very limited. It is essential to get good plant coverage for optimum performance. Extremes in environmental conditions may affect activity. Revenge E can be applied only one time per growing season.

How it works

Revenge E has systemic and contact activity. Revenge inhibits the PPO enzyme involved in chlorophyll and heme synthesis. This action results in leaky cell membranes and rapid browning and death. MP Extra is absorbed by foliage and roots, and inhibits cell elongation.

Expected results

Initial contact symptoms are browning leading to necrosis and may occur within hours to a few days. Symptoms of systemic activity (discolouration) may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed susceptibility.

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Revenge E (cont'd)

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce weed control. **Grazing:** No grazing restrictions
Re-cropping: 2 months after application, canola, flax, lentil or alfalfa may be seeded. No rotational restrictions 12 months after application. **Pre-harvest intervals:** No pre-harvest interval for registered crops.
Re-entry interval: 12 hours.

Environmental precautions

Do not contaminate irrigation water. Tribenuron is toxic to aquatic organisms. Recommended buffer zone of 5 metres from any sensitive habitat without the use of any drift control aids.

Toxicity

Tribenuron: Acute oral LD_{50} (rats) = 2000 mg/kg. Carfentrazone-ethyl: Acute oral LD_{50} (rats) = > 5000 mg/kg.

Storage

Store in a cool, dry place and avoid excess heat.

Revenge Pro/IPCO Convex/Co-op Convex

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Revenge Pro co-pack of: Revenge (PCP#33716) + MP 2,4-D 700 Ester (PCP#30460)	NewAgco Inc.	Carfentrazone-ethyl: 240 g/L	Emulsifiable concentrate	1.2 L
		2,4D: 660 g/L		8.69 L
IPCO Convex co pack of IPCO C-Zone (PCP # 33580)	IPCO	Carfentrazone-ethyl: 240 g/L	Emulsifiable concentrate	2.4 L
IPCO 2,4-D Ester 700 (PCP # 27819)	IPCO	2,4-D Ester: 660 g/L	Emulsifiable concentrate	8.2 L
Co-op Convex co pack of IPCO C-Zone (PCP # 33580)	IPCO	Carfentrazone-ethyl: 240 g/L	Emulsifiable concentrate	2.4 L
Co-op 2,4-D Ester 700 (PCP # 32882)	Federated Cooperatives Ltd	2,4-D Ester: 660 g/L	Emulsifiable concentrate	8.2 L

Crops, staging and rates

Crop	Stage	Rates
Spring wheat, durum wheat, winter wheat, barley, rye	Up to 1 day prior to seeding	Revenge: 15 mL/acre + MP 2,4-D: 217 mL/acre

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Weeds and staging

Revenge Pro should be mixed with glyphosate at a rate of 180 - 360 g ae per acre (not included in packaging). See glyphosate page for product rates to control targeted weeds.

annual blue grass[1]	downy brome	morning glory	shepherd's-purse
annual sow thistle[1]	flixweed	narrow-leaved hawk's-beard[1,3]	smartweed
Canada fleabane	foxtail barley[1]	narrow-leaved vetch	stinkweed
Canada thistle[1]	giant foxtail	persian darnel	tansy mustard
chickweed	green foxtail	prickly lettuce[1]	volunteer canola (all HT types)
cleavers	hemp-nettle	quackgrass[1]	volunteer flax
cocklebur	horsetail	redroot pigweed	volunteer wheat
common ragweed	jimsonweed	round-leaved mallow	wild buckwheat
cow cockle	kochia[2]	Russian thistle	wild mustard
crabgrass[1]	lady's-thumb	scentless chamomile	wild oats
dandelion[1,3]	lamb's-quarter		

[1] With the addition of extra glyphosate; refer to label for rates. [2] Including group 2 and 9 resistant biotypes. [3] Seedling and over-wintered rosettes only.

Registered Tank Mixes

Glyphosate at a rate of 180 - 360 g ae per acre

Application information

How to Apply: Ground application only. **Water volume:** 40 L/acre.

Application tips

Good growing conditions promote weed growth and enhance the activity of Revenge Pro. Weeds hardened off by cold weather or drought stress may not be controlled. Insufficient water volumes or coarse sprays may also reduce control levels.

How it works

Revenge is a contact herbicide; therefore, coverage of the weeds is essential for control. 2,4-D is a systemic, non-selective herbicide readily absorbed through leaves or roots. Accumulation is primarily in the young, rapidly growing meristematic regions of roots or shoots. It inhibits pigments, including chlorophyll, leading to death.

Expected results

Initial symptoms such as browning, wilting, and necrosis appear very rapidly (hours to a few days). Susceptible plants become malformed before they die. Complete death occurs within a few days.

Restrictions

Rainfall: Rain within 2 hours of application may reduce weed control. **Grazing:** Do not allow lactating dairy animals to graze within 7 days of application. Withdraw meat animals from treated fields 3 days before slaughter.
Re-cropping: No rotational restrictions the year after application. **Pre-harvest intervals:** 30 days.
Re-entry interval: 12 hours.

Environmental precautions

To reduce runoff from treated areas into aquatic habitats, avoid application to areas with moderate to steep slope, bare soil, compacted soil or clay. The use of 2,4-D may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow.

Toxicity

Carfentrazone-ethyl: Acute oral LD_{50} (rats) = > 5000 mg/kg. 2,4-D 700 Ester: Acute oral LD_{50} (rats) = technical 300 - 1,200 mg/kg.

Storage

Store in a cool, dry place and avoid excess heat. 2,4-D Ester may be frozen.

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Reward

Group 22

Formulation

Product	Company	Active ingredient	Formulation	Container size
Reward (PCP# 26271)	Syngenta	Diquat: 240 g/L	Liquid	3.78 L

Aquatic use: Weed control in still or slow moving water of farm ditches, farm dugouts, farm ponds, lakes and canals.

Weeds, rates and staging

Weed	Staging	Rate
Water weeds: Canada waterweed, coontail, duckweed, pondweed, water milfoil **Algae**: *Cladophora*, *Spirogyra*, and *Pithophora* sp. (temporary control)	Apply only after weeds are visible and in an active stage of growth which is normally sometime in late May through June as growth is dependent on water temperatures	For areas less than 1.5 m (5 feet) deep: 7.4 L/acre For areas more than 1.5 m (5 feet) deep: 10 - 11.8 L/acre Calculating area to be treated: length (m) x width (m) ÷ 10,000 m^2 x 2.47 = acres

Application information

How to apply: For floating weeds, use surface application: Dilute 1 part Reward with at least 4 parts clean water and spray over water surface. Apply from the banks of small bodies of water.

For submerged weeds, inject below the water surface: A suction type of boat bailer is mounted on the cavitation plate of an outboard motor and the end of the inlet tube inserted into a solution containing 1 part Reward diluted with at least 10 parts of clean water (a backpack sprayer may also be used). Make lines of travel at regular intervals through the water (3 metres or less apart) over the area to be treated until the whole area has received a uniform application.

Application tips

Do not apply to muddy water and do not agitate water excessively during 1 or 2 days after treatment as the effectiveness of the chemical will be reduced. Use clean water for diluting the chemical. Do not use wetting agents or surfactants for water treatment. Repeat treatment may be necessary if weed growth reappears. Avoid application or drift onto crops or other desirable growth.

How it works

Reward is a contact herbicide. Thorough coverage on the weeds is essential to ensure satisfactory control. Interferes with photosynthesis.

Expected results

Control of susceptible weeds generally occurs within 1 to 2 weeks.

Restrictions

Rainfall: None. **Grazing:** Do not use treated water for at least 24 hours after treatment for swimming and animal consumption. **Fish protection:** To protect the fish in small lakes and ponds with a dense weed growth, treat not more than 1/4 to 1/3 of the area at 1 time, otherwise the dying weeds over a large area will cause a serious loss of oxygen which may injure or kill the fish. **Human consumption and irrigation:** Do not use for at least 5 days after treatment. **Re-entry interval:** 12 hours.

Environmental precautions

Avoid application or drift onto sensitive, non-target plants.

Toxicity

Acute oral LD_{50} (rats) = 886 mg/kg.

Storage

Heated storage is required.

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Rexade

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Rexade A (PCP# 32520)	Corteva Agriscience	Pyroxsulam: 15% Halauxifen: 5%	Wettable granule	1.62 kg
Rexade B (PCP# 32294)		2,4-D Ester: 660 g/L	Emulsifiable Concentrate	8.58 L

Crops, staging and rates

Crop	Staging	Rate
Wheat (including durum)	2 leaf to prior to flag leaf emergence	Rexade A: 40.5 g/acre + Rexade B: 215 mL/acre
Winter wheat	2 - 7 leaf, 4 tiller stage	

1 case of Rexade treats 40 acres.

Weeds and staging

Consult label for stages and application. Apply when weeds are actively growing. Only weeds emerged at the time of treatment will be controlled. Best results are obtained from applications made to seedling weeds. Read and observe all label directions.

Weeds controlled

- alfalfa
- American dragonhead
- annual sunflower
- barnyard grass (1 - 5 leaf)
- bluebur
- japanese brome (1 - 6 leaf)
- buckwheat, wild
- burdock
- Canada fleabane
- volunteer canola (1 - 6 leaf)
- chickweed, common (up to 10 cm)
- cleavers†† (1 to 9 whorl)
- cocklebur
- corn spurry (up to 2 whorl stage, <10 cm in height)
- cow cockle
- flixweed (up to 10 cm)
- yellow foxtail (1 - 5 leaf)
- volunteer flax (up to 15 cm in height)
- hemp nettle††
- henbit
- kochia (up to 10 cm)
- lamb's-quarter††
- mustard (except dog and green tansy)
- wild oats (up to 4 leaf, 2 tiller)
- red root pigweed††
- plantain
- prickly lettuce
- ragweeds
- round-leaved mallow (up to 6-leaf stage, <10 cm in size)
- Russian thistle
- smartweed (lady's-thumb, 1 - 5 leaf)
- shepherd's purse (up to 30 cm tall)
- stinkweed (up to 30 cm tall)
- stork's bill
- sweet clover
- white cockle (season-long control, up to bud stage, <15 cm in height)
- wild radish

Weeds suppressed

- annual sow thistle (up to 5-leaf stage)
- downy brome (2 - 6 leaf, 4 tillers)
- Canada thistle (up to 30 cm tall, pre-bud)
- dandelion (seedlings and over-wintered rosettes less than or equal to 20 cm)
- green foxtail (1 - 5 leaf)
- night-flowering catchfly (up to bolting stage, 15 cm in height)

* Light to moderate infestations (up to 150 plants/m3; up to 15 cm in height).
†† Including Group 2 resistant biotypes.

Registered tank mixes

The user should contact Corteva Agriscience at 1-800-667-3852 or *www.corteva.ca* for information before mixing any pesticide to confirm any additional mixes supported in the use of this product.

Application information

How to apply: Ground application: **Water volume:** 20 - 40 L/acre. Aerial application: **Water volume:** 12 L/acre. Apply in the spring to spring wheat and durum wheat from the 2-leaf stage expanded to just before the flag leaf stage and to winter wheat in the 2 to 7-leaf, 4-tiller stage. Apply when weeds are actively growing at the 1 to 8-leaf stage, unless otherwise specified. Only weeds emerged at the time of treatment will be controlled. Best results are obtained from applications made to seedling weeds.

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Rexade (cont'd)

Mixing instructions
Use mixing instructions "b" on page 15. Note, a surfactant is not required for mixes.

How it works
Rexade should be applied to actively growing weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of Rexade by allowing for maximum foliar uptake and movement of the herbicide into the targeted weeds. Rexade is a mixture of auxin herbicides (Group 4) and an ALS enzyme inhibitor herbicide (Group 2). The product controls weeds by disrupting normal plant growth patterns and/or by inhibiting the production of the enzymes essential for the production of certain amino acids for plant growth.

Expected results
Weeds start to twist between 2 to 20 days after spraying, depending on weather conditions, rate of growth, moisture and the weeds being targeted by this herbicide application. Symptoms include twisting, bending and yellowing; weeds will turn brown, resulting in plant mortality.

Restrictions
Rainfall: Avoid application if rainfall is forecast within 1 hour. **Grazing:** Livestock may be grazed on treated crops 7 days following application. **Re-entry interval:** 12 hours. **Pre-harvest intervals:** Do not harvest the treated crop for 60 day after application. **Re-cropping:** Fields can be seeded 11 months following an application of Rexade A with the following crops: spring barley, spring wheat, oats, canola, flax, brown and yellow mustard, canola quality *Brassica juncea*, field pea, potato (excluding seed potato) and soybean, or fields can be summerfallowed. Sunflowers can be planted 10 months and lentils 22 months after application of Rexade.

Environmental precautions
A 1-metre buffer zone is required between the treated area and terrestrial and water habits. Do not allow spray drift to come in contact with sensitive broadleaf crops. Spray when the wind velocity is 15 km/hr or less.

Toxicity
Pyroxsulam: Acute oral LD_{50} > 3,129 mg/kg. Halauxifen: Acute oral LD_{50} > 5,000 mg/kg. 2,4-D : Acute oral LD_{50} technical = 639 - 764 mg/kg.

Storage
Store in the original containers in secure, dry, well ventilated storage. Store in heated storage. If product is frozen, bring to room temperature and agitate before use.

Rezuvant/Rezuvant XL

Group 1,4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Rezuvant A (PCP# 33262)	Corteva Agriscience	Halauxifen: 16.25 g/L + fluroxypyr: 250 g/L	Emulsifiable concentrate	4.9 L, 9.8 L
Rezuvant B (PCP# 33277)		Pinoxaden: 50g/L		10 L, 80 L
Rezuvant XL (PCP # 34045)		Halauxifen: 4.2 g/L + fluroxypyr: 104.2 g/L		9.7 L, 116.4 L
		Pinoxaden: 50g/L		

Tank mix with 189 L/acre (53 acres/jug) MCPA Ester 600. Addition of surfactant is NOT required.

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Crops, staging and rates

Crop	Staging	Rate
Spring wheat (excluding durum), winter wheat and barley	3-leaf to just prior to flag leaf emergence	Rezuvant A at 123 mL/acre + Rezuvant B at 500 mL/acre Rezuvant XL: 485 mL/acre

Weeds, rates and staging

Grass weeds controlled from 1 - 6 leaf, prior to 4th tiller

wild oats	barnyard grass	green foxtail	volunteer canary seed
proso millet	yellow foxtail	volunteer oats	

Broadleaf weeds controlled when tank mixed with 187-234 mL/acre of MCPA Ester 600. Rezuvant is meant to be mixed with MCPA and not used as a stand-alone product

American dragonhead	cow cockle	nightshade (eastern black, hairy cut leaf, up to 6-leaf)	shepherd's-purse
annual sunflower	dandelion[1]	perennial sow thistle[1]	smartweed/lady's-thumb[1]
wild buckwheat (1 - 8 leaf)	field horsetail[1]	red root pigweed (1 - 8 leaf)	stinkweed
burdock (before 4-leaf)	volunteer flax (up to 15 cm tall)	prickly lettuce	stork's-bill
Canada fleabane	flixweed	ragweed (common, false, giant)	annual sow thistle[1]
Canada thistle[1]	hemp-nettle*	round-leaved mallow	vetch
volunteer canola (1 - 8 leaf)	henbit		volunteer alfalfa (up to 25 cm)
chickweed (1 - 8 leaf)*	kochia (up to 15 cm tall)*		wild radish
cleavers (1 - 9 whorl)*	lamb's-quarter (1 - 8 leaf)		
cocklebur	wild mustard[1]		

[1] Suppression.
* Including Group 2 resistant biotypes.

Registered tank mixes

Rezuvant is not intended to be used without the addition of MCPA Ester 600. Add at the rate of 187 - 234 mL/acre (53 - 40 acres per 10 L jug). MCPA Ester 600 is not included in the Rezuvant package and must be purchased separately.

Application information

How to apply: Ground or aerial application. Use coarse nozzles for application to reduce drift risk.
Water volume: 20 - 40 L/acre for ground application, minimum 12 L/acre by air.

Application tips

For optimum control, apply to actively growing weeds. Weed control following application of Rezuvant B herbicide, in combination with Rezuvant A herbicide, can be reduced or delayed under stress conditions such as drought, heat, insufficient fertility, flooding, or prolonged cool temperatures. If foliage is wet at the time of application, control may be decreased. Under conditions of low crop and high weed density, control may be reduced. Optimum weed control will be obtained if application is delayed until the stress conditions have ended and the weeds have resumed growth.

How it works

Rezuvant A herbicide provides a Group 4 mode of action broad leaf herbicide. The group 4 mode of action disrupts normal plant growth regulation resulting in the death of susceptible plants. Rezuvant B herbicide contains a Group 1 mode of action which is absorbed by the leaves and rapidly translocated to the growing points of the leaves and stems.

Expected results

Broadleaf weeds start to twist between 2 to 20 days after spraying, depending on weather and growing conditions. Symptoms include twisting, bending and yellowing; weeds will turn brown, resulting in plant mortality. Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on grass species, growing conditions and crop competition, leaves and growing points turn yellow within 1 to 3 weeks after application, followed by browning and control 3 to 5 weeks after application.

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Restrictions

Rainfall: Rainfast within 1 hour after application. **Grazing:** Do not graze for 7 days or silage/hay for 30 days following application. **Pre-harvest interval:** Do not harvest the treated crop for grain within 60 days of application. **Re-cropping:** Fields previously treated with Rezuvant can be seeded after a minimum of 10 months to spring wheat, spring barley, oat, canola, corn, soybean, sunflower, faba bean, flax, field pea, potato (except seed potato), mustard, alfalfa, dry beans (*P. vulgaris* species including pinto, kidney and white types) and timothy. Lentils can be planted 22 months after application of Rezuvant. **Re-entry interval:** 12 hours.

Environmental precautions

Do not contaminate any body of water, including irrigation water. Use a buffer zone of 2 metres between terrestrial habitat and a minimum of 1 metre between aquatic habitats.

Toxicity

Acute oral LD_{50} (rats) = >5,000 mg/kg.

Storage

Store in original containers in a secure, dry, well ventilated and heated storage.

Roundup Xtend® with VaporGrip® Technology/Roundup Xtend® 2 with Vaporgrip® Technology herbicide

Group 4, 9

Formulation

Product	Company	Active ingredient	Formulation	Container size
Roundup Xtend® with VaporGrip® Technology (PCP# 32274)	Bayer	Glyphosate, present as monoethanolamine salt: 240 g ae/L Dicamba, present as monoethanolamine salt: 120 g/L	Solution	10 L, 450 L
Roundup Xtend® 2 with VaporGrip® Technology (PCP# 33502)	Bayer	Glyphosate, present as monoethanolamine salt: 317 g a.e./L Dicamba, present as monoethanolamine salt: 120 g a.e./L	Solution	10 L, 450 L

Crops, staging and rates

Crop	Staging	Rate
Corn with Roundup Ready 2® Technology (Do not apply to sweet corn, corn grown for seed production, or corn without Roundup Ready 2 Technology)	Pre-emergence: prior to the crop	**Roundup Xtend with VaporGrip Technology:** 1 - 2 L/acre per application and do not exceed 4 L/acre during a single growing season 2.0 L/acre rate can be used only ONCE per season and is recommended early, with up to 2 applications of 1 L/acre prior to R1. The 3rd application should only be made for the control of glyphosate-resistant weed populations **Roundup Xtend 2 with Vaporgrip Technology:** 0.77 - 1.52 L/acre. Total application of Roundup Xtend 2 withVaporGrip® Technology in a growing season must not exceed 3 L/ac. A third application of Roundup Xtend® 2 with VaporGrip® Technology should only be made for the control of glyphosate-resistant weed populations. The 1.52 L/acre rate is to be used only once in a season and should be applied pre-plant, per-emergence or early post-emergence (spike to 5-leaf corn).
	Post-emergence: spike to 5-leaf stage	

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Weeds, rates and staging

Rate per acre - Roundup Xtend	Rate per acre - Roundup Xtend 2	Weeds controlled:		
1.0 L	0.77 L	**Annual broadleaf weeds:** buckwheat (tartary, wild) chickweed cleavers corn spurry cow cockle flixweed hemp-nettle narrow-leaved hawk's-beard night-flowering catchfly kochia lamb's-quarter	mustard, wild pigweed, redroot shepherd's-purse smartweed (green, lady's-thumb) stinkweed stork's-bill Russian thistle volunteer canola (non-glyphosate-tolerant) wild tomato	**Annual grass weeds:** barnyard grass green foxtail volunteer barley volunteer wheat wild oats Perennial weeds: Canada thistle* dandelion (suppression only) foxtail barley* quackgrass sow thistle (perennial)*
1.5 L	1.14 L	*All weeds listed above plus:* **Annual broadleaf weeds:** biennial wormwood (2 - 8 leaf stage) bur cucumber (up to 18 leaf stage)* cocklebur Canada fleabane (post-emergent up to 8 cm) eastern black nightshade narrow-leaved vetch	pigweed (smooth) prickly lettuce ragweed (common) round-leaved mallow* smartweed (Pennsylvania) sow thistle (annual) stork's-bill volunteer flax	**Annual grass weeds:** annual blue grass downy brome proso millet Persian darnel yellow foxtail **Perennial weeds:** common milkweed* dandelion** (pre-emergent to crop) field bindweed* foxtail barley yellow nutsedge*
2.0 L	1.52	*All weeds listed above plus:* mustard (hare's-ear, Indian, tumble, wormseed) Russian pigweed ragweed (false, giant)	**Short term residual activity on annual broadleaf weeds:** lamb's-quarter redroot pigweed ragweed (common) wild buckwheat	

Notes: * Single application provides suppression. Sequential applications provide control. For sequential applications, ensure the crop has not advanced beyond the recommended growth stage. The sequential application should be applied at least 2 weeks after the first application.

** Control with a single application prior to seeding in the spring. The addition of 360 g ae/acre of additional glyphosate (see Registered Tank Mixes) will improve control of heavy infestation and plants over 15 cm (6 inches) across.

Registered tank mixes

Herbicides: glyphosate (Roundup brands) – top up of total glyphosate to a maximum of 720 g ae/acre. DO NOT add acidifying buffering agents, acidic pH adjusting agents or adjuvants other than agriculturally approved NIS to the spray solution. DO NOT add ammonium sulfate (AMS), AMS-containing adjuvants, water conditioners or sprayable fluid fertilizers. Check labels of products to be mixed for directions.

Application information

With: Ground application only. Do not apply by air. **Water volume:** 40L/acre minimum.
Nozzles and pressure: Use only nozzles that produce extremely coarse or ultra-coarse droplet sizes. Refer to label for a full description of application requirements. DO NOT allow herbicide solution to mist, drip, drift or splash onto desirable vegetation because severe injury or destruction to desirable broadleaf plants could result. Apply when air temperature is between 10 and 25°C. DO NOT spray when the temperature is expected to exceed 30°C.
When applying Roundup Xtend adjacent to sensitive crops, apply as a pre-plant, pre-emergent or early post-emergent treatment to avoid potential drift onto the sensitive crops. Apply to small actively growing weeds less than 10 cm (4 inches) in height or width.

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Restrictions

Rainfall: Within 4 hours of application may reduce control. **Grazing:** DO NOT permit lactating dairy animals to graze fields within 7 days after application. DO NOT harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.
Re-cropping: A plant-back interval of 120 days is required for those crops not on the label of Roundup Xtend/Roundup Xtend 2 with VaporGrip Technology. Do not count days when the ground is frozen. Moisture is essential for the degradation of this herbicide in soil. If dry weather persists after application, crop injury may occur the following spring.

Environmental precautions

Buffer zones of 15 metres are required between the area of application and aquatic and terrestrial sensitive areas. Distance is measured from the downwind edge of the boom to sensitive areas. **Runoff:** Avoid runoff risk under conditions of heavy rainfall, moderate to steep slope, bare soil, poorly draining soil. **Leaching:** This product will move with water. Avoid using in areas where soils are permeable and/or the depth to the water table is shallow.

Toxicity

Dicamba: Oral LD_{50} (rats) = 2,629 mg/kg. Glyphosate: Oral LD_{50} (rats) = 4,320 mg/kg.

Storage

Store above -10°C to keep product in solution. If product freezes and crystals form, place in a warm room, allow the product to reach room temperature and roll or shake periodically until crystals have re-dissolved.

Samurai Master

Groups 1, 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Samurai Master co-pack of: Samurai (PCP#33033) Independence (PCP#32851)	NewAgco Inc	Imazamox: 70%	Water dispersible granules	117 grams
		Clethodim: 240 g/L	Emulsifiable concentrate	8 L

Note: Assasin or Merge adjuvant is required at 0.5% v/v but not supplied.

Crops, staging and rates

Crop	Stage	Rates
Field peas	1 - 6 true leaf	Samurai: 11.7 g/acre + Independence: 50 mL/acre + Assassin or Merge Adjuvant: 0.5% v/v (5.0 L per 1000 L of spray solution)

Weeds, sates and staging

Grasses: 1 - 4 true leaf stage

barnyard grass
volunteer cereals
witchgrass
green foxtail
volunteer corn
yellow foxtail
Japanese brome grass*
volunteer canary grass
proso millet
wild oats

Broadleaves: cotyledon - 4 leaf stage

cleavers*
lamb's-quarter
shepherd's-purse
wild buckwheat*
cow cockle
redroot pigweed
stinkweed
wild mustard[t]
kochia*[t]
round-leaved mallow*
volunteer canola (non-Clearfield tolerant canola only)
Russian thistle

* Suppression

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[t] **Note:** Recent surveys of kochia in Alberta have found 90% of fields contain kochia that are resistant to Group 2 herbicides. Without testing, assume kochia in your field is resistant to Group 2 herbicides and use other herbicide groups to control kochia. Some wild mustard populations may also be resistant to Group 2 herbicides.

Registered Tank Mixes

Application information

How to Apply: Apply with ground equipment only. Do not apply by air. **Water Volume:** 40 L/acre.

Mixing Instructions

Use mixing instructions "b" on page 15.

Application tips

Water soluble bags will dissolve better when kept intact; do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray MP Samurai Master if temperatures of 5ºC or lower are forecasted within 3 days of application. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield.

How it works

Imazamox is absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions. Clethodim is a systemic herbicide that is translocated from the treated foliage to the growing points of leaves, shoots and roots.

Expected results

Leaf foliage will first change from green to yellowing, then purplish and finally a brown colour. The time required for complete control is 7 to 21 days following treatment, depending on growing conditions and crop competition.

Restrictions

Rainfall: Rainfall within 3 hours of application may reduce control. **Grazing:** Do not graze treated crop or cut for feed within 60 days of application. Do not harvest treated crops within 75 days of application.
Pre-harvest intervals: Do not harvest the treated crop within 60 days of application. **Re-cropping:** The following crops may be grown safely the year following an application: Field pea, canola, spring wheat, durum wheat, spring barley, tame oats, flax, Clearfield® sunflower. There are insufficient data for other follow crops. Conduct a field bioassay (a test strip grown to maturity) the year before growing any crop other than those listed above.
Re-entry interval: 12 hours.

[t] Initial injury to non-Clearfield canola may be observed.

Environmental precautions: TMP Samurai Master is highly toxic to aquatic plants and non-target terrestrial plants, and moderately to highly toxic to aquatic organisms. Leave at least an 11-metre buffer strip between the point of application and sensitive aquatic and terrestrial habitats.

Toxicity

Imazamox: Acute oral LD_{50} (rats) = 5,000 mg/kg. Clethodim: Acute oral LD_{50} (rats) = 2,920 mg/kg.

Storage

Store at temperatures above 5ºC. Keep unused water soluble bags in resealed, original container. Keep packages dry at all times.

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Select/Select 1EC/Centurion/Arrow 240 EC/Arrow All-In/Shadow RTM/ Patron 240 EC/Antler 240 EC/Statue/ Independence/Clethodim 250/Advantage Clethodim 240/Antler 360 Unpacked/FBN Clethodim 240/IPCO GraminX

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Select (PCP# 22625) + Amigo (PCP# 22644)	UPL AgroSolutions	Clethodim: 240 g/L	Emulsifiable concentrate	3 L
		Surfactant: 30%		9 L
Select 1EC* (PCP # 34250)	UPL AgroSolutions	Clethodim: 120 g/L		6.1 L, 97.6 L
Centurion (PCP# 27598) + Amigo (PCP# 22644),	BASF	Clethodim: 240 g/L		3 L
		Surfactant: 30%		9 L
Arrow 240 EC (PCP# 28224) + X-Act (PCP# 28225)	ADAMA Canada	Clethodim: 240 g/L		3 L
		Surfactant: 30%		9 L
Arrow All-In (PCP# 33225)*	ADAMA Canada	Clethodim: 120 g/L		6 L, 96 L
Shadow RTM (PCP# 29277) + Amigo (PCP# 22644)	Loveland Products	Clethodim: 240 g/L	Emulsifiable concentrate	3 L
		Surfactant: 30%		9 L
Patron 240 EC (PCP# 32495) + Patron adjuvant (PCP# 32496)	Federated Co-operatives Ltd.	Clethodim: 240 g/L		3 L
		Surfactant: 30%		9 L
Antler 240 EC (PCP# 32880)	WinField United Canada	Clethodim: 240 g/L		3 L
		Journey HSOC		7.5 L
Independence (PCP# 32851) + Empire II (PCP # 32615)	NewAgco Inc	Clethodim: 240 g/L		6 L, 72 L
	NewAgco Inc	Adjuvant: 30%		15 L, 180 L
Statue Herbicide (PCP# 32885)**	Nufarm Agriculture	Clethodim: 240 g/L		3 L
Clethodim 250 (PCP # 32334)	Albaugh LLC	Clethodim: 240 g/L		3 L
		Surfactant: 30%		9 L
Advantage Clethodim 240 (PCP # 33721)	Advantage Crop Protection Inc	Clethodim: 240 g/L		3 L
		Surfactant: 30%		9 L
Antler 360 Unpacked (PCP # 33866)	Winfield United Canada	Clethodim: 360 g/L		4 L
		Adjuvant sold separately		
FBN Clethodim 240 (PCP # 33646)	Farmer's Business Network	Surfactant: 30%		3 L
		Clethodim: 240 g/L		9 L

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Product	Company	Active ingredient	Formulation	Container size
IPCO GraminX (PCP # 33659)	**IPCO**	Clethodim: 240 g/L	Emulsifiable concentrate	3 L
IPCO X-Surf Adjuvant (PCP # 33660)		Surfactant: 30%		9 L

***Note: These products do not need a surfactant as it is already in the product.** **Carrier surfactant sold separately.

Crops, staging and rate

Crops are tolerant at all growth stages with the exception of chickpeas, fenugreek, prairie carnation, safflower, dry onions, dill and coriander, although maximum rates and pre-harvest intervals must be observed to prevent excess residues in the grain.

Maximum application rate: Chickpea (prior to 9 node stage), faba bean, dry beans, spinach and prairie carnation (2 - 5 leaf)) – 76 mL/acre, Arrow All-In/Select 1EC – 153 mL/acre. All other crops listed below – 152 mL/acre, Arrow All-In/Select 1EC – 305 mL/acre.

alfalfa (seedling)
canola
caraway*
carrot
coriander* (2 - 5 leaf)
dill* (3 - 5 leaf)
dry onions (1 - 4 leaf)
fenugreek (3 - 5 leaf)*[1]
field pea
flax
lentil
mustard (oriental, brown)
yellow mustard
parsnip
potato
radish
red garden beet
safflower[1]
soybean
spinach*[1]
sunflower

* 1 application per year.

[1] Select, Select 1EC and Centurion only.

Note: Dry common bean varieties may vary in their tolerance to clethodim (Arrow/Centuron/Select/Shadow/Patron). Since not all dry common bean varieties have been tested for tolerance to clethodim, first use of clethodim should be limited to a small area of each variety to confirm tolerance prior to adoption as a general field practice. Additionally, consult your seed supplier for information on the tolerance of specific varieties of dry common beans to clethodim.

Weeds, rates and staging

Weed species	Leaf stage	Rate per acre Antler 360/ Select etc./ Arrow All-In/Select 1EC	Rate of surfactant**
Green foxtail, volunteer cereals, wild oats, yellow foxtail	2 - 4 leaf	34/50/100 mL	0.5% v/v
Barnyard grass, fall panicum, proso millet, volunteer canary grass, volunteer corn, witch grass	2 - 6 leaf		
Barnyard grass, crabgrass, fall panicum, foxtail barley, green foxtail, Japanese brome, Persian darnel, proso millet, volunteer canary grass, volunteer cereals, volunteer corn, wild oats, witch grass, yellow foxtail	2 - 6 leaf	51/76/153 mL	0.5% v/v.
Quackgrass (suppression only*)	2 - 6 leaf	51/76/153 mL	
Quackgrass control (season-long), control of Japanese brome, foxtail barley	2 - 6 leaf	101/152/305 mL	1.0 % v/v

* For quackgrass suppression. Most effective results are achieved when application is made at the 3 - 5 leaf stage, when the canopy is uniform and actively growing. **Arrow All-In and Select 1EC do not require the addition of a surfactant

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Select/Centurion/Arrow 240 EC/Arrow All-In/Shadow RTM/Patron 240 EC/Antler 240 EC/Statue/ Independence/Clethodim 250/Advantage Clethodim 240/Antler 360 Unpacked/ FBN Clethodim 240 (cont'd)

Registered tank mixes

Note: not all tank mixes may be registered for all clethodim herbicides. Check label for instructions.

Tank mix partner	Tank mix partner rate	Additional weeds controlled
Flax (including Solin)		
Buctril M/Badge	Clethodim: 76 - 152 mL/acre, OR Arrow All-In/Select 1EC: 153 - 305 mL/acre (no adjuvant required for All-In/Select 1EC) + Buctril M: 400 mL/acre + Amigo: 0.5% v/v OR Badge II: 500 mL/acre + X-Act: 0.5% v/v.	Clethodim susceptible weeds plus certain seedling broadleaf weeds. Note: Do not apply this tank mix in hot, humid weather when temperatures are over 25 - 29ºC
Badge (only with Arrow 240)	Clethodim: 76 - 152 mL/acre OR Arrow All-In/Select 1EC: 153 - 305 mL/acre (no adjuvant required for All-In/Select 1EC) + Badge: 500 mL/acre + X-Act: 0.5 % v/v.	
Curtail M	Clethodim: 76 mL/acre OR Arrow All-In/Select 1EC: 153 mL/ acre (no adjuvant required for All-In/Select 1EC) + Curtail M: 600 - 800 mL/acre + Amigo: 0.5 % v/v.	Clethodim susceptible weeds plus wild buckwheat and Canada thistle
Lontrel 360	Clethodim: 76 mL/acre OR Arrow All-In/Select 1EC: 153 mL/ acre (no adjuvant required for All-In/Select 1EC) + Lontrel 360: 230 - 340 mL/acre + Amigo: 0.5 % v/v.	
MCPA* (not Solin varieties)	Clethodim: 76 - 152 mL/acre OR Arrow All-In/Select 1EC: 153 - 305 mL/acre (no adjuvant required for All-In/Select 1EC) + MCPA ester 600: 340 mL + Amigo: 0.5 % v/v.	Clethodim susceptible weeds plus certain seedling broadleaf weeds
Canola		
Lontrel	Clethodim: 76 mL/acre OR Arrow All-In/Select 1EC: 153 mL/ acre (no adjuvant required for All-In/Select 1EC) + Lontrel 360: 169 - 335 mL/acre + Amigo: 0.5 % v/v.	Clethodim susceptible weeds plus wild buckwheat and Canada thistle
Muster	Clethodim: 76 mL/acre OR Arrow All-In/Select 1EC: 153 m:/ acre (no adjuvant required for All-In/Select 1EC) + Muster: 8 - 12 g/acre + Amigo: 0.5 % v/v.	Clethodim susceptible weeds plus wild mustard, stinkweed, green smartweed and redroot pigweed, hemp-nettle, flixweed (seedlings)
Group 2 tolerant canola		
Pursuit	Clethodim: 76 mL/acre OR Arrow All-In/Select 1EC: 153 mL/ acre (no adjuvant required for All-In/Select 1EC) + Pursuit: 40 - 85 mL/acre + Amigo: 0.5 % v/v.	Clethodim susceptible weeds plus chickweed, hemp-nettle, red root pigweed, stinkweed, volunteer canola (except Group 2 tolerant), wild buckwheat, wild mustard
Field peas		
Pursuit	Clethodim: 76 mL/acre OR Arrow All-In/Select 1EC: 153 mL/acre (no adjuvant required for All-In/Select 1EC) + Pursuit: 85 mL/acre + Amigo: 0.5 % v/v.	
Liberty Link/glufosinate tolerant canola		
Liberty 150 SN/ Interline	Clethodim: 25 - 75 mL/acre OR Arrow All-In/Select 1EC: 50 - 100mL/acre (no adjuvant required for All-In/Select 1EC) + Liberty: 1.1 - 1.62 L/acre + Amigo: 0.5 % v/v.	Wild oat, volunteer barley, volunteer wheat, volunteer oats, Liberty susceptible weeds.

* Flax may be treated from 5 cm tall to just before the bud stage.

BASF also supports the following mixes that are not on the Centurion label. Centurion with Odyssey in field pea, alfalfa, CLEARFIELD canola and CLEARFIELD lentils, Headline in chickpea, dry bean, lentil and field pea, Proline with chickpea and lentil, Quadris or Quilt in chickpea, dry bean, lentil and field pea, Decis and Sevin XLR. Loveland Products support the same unregistered tank mixes with Shadow RTM. Apply mixes according to the most restrictive use limitations for either product. Adama supports the same unregistered tank mixes with Arrow 240 EC as well as Phantom 240 SL in pea. NewAgco (Independence) and Nufarm (Statue) supports the following mixes: Boa, Buck M, Clobber, Clobber M, Kamikaze, MP MCPA ester, Ninja, Vigor.

Application information

With: Apply with ground equipment. Some crops are registered for use by aerial applications. Refer to label for list of crops registered for aerial applications. **Water volume:** Ground – 22 - 91 L/acre. Aerial application – 11 L/acre minimum.

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Mixing instructions
Use mixing instructions "c" on page 15.

Application tips
The use of 80° stainless steel flat fan nozzles tilted 45° forward is recommended for optimum spray coverage. Use high water volumes on dense crop canopies for better penetration to weeds.

How it works
Clethodim is a systemic herbicide that is translocated from the treated foliage to the growing points of leaves, shoots and roots.

Expected results
Weeds: Leaf foliage will first change from green to yellowish, then purplish and finally a brown colour. The time required for complete control is 7 to 21 days following treatment, depending on growing conditions and crop competition.

Restrictions
Rainfall: Rainfall within 1 hour of application may reduce the effectiveness of the spray. **Grazing:** Do not cut treated crops for feed or graze until 60 days after application to annual crops and 30 days after application to seedling alfalfa.
Pre-harvest intervals: Canola, coriander, common dry bean, caraway, chickpea (desi, Kabuli), faba bean, flax (including Solin), lentil, potato and mustard (brown, yellow oriental): 60 days. Alfalfa, carrot, fenugreek, radish, red garden beet and parsnip – 30 days. Dill – 40 days Sunflower – 72 days. Field pea, soybean – 75 days.
Re-entry interval: 12 hours.

Environmental precautions
Clethodim is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application.

Toxicity
Acute oral LD_{50} (male rats) = 2,920 mg/kg.

Storage
Does not require heated storage.

Sencor® 480 F Herbicide/Sencor® 75 DF Herbicide/Squadron II/Tricor/Metrix SC/ Buzzin/Meter 75 DF/Meteor

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Squadron II (PCP# 33382)	ADAMA Canada	Metribuzin: 75%	Water dispersible granules	5 kg
Tricor 75 DF (PCP# 30661)	UPL AgroSolutions	Metribuzin: 75%	Dry flowable	2.5 kg
Tricor LQ (PCP# 33911)	UPL AgroSolutions	Metribuzin: 480 g/L	Suspension	9.46 L
Metrix SC (PCP# 32876)	Sharda Cropchem Ltd	Metribuzin: 480 g/L	Suspension	1 L to 1,050 L
Buzzin (PCP# 32756)	Sharda Cropchem Ltd	Metribuzin: 70%	Wettable granule	2.5 kg
Meter 75 DF (PCP # 33932)	Sharda Cropchem Ltd	Metribuzin: 75%	Dry flowable	2.5 kg
Sencor® 480 F (PCP # 26280)	Bayer	Metribuzin: 480 g/L	Suspension	5 L
Sencor® 75 DF (PCP # 17242)	Bayer	Metribuzin: 75%	Dry flowable	2.5 kg
Meteor (PCP # 34370)	NewAgco Inc	Metribuzin: 75%	Water dispersible granules	5 kg

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Sencor® 480 F herbicide/Sencor® 75 DF herbicide Squadron/Tricor/Metrix SC/ Buzzin/Meter 75 DF/Meteor (cont'd)

Crops, staging and rates

Crop	Rates per acre (rate depends on soil texture)			
	Staging	Squadron, Tricor 75 DF, Sencor 75 DF, Meter 75/Meteor	Metrix, Tricor LQ, Sencor 480 F	Buzzin
Barley	2 - 5 Leaf	81 - 152 g/acre	112 - 222 mL/acre	87 - 163 g/acre
Spring wheat (including durum)	2 - 5 leaf	81 - 111 g/acre	112 - 172 mL/acre	87 - 119 g/acre
Field pea	Post-emergence, up to 15 cm vine length	110 - 152 g/acre	283 - 344 mL/acre	119 - 163 g/acre
	Post-emergence (split application*)	56 - 77 g/acre	85 - 114 mL/acre	61 - 83 g/acre
	Pre-plant incorporated when tank mixed with Treflan or Rival	150 - 220 g/acre	223 - 344 mL/acre	163 - 239 g/acre
Chickpea	Up to 6 cm height	110 g/acre	167 mL/acre	119 g/acre
Lentil	Post emergence, up to 15 cm	110 g/acre	172 mL	119 g/acre
Soybean	Pre-plant incorporated when tank mixed with Treflan	111 - 223 g/acre	172 - 344 mL/acre	119 - 239 g/acre
Faba bean	Pre-plant incorporated when tank mixed with Treflan	110 - 220 g/acre	172 - 344 mL/acre	119 - 239 g/acre
Potatoes	Pre-plant incorporated with Eptam	152 - 222 g/acre	223 - 344 mL/acre	163 - 239 g/acre
	Pre-emergence (irrigation) with Eptam	152 - 300 g/acre	223 - 446 mL/acre	163 - 325 g/acre
	Early post-emergence, up to 10 cm	152 g/acre	222 mL/acre	
Potatoes (under irrigation)	Pre-plant incorporated with Komodo/ Dual II Magnum or Eptam	303 - 607 g/acre	445 - 911 mL/acre	
	Pre-emergence	223 - 607 g/acre	344 - 911 mL/acre	
	Early post-emergent	223 - 607 g/acre	344 - 911 mL/acre	
Shelterbelt	Pre-plant incorporated – spring when tank mixed with Treflan EC	161 g/acre + Treflan: 2.1 L/acre	243 mL/acre + Treflan	173 g/acre + Treflan
(Alberta only) Alfalfa (grown under irrigation)**	Dormant established crops (fall application)		910 mL/acre	

* First application followed by second application, 7 - 10 days later in the same range. ** Treatment must occur 18 months or more after seeding.

Weeds, rates and staging

Post-emergence applications

Barley, wheat (including durum): apply metribuzin at a rate of 81 g/acre or 111 mL/acre Metrix/Tricor LQ/ Sencor 480 F

chickweed, green smartweed, hemp-nettle (suppression), lady's-thumb, lamb's-quarter, redroot pigweed, stinkweed, volunteer canola, wild mustard

Barley, wheat (including durum): apply metribuzin at a rate of 111 - 152 g/acre, 172 - 222 mL/acre Metrix/Tricor LQ/ Sencor 480 F: all the above weeds plus control of

ball mustard, common groundsel, corn spurry, hemp-nettle, henbit (high rate only), night-flowering catchfly, Russian thistle (high rate only), tartary buckwheat, wormseed mustard

Winter wheat (Norstar only): apply metribuzin at a rate of 226 - 303 g/acre, 344 - 453 mL/acre Metrix/Tricor LQ/ Sencor 480 F

downy brome, flixweed, shepherd's-purse, stinkweed

Chickpea, lentils (suppression only): apply metribuzin at a rate of 111 g/acre, 172 mL/acre Metrix/Tricor LQ/ Sencor 480 F

ball mustard, common chickweed, corn spurry, green smartweed, hemp-nettle, lamb's-quarter, stinkweed, tartary buckwheat, volunteer canola, wild mustard

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Field pea: apply metribuzin at a rate of 111 - 151 g/acre,172 - 222 mL/acre Metri/Tricor LQ/ Sencor 480 F

ball mustard	green smartweed	stinkweed	volunteer canola
common chickweed	hemp-nettle	tartary buckwheat	wild mustard
corn spurry	lamb's-quarter		

Potato: apply metribuzin at a rate of 152 g/acre, 222 mL/acre Metrix/Tricor LQ/ Sencor 480 F: do not use post-emergence on varieties Atlantic, Eramosa, red-skinned or any early maturing varieties

ball mustard	green smartweed	lamb's-quarter	tartary buckwheat
common chickweed	hemp-nettle	redroot pigweed	volunteer canola
corn spurry	lady's-thumb	stinkweed	wild mustard

Alfalfa (under irrigation): apply TriCor LQ / Sencor 480 F at a rate of 910 mL/acre

annual sow thistle	green foxtail	pasture sage	shepherd's-purse
downy brome	kochia	redroot pigweed	stinkweed
flixweed	lamb's-quarter	Russian thistle	wild oat

Pre-plant incorporated applications
Must be applied in a tank mix with Treflan EC, Eptam 8-E or Rival – check tank mix label for additional weeds and rates.

Registered tank mixes - post-emergence

Note: Not all tank mixes are registered with all metribuzin products. Check label for registered mixes. For barley the rate of metribuzin is 80 - 150 g/acre, wheat (durum and spring) 80 - 110 g/acre.

Tank mix partner	Staging	Tank mixture partner rate (per acre)
Barley, spring wheat (including durum) - post-emergence		
2,4-D amine	3 - 5 leaf	344 - 445 mL
MCPA	3 - 5 leaf	344 - 445 mL
Field peas - post-emergence		
MCPA (Na-salt)	Vine: 15 cm long	188 mL
Potatoes (under irrigation) - early post-emergent		
Prism + Adjuvant	Less than 10 cm high	24 g + 0.2% v/v

Tank mix partner	Metribuzin/Metrix/Tricor LQ	Tank mix partner rate (per acre)
Potatoes - pre-plant incorporated		
Eptam	152 - 222 g/222 - 344 mL	1.7 - 2.2 L
Potato (sprinkler irrigation) - pre-emergence		
Eptam	152 - 304 g/222 - 445 mL	1.7 - 2.2 L
Tank mix partner	**Tricor 75 DF/Tricor LQ**	**Tank mix partner rate (per acre)**
Potatoes (under irrigation) – pre-plant incorporated		
Dual II Magnum/Komodo*	Tricor 75 DF: 305 - 607 g/acre Tricor LQ: 445 - 911 mL/acre	506 - 709 mL
Eptam	Tricor 75 DF: 305 - 445 g/acre Tricor LQ: 445 - 709 mL/acre	1.7 - 2.2 L
Potatoes (under irrigation) – pre-plant incorporated		
Dual II Magnum/Komodo*	Tricor 75 DF: 305 - 607 g/acre Tricor LQ: 445 - 911 mL/acre	506 - 709 mL

*Komodo tank-mixes are only registered with TriCor LQ.

Application information

With: Ground application only. Do not apply by air. **Water volume:** Ground – post-emergence barley, wheat – 30 - 40 L/acre. Chickpea, lentil, pea – 70 L/acre. Pre-plant incorporated (field pea, lentil, faba bean, soybean) – 40 L/acre. Potato – 40 - 120 L. Note: In potato, higher rates of water increase crop tolerance.

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Sencor® 480 F herbicide/Sencor® 75 DF herbicide Squadron/Tricor/Metrix SC/ Buzzin/Meter 75 DF/Meteor (cont'd)

Mixing instructions

Use mixing instructions "a" on page 15.

Incorporation

Be aware of soil organic matter levels when applying metribuzin either alone or with a soil incorporated mix with other herbicides. Special conditions may apply.

With irrigation: Metribuzin + Eptam – Potatoes – pre-emergence in sprinkler irrigation. Apply specified dosage in 8 to 19 mm of water per hectare (3.8 mm/acre) on a continuous injection in centre pivot systems, or in the last 15 to 30 minutes of set in permanent solid set sprinkler system of self-propelled wheel move systems. On sandy soil, apply in 8 to 12 mm of water and use the lower rate of metribuzin and Eptam. Apply pre-emergence to crop and weeds. Use the higher rate for control of grassy weeds or when broadleaf weeds are dense.

Application tips

Allow 4 to 5 days between application of metribuzin and post-emergent wild oats herbicides. Allow 4 to 5 days after frost for crop to recover before applying metribuzin. Weed control may be reduced if applied later than the 5-leaf stage of crop. Crop may be sprayed when wet with dew. When incorporated, crop must be planted at least 5 cm below soil surface. Uneven application or improper incorporation of can result in erratic weed control or crop injury depending on rate used.

Stress conditions such as seedling disease, cold weather, deep planting, excessive moisture, high salt concentration, or drought may weaken seedlings and increase the possibility of crop damage from the herbicides. Temporary lightening in colour may occur on the margin of leaves or cotyledons and a slight delay in crop development may be observed. This is quickly outgrown and usually has no lasting effect.

How it works

A systemic herbicide absorbed by leaves and roots and translocated to new growth. Inhibits photosynthesis and the weed turns brown and dies.

Expected results

Broadleaf weeds: Initial yellowing 5 to 7 days after application; weeds turn brown and die within 14 to 16 days. Active in soil for a short period and can control new shallow-rooted germinants, like chickweed.

Crops: In extremely hot weather or when frost occurs within 1 to 2 days of application, crop will show some yellowing and slight reduction in height. Discolouration disappears in 7 to 10 days. On some barley varieties, temporary lightening in colour and reduction in height may occur. Lentils and peas provide little competition against weed growth due to their low growth habit. Under heavy weed infestations or lush growth, control may be poor.

Field pea and lentil: Stressful conditions increase the possibility of damage. Temporary lightening on the margins of cotyledons and a slight delay in development may occur. Ensure 70 L/acre Water volume is used to reduce crop injury.

Restrictions

Rainfall: Rainfall within 6 hours after application may reduce weed control. **Re-entry interval:** 12 hours. **Grazing:** Spring wheat and barley – 30 days, peas (field and processing), chickpea, lentil – 70 days. Other crops – not specified. **Pre-harvest intervals:** Spring wheat, barley, potatoes – 60 days. Processing peas, chickpea – 40 days. Field pea, lentil – 70 days. Other crops – not specified. **Re-cropping:** 24 months are required for crops other than potatoes if 910 mL/acre (610 g/acre) is applied. Canola, celery, cole crops, cucurbits, lettuce, onion, pepper, spinach, sugar beet, table beet and turnip may be injured if planted in soil treated with metribuzin during the year of application and the following crop year. Fall seeded or cover crops such as wheat, oats, and rye may be injured when seeded in the same season as the application of metribuzin.

Environmental precautions

Avoid contamination of water bodies through the use of buffer zones: 5 metres for aquatic habitats and 10 metres between sensitive terrestrial habitats.

Toxicity

Acute oral LD_{50} (male/female combined rats) = 1,471mg/kg.

Storage

No damage by freezing but avoid large temperature fluctuations. Store in a cool, dry place.

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Sentrallas

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Sentrallas (PCP# 32143)	FMC of Canada Limited	Thifensulfuron-methyl:30 g/L	Suspension	8 L
		Fluroxypyr (present as 1-methylheptyl ester): 150 g a.e. /L		

Crops, staging and rate

Weed species	Stage	Rate per acre
Wheat (spring, durum), barley, oats	Two leaf stage to the flag leaf (shot blade) stage	202 mL
Winter wheat	Apply in the spring from the 3 tiller to just before the flag leaf (shot blade) stage	202 mL

Weeds, rates and staging

For best results, apply to young, actively growing weeds that are less than 10 cm in height or diameter. Thorough coverage of target weeds is essential.

annual smartweed (green smartweed, lady's thumb)
chickweed[1]
cleavers (1 - 4 whorl)
corn spurry
cow cockle
hemp-nettle
kochia (including Group 2 resistant)
lamb's-quarter
redroot Pigweed
Russian Thistle
stinkweed
wild buckwheat (1 - 5 leaf)[2]
wild mustard

[1]Chickweed: Apply Sentrallas® herbicide when the chickweed is small (1 - 6 leaf) and actively growing but before crop canopy prevents thorough coverage of weeds. Chickweed emerging after application will not be controlled. [2]Wild Buckwheat: Apply Sentrallas® herbicide to actively growing wild buckwheat in the 1 - 5 leaf stage. Under dry conditions control may be reduced. Large plants may regrow after treatment.

Registered tank mixes

Note: not all tank mixes may be registered for all clethodim herbicides. Check label for instructions.

Tank mix partner	Tank mix partner rate	Additional weeds controlled
Spring wheat (including durum), winter wheat, spring barley and oats		
MCPA Amine or Ester 500	283 - 445 ml/ac	All weeds with Sentrallas alone plus ball mustard, burdocks (seedling), cocklebur, shepherd's-purse[1], volunteer canola, wild radish, wormseed mustard, false ragweed, flixweed (seedlings), giant ragweed, hare's-ear mustard, Indian mustard, plantain (common), prickly lettuce, ragweed, Russian pigweed[1]
MCPA Ester 600	234 - 364 ml/ac	
Weeds Controlled by MCPA Ester 500 at 226 ml/ac or MCPA Ester 600 at 190 ml/ac: Weeds controlled or suppressed by Sentrallas® herbicide alone plus volunteer canola (2-4 leaf stage) including imazethapyr tolerant canola varieties (e.g. Clearfield* canola or other varieties with the Pursuit* Smart trait).		

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Sentrallas (cont'd)

Tank mix partner	Tank mix partner rate	Additional weeds controlled
Wheat (spring, durum, winter) and spring barley		
2,4 D ester LV700	202 - 323 mL/ac	All weeds with Sentrallas alone plus annual sow thistle, ball mustard, bluebur and burdock (before the 4th leaf stage), cocklebur, common plantain, common ragweed, daisy fleabane, false flax, false ragweed, flixweed (spring seedlings), giant ragweed, goat's-beard, hare's-ear mustard, Indian mustard, narrow-leaved hawk's-beard, prickly lettuce, ragweed, Russian pigweed, shepherd's-purse, stinging nettle, sweet clover (seedling), thyme-leaved spurge, tumble mustard, volunteer canola, wild radish, wild sunflower, wormseed mustard
Spring wheat (excluding durum), winter wheat and spring barley		
Axial* Herbicide	485 mL/ac	All weeds with Sentrallas alone plus wild oats
Axial* Herbicide + MCPA Ester	485 mL/ac + (226 mL/ac MCPA Ester 500 or 190 mL/ac MCPA Ester 600)	All weeds with Sentrallas alone plus wild oats and volunteer group 2 herbicide tolerant canola
Spring wheat, durum wheat and winter wheat		
Simplicity + Adjuvant (Agral 90 or Ag Surf)	202 ml/ac + 2.5 litres per 1000 litres of spray solution	All weeds with Sentrallas alone plus all weeds controlled by Simplicity alone
Simplicity + MCPA Ester	202 mL/ac + (226 mL/ac MCPA Ester 500 or 190 mL/ac MCPA Ester 600)	All weeds with Sentrallas alone plus all weeds controlled by Simplicity alone and volunteer group 2 herbicide tolerant canola
Varro	202 mL/ac	All weeds with Sentrallas alone plus wild oats
Varro + MCPA Ester	202 mL/ac + (226 mL/ac MCPA Ester 500 or 190 mL/ac MCPA Ester 600)	All weeds with Sentrallas alone plus wild oats and volunteer group 2 herbicide tolerant canola
Spring wheat and durum wheat		
Horizon NG Herbicide	376 mL/ac	All weeds with Sentrallas alone plus wild oats

[1] Use higher rate of MCPA

FMC supports the following mixes not on the Sentrallas label. Apply tank mixes according to the most restrictive use limitations for either label: Foothills (Clodinafop) Herbicide, Foothills (Clodinafop) Herbicide + MCPA Ester, Everest 3.0 AG Herbicide, Everest 3.0 AG Herbicide + MCPA or 2,4-D, Simplicity GoDri Herbicide +/- MCPA or 2,4-D, Traxos Herbicide, Traxos Herbicide + MCPA Ester

Application information

How to apply: Ground or aerial equipment. **Water volume:** Ground 22 L/acre minimum. Aerial: 10 - 20 L/acre.

Mixing instructions

1. Always start with a clean and empty sprayer tank.
2. Fill the tank to 1/2 full with clean water.
3. With the agitator running, add the required amount of Sentrallas® herbicide. Continue agitation until Sentrallas® herbicide is completely dispersed.
4. If tank mixing Sentrallas® herbicide with another herbicide, follow this mixing order: Dry flowables and soluble granules first, followed by solutions, then oil dispersions (OD) or emulsifiable concentrates (EC). Maintain continuous agitation. Add the rest of the water.
5. Add the appropriate adjuvant, if required. If an antifoam agent is required, add last.

Application tips

Sentrallas® herbicide activity is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before application (3 days) or shortly after (3 days) may reduce weed control and crop tolerance.

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Weed control may be reduced during stress conditions, e.g., drought, heat or cold stress, or if weeds have initiated flowering, or if heavy infestations exist. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and regrowth may occur.

How it works

Absorbed through foliage. Inhibits cell elongation.Causes stem elongation, leaf cupping or curling.

Expected results

Growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed species.

Restrictions

Rainfall: Rainfall within 2 hours of application may reduce weed control. **Grazing/Harvesting:** Do not graze or feed the treated crop to livestock within 7 days of application. Do not harvest the treated crop within 60 days of application. **Re-cropping:** Fields previously treated with Sentrallas® herbicide can be seeded the following year to alfalfa, barley, canola, corn, dry beans, flax, forage grasses, lentils, mustard, oats, peas, potatoes, rye, soybeans, sugar beets, sunflowers or wheat. **Pre-harvest Intervals:** Do not harvest the treated crop within 60 days of application.
Re-entry interval: 12 hours. Do not apply more than 202 mL/ acre of Sentrallas® herbicide per year.

Environmental precautions

Toxic to non-target terrestrial plants and aquatic organisms. Observe buffer zones specified on the label.

Toxicity

Oral LD_{50} (rats) = > 5000 mg/kg

Storage

Shake well before using. Store product in original container only. If product is stored below freezing for an extended period of time, slowly warm to a minimum of 10°C and shake well before using.

Shieldex

Group 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Shieldex 400SC	Gowan Company	Tolpyralate: 400 g/L	Suspension concentrate	600 mL

Crops, staging and rates

Crop	Stage	Rate
Corn – all types	50 cm tall or 1 - 6 leaf collars (V6)	30 - 40 mL/acre

Weeds, rates and staging

Weeds controlled or suppressed with Shieldex. Apply to weeds < 10 cm tall.

barnyard grass*
common cocklebur
common purslane*
common ragweed*
common waterhemp*
giant foxtail*
giant ragweed*
green foxtail
lamb's-quarter
lady's thumb*
large crabgrass
mustard, wild*
palmer amaranth*
Pennsylvania smartweed*
Powell amaranth*
redroot pigweed
shepherd's-purse*
smooth pigweed
tall waterhemp
yellow foxtail*

*Suppression only

Registered tank mixes

Herbicides: Atrazine – recommended. Sheildex tank mixed with atrazine controls the weeds listed above except for barnyard grass, Pennsylvania smartweed, giant foxtail and yellow foxtail (suppression only).

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Shieldex (cont'd)

Application information
Water volume: 56 L/acre.

Application tips
Applications made during warm, moist conditions (21°C or more) and adequate soil moisture both before and after application maximizes performance. Under cool or dry conditions, control of some weeds may by severely reduced. Overall weed control may be improved with the addition of a nitrogen source such as UAN or AMS. Target applications to corn less than 30 cm tall for improved coverage and best overall performance. Do not apply atrazine if corn is greater than 30 cm.

How it works
Tolpyralate is absorbed through foliage and is translocated to the meristematic regions. It inhibits the HPPD enzyme causing bleaching of leaves

Expected results
Rapid bleaching of leaves within days, and plant death within 7 to 14 days.

Restrictions
Rainfall: Rainfall with 1 hour may reduce activity. **Grazing:** Do not graze or feed treated corn forage or silage within 21 days of application. **Re-cropping:** All types of corn can be planted immediately after application of Shieldex. Winter wheat, rye (annual and fall) can be planted 3 months after application. Alfalfa, barley, dry bean, canola, oats, field pea, potato, sorghum, soybean, sunflower and spring wheat can be planted 9 months after application. Sugar beet can be planted 18 months after application, and the year after application, all other rotational crops can be planted. **Re-entry interval:** Corn detasseling: 2 days. All other activities 12 hours.

Environmental precautions
Sheildex is toxic to aquatic organisms and non-target terrestrial plants. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

Toxicity
Acute oral LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store in a cool, dry place away from food and feed.

Signal FSU

Group 1, 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Signal FSU (PCP# 31434)	Nufarm Canada	Clodinafop-propargyl: 112 g/L + fluroxypyr: 217 g/L	Emulsifiable concentrate	8 L
Boost (PCP# 30377)		Thifensulfuron-methyl: 50% + tribenuron-methyl: 25%	Water dispersible granule	320 g
Enhance (PCP# 29952)		Triglyceride ethoxylate 10 POE 80 %	Emulsifiable concentrate	4 L

Crops, staging and rates

Crop	Stage	Rate
Spring wheat (including durum)	2 leaf up to emergence of 4th tiller	Signal F: 0.2 L/acre + 8 g/acre Boost + Enhance 0.25% v/v

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Weeds and staging

Apply to young, actively growing broadleaf weeds, less than 10 cm tall or across, unless otherwise stated.

Grassy weeds

- green foxtail (1 - 5 leaf before 3-tiller)
- wild oats (1 - 6 leaf, before 4 tillers)
- yellow foxtail (1 - 5 leaf, before 3 tillers)

Broadleaf weeds

- annual smartweed (green)
- ball mustard
- barnyard grass (prior to tillering)
- Canada thistle (≥ 15 cm, but before budding)*
- chickweed (1 - 6 leaf)
- cleavers (1 - 4 whorl)
- common groundsel
- corn spurry
- cow cockle
- flixweed
- green smartweed
- hemp-nettle
- kochia (including Group 2 - resistant biotypes)
- lady's-thumb
- lamb's-quarter
- narrow-leaved hawk's-beard
- redroot pigweed
- roundleaved mallow (2 - 6 leaf)*
- Russian thistle
- scentless chamomile*
- shepherd's-purse
- sow thistle (≤15 cm, before budding)*
- stinkweed
- stork's-bill (2 - 6 leaf)*
- tartary buckwheat
- toadflax (≤15 cm in height)*
- volunteer canaryseed
- volunteer canola
- volunteer flax
- volunteer sunflower
- wild buckwheat (1 - 5 leaf)
- wild mustard

* Suppression.

Registered tank mixes

Signal FSU: 2,4-D Ester 700: up to 0.172 L/acre. MCPA Ester 600: up to 0.190 L/acre.

Application information

With: Ground equipment only. Do not apply by air. **Water volume:** 22 L/acre. Surfactant included in Signal FSU package.

Mixing instructions

Use mixing instructions "b" on page 15.

Application tips

Higher spray volumes are required for dense crop canopy and/or large weeds. Weeds should be less than 10 cm tall or across at application. Effectiveness of Signal FSU may be reduced if it remains in the tank for more than 24 hours. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it works

Signal FSU is absorbed by the foliage and rapidly translocated to the growing points. Inhibits cell elongation in broadleaf weeds. Thorough coverage of the plants is essential for consistent control.

Expected results

Broadleaf weed growth stops immediately. Discolouration of dying weeds may be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed species. Grassy weeds: depending on the species, growing conditions and crop competition, leaves and growing points turn yellow within 1 to 3 weeks after application. Poor results may be expected if there is improper mixing, timing or coverage, or when weeds are under drought stress.

Restrictions

Rainfall: Rainfall within 1 hour of application may lessen degree of weed control with Signal FSU. **Grazing:** Wheat may be grazed 7 days after the application of Signal FSU. **Pre-harvest intervals:** Do not harvest forage or cut hay within 60 days after application. **Re-cropping:** Barley, canola, flax, forage grasses, lentil, mustard, oats, pea, rye or wheat or fields can be summerfallowed the year after treatment. Do not exceed a total of 8 g/acre of Boost per crop year. **Re-entry interval:** 12 hours.

Environmental precautions

Clodinafop-propargyl is highly toxic to fish. Do not apply clodinafop-propargyl on freshwater habitats. Use a 15-metre buffer between the treated area and sensitive aquatic environments.

Toxicity

Acute oral LD_{50} (rats) = 2,276 mg/kg.

Storage

Store in a cool, dry place. May be frozen. If frozen, bring to room temperature and agitate before use. This product is COMBUSTIBLE. DO NOT store near heat or open flame.

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Simplicity/Simplicity GoDRI

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Simplicity (PCP# 28887)	Corteva Agriscience	Pyroxsulam: 30 g/L	Oil dispersion	2 x 8 L + 2 x 1.5 L
Simplicity GoDRI (PCP# 31916)		Pyroxsulam: 21.5%	Water dispersible granule	2.24 kg

1 case of Simplicity treats 80 - 106 acres. 1 case of Simplicity GoDRI treats 320 - 424 acres.

Crops, staging and rates

Note: Add a non-ionic surfactant (Agral 90, Sentry, or AgSurf Original) at 0.25 v/v (0.25 L per 100 L of spray solution) when applying Simplicity or Simplicity GoDRI ALONE. Bindem Utility Modifier is required at 60 mL/acre (80 ac/jug) with Simplicity GoDRI when applied with an EC broadleaf tank mix partner.

Crop	Staging	Rate
Spring and durum wheat	2 leaf to just before flag leaf	150 - 200 mL/acre Simplicity. 21 - 28 g/acre GoDRI formulation. Low rate for less than 75 wild oats/sq. metre High rate for infestations above 75 wild oats/sq. metre
Winter wheat	1 - 3 leaf stage in fall or in spring at 2 - 7 leaf, 4 tillers	150 - 200 mL/acre Simplicity or 21 - 28 g/acre Simplicity GoDRI
Triticale	3-leaf to first node	150 - 200 mL/acre Simplicity or 21 - 28 g/acre Simplicity GoDRI

Weeds and staging:

Low rate (wild oats and Japanese brome rate): 150 mL/acre of Simplicity or 21 g/acre of Simplicity GoDRI – Wild oats and Japanese brome only (less than 75 plants/square metre). High rate (grass and broadleaf rate): 200 mL/acre of Simplicity or 28 g/acre of Simplicity GoDRI.

barnyard grass (1 - 5 leaf stage)
Canada thistle* (up to 30 cm, prebud)
common chickweed (up to 10 cm)
cleavers (up to 6 whorl)
corn spurry (up to 2 whorl, <10cm)
cow cockle (up to 8 leaf)
dandelion* (≤ 20 cm)
downy brome* (1 - 6 leaf)
flixweed (up to 10 cm)
green foxtail* (1 - 5 leaf)
hemp-nettle (1- 8 leaf)
Japanese brome (1 - 6 leaf)
lady's-thumb (1 - 5 leaf)
Persian darnel* (1 - 4 leaf)
red root pigweed (1 - 8 leaf)
round-leaved mallow (up to 6-leaf, <10cm)
Russian thistle* (up to 10 cm)
smartweed, lady's-thumb (1 - 5 leaf)
shepherd's-purse (up to 30 cm)
stinkweed (up to 30 cm)
wild buckwheat* (1 - 4 leaf)
wild oats (up to 4-leaf, 2 tillers)
volunteer canola (excluding Group 2 tolerant) (1 - 5 leaf)
yellow foxtail (1 - 5 leaf)

* Suppression. ** Fall application in winter wheat will give control; spring application will suppress downy brome.

Registered tank mixes

Tank mix partner	Tank mix partner rate	Additional weeds controlled
2,4-D Ester 700	2,4-D Ester 700 (160 - 241 mL/acre)	Added broadleaf control. The lowest rate will add lamb's-quarter and all volunteer canola
Buctril M	Buctril M: 404 mL/acre	See Buctril M label
Curtail M	Curtail M: 600 mL/acre	Canada thistle (season-long)
MCPA LV ester 600	MCPA ester 600: 187 - 374 mL/acre	Added broadleaf control. The lowest rate will add control of lamb's-quarter and all volunteer canola. Use 374 mL/acre rate for added weeds and larger sized weeds
OcTTain XL/IPCO OcTTain XL	Simplicity: 150 - 200 mL/acre OcTTain: 450 mL/acre or Simplicity GoDRI at 21 - 28 g/acre	See OcTTain Label
Prestige XL	Prestige XL: 0.71 - 0.95 L/acre. Consult Prestige XL label when mixing with Simplicity GoDRI.	Wild buckwheat (1- 9 leaf), Canada thistle
Refine SG	Refine SG:12 g/acre + a registered adjuvant	Consult label

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Tank mix partner	Tank mix partner rate	Additional weeds controlled
Stellar XL	Stellar XL: 400 mL/acre	Group 4 mode of action for control of cleavers, hemp-nettle, white cockle and seedling narrow-leaf hawk's-beard
Exhilarate/IPCO Exhilarate	Exhilarate A 10 g/acre + MCPA Ester 600: 189mL/acre	Group 4 mode of action for control of cleavers, hemp-nettle, white cockle and narrow-leaved hawk's-beard
Pixxaro	Pixxaro A: 125 mL/acre + Pixxaro B: 235 mL/acre	Group 4 mode of action and is mixable with all Group 1 and Group 2 grass herbicides
Thumper	Thumper: 405 mL/acre	Consult label

Note: Corteva Agriscience also supports Cirpreme XC and Prominex as a tank mix. Add Bindem Utility Modifier at 60 ml/acre to the above tank mixes with Simplicity GoDRI.

Application information

How to apply: Ground and aerial application.
Water volume: Ground – 20 - 40 L/acre. Aerial – 12 - 20 L/acre.

Mixing instructions

Use mixing instructions "a" on page 15. Dry formulated products are added to the spray tank first.

Application tips

Only weeds emerged at time of application are controlled. For optimum results, apply Simplicity to actively growing seedling weeds. Weed control may be reduced if Simplicity is applied under stress conditions. Do not apply to crops that are stressed as crop injury may result. Under conditions of low crop competition and high weed density or wet foliage at time of application, control may be reduced.

How it works

Simplicity inhibits the production of the ALS enzyme in plants. This enzyme is essential for the production of certain amino acids, which are essential for plant growth.

Expected results

Simplicity rapidly stops the growth of susceptible weeds. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks following application, depending on growing conditions and weed susceptibility. Degree of control and duration of symptoms depend on weed sensitivity, weed size, crop competition, growing conditions following treatment and spray coverage.

Restrictions

Rainfall: Rain within 2 hours of application may reduce control. **Grazing:** Livestock may be grazed on treated crops 7 days following application. **Pre-harvest intervals:** Do not harvest the treated crop within 50 days after application. **Re-cropping:** 11 months following an application of Simplicity, the following crops can be seeded: alfalfa, barley, brown mustard, canola, corn, dry bean (of the species *Phaseolus vulgaris*), flax, canola quality Brassica juncea, lentil, oats, field pea, potato, chickpea, spring wheat, soybean, sunflower and yellow mustard or summerfallowed.
Re-entry interval: 12 hours.

Environmental precautions

Simplicity is toxic to aquatic organisms and non-target terrestrial plants. Avoid contaminaton of these sensitive areas by using the recommended buffer of 1 metre from water bodies and 2 metres from sensitive terrestrial areas.

Toxicity

Acute LD_{50} (rats) = > 3,129 mg/kg.

Storage

Store in original container in a secure, dry, heated storage. Simplicity will freeze at -10°C. Simplicity GoDRI is not affected by freezing. Do not store below -9°C. Allow product to warm above 7°C before using and thoroughly mix the product prior to use.

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Smoulder

Group 2,14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Smoulder (PCP # 33943)	BASF Canada	Saflufenacil: 64.6% Metsulfuron-methyl: 5.4%	Water dispersible granules	907 g
Merge (PCP# 24702)	BASF Canada	Surfactant Blend: 50%		8.1L

Crops, staging and rates

Crop	Stage	Rate per acre Smoulder	Rate per acre Merge
Barley, wheat (including durum, spring and winter)	Pre-seed, post-harvest	11.3 grams	200 - 400 mL

Weeds, rates and staging

Broadleaf weeds (up to 8-leaf except where indicated)

kochia (up to 15cm in height)[1]
Canada Fleabane
Canada Thistle (up to 15cm)[2, 3]
cleavers (up to 4-whorl stage)
dandelion (up to 15cm)[3]
flixweed[3]
lamb's- quarter
narrow-leaved hawk's-beard
redroot pigweed
round-leaved mallow
stinkweed
volunteer canola[4]
wild buckwheat
wild mustard

[1] Includes group 9,4 and 2 resistant biotypes. [2] Season-long top growth control.[3] When tank mixed with glyphosate will provide rapid burndown control of these weeds in addition to those weed listed under Smoulder applied alone.[4] Provides control of secondary flushes of volunteer canola (including Roundup Ready and LibertyLink) in addition to burndown control of volunteer canola (all types).

Registered tank mixes

Smoulder should be tank mixed with glyphosate at 0.5 - 1 L/acre of 360 g/L equivalent.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 20 - 40 L/acre.

Mixing instructions

Add products to the spray tank in the following order: Smoulder, Glyphosate, Merge. When adding Smoulder continue agitation until completely dissolved and product is fully dispersed.

Application tips

Do not use on soils that have large gravelly or sandy areas, eroded knolls or calcium deposits.

How it works

Smoulder is rapidly absorbed by foliar and root uptake. Under active growing conditions susceptible emerged weeds develop injury symptoms within hours of application; plant death occurs within 3 - 5 days Susceptible emerging weed seedlings will usually die as they reach the soil surface shortly after emergence.

Expected results

Susceptible weeds will develop injury symptoms shortly after application, then death of the weeds will be 3 - 5 days after application.

Restrictions

Rainfall: Follow the glyphosate manufacturers recommendation for rain fastness. **Grazing:** Wheat and barley may be used as feed (hay or silage) or grazed 30 or more days after application. **Re-cropping:** Fields treated with Smoulder may be seeded to wheat (durum, spring and winter) or barley a minimum of 24 hours after application. Canola (all types), field corn, flax, Clearfield lentils, peas, faba beans and soybeans may be seeded 11 months after application. Oats may be seeded anytime the following season. Research studies have shown that flax may be safely planted 11 months following a Smoulder application in all regions of Western Canada except the brown soil zone. In the brown soil zone, observe a minimum 22 month recropping interval.

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Fields treated in the fall with post-harvest application of Smoulder may be seeded in the spring to wheat (spring or durum), barley or oats. **Pre-harvest intervals:** 60 days when used as a pre-seed application. **Re-entry interval:** 12 hours.

Environmental precautions

Avoid spraying in situations where drift may occur. Toxic to aquatic organisms and non-target terrestrial plants. To reduce runoff from treated area into aquatic habitats avoid application to areas with a moderate to sleep slope, compacted soil or clay. Do not apply during periods of dead calm or gusty winds.

Toxicity

Oral toxicity (rats): LD_{50} > 5,000 mg/kg. Dermal toxicity (rats): LD_{50} > 5,000 mg/kg.

Storage

Store this product away from food and feed. Store the product in original, tightly-closed container, in a cool, dry, secure, well- ventilated area.

Solo/Solo ADV/Mizuna/Davai/Amity WDG/ Next 70 WDG Herbicide/Samurai/Venim

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Solo (PCP# 25496, 28741, 28742)	BASF Canada	Imazamox: 70%	Water dispersible granules	117 g
Solo ADV (PCP# 32066)		Imazamox: 25 g/L	Solution	6.5 L
Mizuna (PCP# 32696)	Loveland Products Canada Inc	Imazamox: 70%	Water dispersable granules	117 g
Davai (PCP# 32929)	ADAMA Canada	Imazamox: 80 g/L	Solution	8 L, 96 L
Amity WDG (PCP# 33180)	Corteva Agroscience	Imazamox: 70%	Water dispersible granules	117.7 g
Next 70 WDG Herbicide (PCP # 33620)	Sharda CropChem Ltd	Imazamox: 70%	Water dispersible granules	117.5 g
Samurai (PCP # 33033)	NewAgco Inc	Imazamox: 70%	Water dispersible granules	117 g
Venim (PCP # 34394)	Nufarm Agriculture	Imazamox: 350 g/L	Solution	3.66 L

Note: Merge adjuvant, Surjet (Amity) or other equivalent, non-ionic adjuvant required, at 0.5%v/v for Mizuna, Davai, Samurai and Amity but not supplied. Carrier adjuvant or Merge adjuvant required, at 0.5% v/v for Venim. Solo ADV does not need an adjuvant added as it is included in the formulation.

Crops, staging and rates

Crop*	Staging	Rate
CLEARFIELD canola (Amity WDG, Next 70 WDG only)	2 - 6 leaf stage	11.7 g/acre unless otherwise noted. Merge Adjuvant: 0.5% v/v (5.0 L of Merge per 1,000 L of spray solution) Use Surjet Adjuvant with Amity WDG at 0.5% v/v or Solo ADV at 0.323 L/ acre, no adjuvant required
XCEED canola (Amity WDG only)		
CLEARFIELD sunflower	2 - 8 true leaf	
CLEARFIELD lentil	1 - 9 node stage	
Soybean (Solo ADV only)	Cotyledon to 4-leaf stage	
Field pea (Samurai only)	1 - 6 leaf	11.7 g/acre Samurai + adjuvant at 0.5% v/v (Merge)

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Crop*	Staging	Rate
Davai registered only on field pea, dry bean and soybean		
Field pea	1 - 6 leaf	100 mL/acre + adjvant at 0.5% v/v (Merge, Norac MSO, Hasten NT Ultra) or 0.25% v/v ADAMA Adjuvant 80 or Agral 90
Soybean	Emergence to 3 expanded trifoliate leaves	
Dry bean	Early post-emergence	

Weeds and staging

Grasses: 1 to 4 true leaf stage up until early tillering

barnyard grass
green foxtail
Japanese brome*
Persian darnel[1]
volunteer canary seed [1]
volunteer cereals
volunteer wheat (excluding volunteer Group 2 tolerant wheat)
wild oats
yellow foxtail[1]

Broadleaves: cotyledons, 4-leaf stage

cleavers*
cow cockle
green smartweed
kochia†* (excluding Group 2 resistant biotypes
lamb's-quarter*
redroot pigweed
round-leaved mallow*
Russian thistle
shepherd's-purse
stinkweed
volunteer canola (excluding Group 2 tolerant)
wild buckwheat*
wild mustard†

* Suppression only. [1] Not listed on Samurai label.

† Note: Recent surveys of kochia in Alberta have found 90% of fields contain kochia that are resistant to Group 2 herbicides. Without testing, assume kochia in your field is resistant to Group 2 herbicides and use other herbicides groups to control kochia. Some wild mustard populations may also be resistant to Group 2 herbicides.

Registered tank mixes

Tank mix partner	Tank mix partner rate	Additional weeds controlled
Davai only on field pea and soybean		
Phantom 240 SL + Merge adjuvant	Davai: 75 mL/acre (peas), 81 mL/acre (soybeans) + Phantom: 26 mL/acre + Merge: 0.5% v/v	Weeds controlled under the Phantom label
Amity WDG/Next 70 WDG only on Group 2 tolerant canola		
Lontrel XC	Amity: 11.7 g/acre + Lontrel XC: 51 mL/acre	Weeds controlled under the Lontrel label
Davai on pea, dry beans and soybean		
Basagran Forte + UAN	Davai: 100 mL/acre + Basagran Forte: 500 mL/acre + UAN 28%: 800 mL/acre	Other weeds on the Basagran Forte page
MP Samuraion on field pea		
Basagran forte + UAN	Basagran forte + UAN: 11.6 g/acre Samurai + Basagran Forte: 358 mL/acre Enhanced control, plus control of + UAN 28%: 800 mL/acre	Clearfield volunteer canola, Group 2 resistant wild mustard and suppression of wild buckwheat and cleavers (including Group 2 resistant biotypes)

Application information

How to apply: Ground equipment only. Do not apply by air. **Water volume:** 40 L/acre minimum.

Mixing instructions

Use mixing instructions "d" on page 15.

Application tips

Water soluble bags will dissolve better when kept intact; do not split bags. If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Solo or Amity WDG if temperatures of 5ºC or lower are forecasted within 3 days of application. Temperatures near freezing (below 5ºC) will prevent optimum herbicide performance, as weeds are not actively growing. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield.

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How it works
Absorbed by foliage and roots. Disrupts plant metabolism causing growth to stop. Works best under good growing conditions.

Expected results
Susceptible weeds stop growing within 24 to 48 hours. Yellow striping and purplish or reddish discolouration of the leaves may occur. Leaves begin to die in 3 to 10 days starting with the youngest and moving to the older leaves. Death of the plant may occur in 1 to 3 weeks.

Restrictions
Rainfall: Rainfall within 3 hours of application may reduce control. **Grazing:** Do not graze treated crop or cut for feed within 20 days of application. Do not graze treated sunflower plants or cut for straw; sufficient data are not available to support such use. Peas treated with Davai can be fed to livestock 30 days after application.
Pre-harvest intervals: Do not harvest the treated crop within 60 days of application. **Re-entry interval:** 12 hours.

Re-cropping: The following crops may be grown safely the yearfollowing an application: field pea, field corn, canary seed*, Group 2 tolerant canola, non-Group 2 tolerant canola*,lentils, spring wheat, durum wheat*, spring barley, sunflower, tame oats*, flax*, chickpea. The following crop may be grown safely 2 years following an application: mustard* (condiment type only). Winter wheat can be grown 3 months after treatment*. There are insufficient data for other following crops. Conduct a field bioassay (a test strip grown to maturity) the year before growing any crop other than those listed above.

* If drought conditions are experienced between June 1 and September 1 in the year of application, delay planting of winter wheat, durum wheat, canary seed, tame oats, flax, or canola (non-Clearfield) by an additional year. If drought is received between June 1 and September 1 in the year of application OR between June 1 and September 1 in the year following application, delay planting of mustard by an additional year. In the grey, black, and dark brown soil zones, drought is defined as less than 125 mm of total precipitation between June 1 and September 1. In the brown soil zone, drought is defined as less than 125 mm of total precipitation between June 1 and September 1, OR less than 15 mm of precipitation in any month between June 1 and September 1.

Environmental precautions
Solo/Mizuna/Davai/Amity/Next 70 WDG are highly toxic to aquatic plants and non-target terrestrial plants. Leave at least an 11-metre buffer strip between the point of application and sensitive aquatic and terrestrial habitats.

Toxicity
Acute oral LD_{50} (rats) = 5,000 mg/kg.

Storage
Store at temperatures above 5°C. Keep unused water soluble bags in resealed, original container. Keep packages dry at all times.

Sortan IS/Prism SG/Sharda Rimsulfuron 25% /Hinge

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Sortan IS* (PCP# 32627) Corn only	Corteva Agriscience	Rimsulfuron: 20%	Wettable granule	1.2 kg
Prism SG (PCP# 30057) Potato only		Rimsulfuron: 25%	Dry flowable	480 g
Sharda Rimsulfuron 25% (PCP# 32932) Potato only	Sharda CropChem Ltd	Rimsulfuron: 25%	Dry flowable	480 g

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Sortan IS/Prism SG/Sharda RImsulfuron 25%/Hinge (cont'd)

Product	Company	Active ingredient	Formulation	Container size
Hinge (PCP # 34352)	Rotam North America	Rimsulfuron: 25 %	Soluble granule	480 g

*Sortan IS is a new formulation of rimsulfuron and is only registered for use on glyphosate tolerant corn. No surfactant required for Sortan when tank mixed with glyphosate. **DO NOT** use Sortan for potato or the other rimsulfuron products on corn.

Crops, staging and rates

Rate: 24 g/acre plus non-ionic surfactant for Sortan on corn (15 - 30 g/acre) (Ag Surf or Agral 90): 0.2% v/v or 0.2 L/100 L of spray solution.

Crop	Timing	Remarks
Potato (irrigated) (Prism SG and Sharda Rimsulfuron 25% only)	Apply prior to initiation of flowering	Delay cultivation for 7 - 10 days after application.
Corn (Sortan IS only)*	emergence to V3 (3 visible collars)	15 - 30 g/acre

*Sortan IS for use on glyphosate tolerant corn ONLY. Apply Sortan IS tank mixed with a glyphosate herbicide at 360 g ae/acre. **No surfactant required when mixing with glyphosate at the registered rate.**

Note: Because potato varieties differ in their tolerance to herbicides, limit first use of Prism SG herbicide to a small area of each variety prior to adoption as a field practice. For Sortan, the coleoptile (short, blunt leaf) is counted as the first leaf. A corn leaf is counted as a full leaf when the next leaf is visible in the corn whorl.

Weeds and staging

Prism SG and Sharda Rimsulfuron 25%: Apply to young, actively growing broadleaf weeds in potato before the canopy closes.

Annual grasses		Perennial grasses		Broadleaf	
Barnyard grass	1 - 4 leaf (up to early tillering)	Quackgrass	3 - 6 leaf stage (< 25 cm tall, leaf extended)	Lamb's-quarter (suppression)	4 - 6 leaf stage (< 10 cm tall or across)
Fall panicum				Redroot pigweed	
Green foxtail					
Witchgrass					
Yellow foxtail*					

* Yellow foxtail present at time of application will be controlled. Yellow foxtail emerging after application will not be controlled.

Sortan IS: weeds controlled at 30 g/acre – pre-emergent application.

- annual sow thistle*
- barnyard grass
- fall panicum
- green foxtail
- lady's-thumb*
- large (hairy) crabgrass*
- proso millet
- shepherd's-purse
- yellow foxtail*
- volunteer canola (except Group 2 tolerant)

* Suppression.

Post-emergent weeds controlled at 15 g/acre are volunteer canola (cotyledon to 5-leaf), redroot pigweed (2 - 4 leaf), wild buckwheat. Post-emergent weeds controlled more consistently at 22.8 g/acre (higher populations, cotyledon to 4 leaf) are wild buckwheat and redroot pigweed.

Post-emergent weeds controlled at 30 g/acre are above weeds (staging 1 - 4 leaf unless stated otherwise) and the following

- barnyard grass
- fall panicum
- giant foxtail
- green foxtail
- large crabgrass*
- old witchgrass
- quackgrass* (3 - 6 leaf)**
- redroot pigweed (2 - 4 leaf)
- shepherd's-purse
- wild buckwheat (to 4 leaf)
- yellow foxtail*

* Suppression. **For quackgrass, apply Sortan with recommended surfactant.

Registered tank mixes

Sortan IS (**only**) mixed with glyphosate herbicide at 360 g ai/acre. No surfactant required when tank mixed with glyphosate at registered rates.

Application information

With: Apply with ground equipment. Do not apply by air. **Water volume:** 40 L/acre. Sortan – 40 - 80 L/acre.

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Application tips
Sortan IS: Optimum pre-emergence weed control is achieved when it is activated with rainfall 3 to 5 days after application. Activation occurs when the top 5 to 10 cm of soil is thoroughly moistened following rainfall, and the herbicide is readily available to germinating weeds. Sortan IS: apply when temperature in the 24 hours before and after application ranges between 5 and 28°C. Rapid fluctuations in temperature will stress both potato and corn (for Sortan, Prism SG and Sharda). For Prism SG and Sharda Rimsulfuron, wait 48 to 72 hours after potato or corn have been injured by frost before application.

How it works
Prism SG is absorbed through the foliage and inhibits cell elongation.

Expected result
Prism SG/Sharda Rimsulfuron/Sortan herbicides rapidly stop growth of susceptible species; typical symptoms usually appear within 5 to 7 days, but may not be noticeable for 2 to 3 weeks after application, depending on growing conditions and weed susceptibility. Warm, moist conditions following application promote the activity of Prism SG, while cool and/or dry conditions may reduce or delay activity. Poor results may be expected if improper mixing, timing, coverage or when weeds are under stress.

Restrictions
Rainfall: Rainfall within 2 to 4 hours of application may lessen degree of weed control. **Grazing Restrictions:** Do not graze the treated crops or cut for hay; sufficient data is not available to support such use.
Pre-harvest intervals: 30 days. Make only 1 application per year. **Re-cropping:** Barley, soybean, white bean, red clover, sorghum, sweet, seed and field corn, oats, canola, spring and durum wheat, dry bean, chickpea, sunflower, field pea, lentils, flax, faba bean and potato may be planted 10 months after application. Winter wheat may be planted 4 months after application. For all other crops, a field bioassay is recommended before planting.
Re-entry interval: 12 hours.

Environmental precautions
Rimsulfuron herbicide is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the label.

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in a cool, dry, well ventilated room.

Steadfast IS

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Steadfast IS (PCP# 33369))	Corteva Agriscience	Rimsulfuron: 12.5% Nicosulfuron: 25.2%	Wettable granule	540 g jug

Crops, staging and rates
Apply as a post-emergent broadcast spray with recommended surfactant*. Use the higher rate for high populations or larger weeds

Crop	Staging	Rate per acre
Field Corn	Emergence to V2 (2 visible collars)	16 - 27 g

* Use with a non-ionic surfactant at 0.2% v/v.

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Steadfast IS (cont'd)

Weeds, rates and staging

canola, volunteer (cotyledon to 5 leaf) (except Group 2 tolerant)
green foxtail (1 - 4 leaf, up to early tillering)
lamb's-quarter
wild oats (1 - 4 leaf, up to early tillering)
wheat, volunteer (1 - 3 leaf, up to early tillering)

Registered tank mixes

Glyphosate at 360 g ai/acre when applied to glyphosate tolerant corn only. No surfactant required when tank mixed with glyphosate.

Application information

How to apply: Ground applications only. **Water volume:** 40 L/acre minimum (optimum water volume is 55 - 80 L/acre).

Mixing instructions

Half fill sprayer with water and agitate. If mixing with a WDG or dry formulation, add the dry formulation to the mixture first. Add Stellar followed by the grassy herbicide tank mix partner.

Application Tips

Apply only when the temperature in the 24 hours before and after the application ranges between 5 and 30°C. Do not apply to corn that has been stressed by abnormally hot, humid or cold weather conditions, frost, low fertility, drought, previous pesticide applications, disease or insect damage. Temporary crop injury may occur. Do not tank mix with an organophosphorus insecticide. Do not apply an organophosphorus insecticide within 7 days before or after an application of Steadfast IS. Do not cultivate corn within 7 days before or after and application of Steadfast IS. Make only 1 application of Steadfast IS per year.

How it works

Steadfast IS a systemic herbicide that is absorbed by the foliage and rapidly translocated to the plant's growing points. Growth is quickly stopped in susceptible species.

Expected results

Symptoms typically appear in 5 to 7 days, but may not be noticeable for 2 to 3 weeks after application depending on growing conditions and weed susceptibility. Typical injury symptoms include yellowing, purpling and reddening of the newest leaves. Eventually the plant will brown and die.

Restrictions

Rainfall: Rain-free period of 2 to 4 hours after application. **Grazing:** Do not graze for at least 30 days after application. **Re-cropping:** Winter wheat may be seeded 4 months after application. Spring cereals, canola, field pea, flax, corn, potato, dry bean*, sunflower, alfalfa may be seeded 10 months after application. **Pre-harvest intervals:** Do not harvest grain within 30 days of application; Do not cut for silage or fodder within 30 days of application. **Re-entry interval:** 12 hours.

* Since not all dry bean varieties have been tested for tolerance to Steadfast IS, first planting of each variety to previously treated field should be limited to a small area to confirm tolerance prior to general field scale.

Environmental precautions

Toxic to terrestrial plants and aquatic organisms. Leave a buffer zone of at least 5 metres between the downwind point of direct application and the closest edge of sensitive terrestrial habitats and of a least 1 metre of sensitive aquatic habitats.

Toxicity

Acute oral LD_{50} (rats) = >5000 mg/kg.

Storage

Store in a cool, dry well ventilated secure area.

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Stellar XL/Outshine

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Stellar XL (PCP# 32099)	Corteva Agriscience	Florasulam: 2.5g/L + fluroxypyr: 100 g/L MCPA: 350 g/L	Emulsifiable concentrate	8.1 L, 97.1 L, 518 L
Outshine (PCP# 31646, 31669)	ADAMA Canada	Florasulam: 2.5 g/L + fluroxypyr: 100 g/L + separate jug MCPA Ester: 600 g/L	Suspension concentrate	8.0 L, 9.3 L

Crops, staging and rates

Crop	Staging	Rate
Spring and durum wheat, barley, oats	2 leaf to just prior to flag leaf	Stellar XL: 405 mL/acre or Outshine: 400 mL/acre + MCPA Ester: 240 mL/acre

Weeds, rates and staging

Weed stage: Apply when weeds are actively growing (2 to 4 leaf stage). Only weeds emerged at the time of treatment will be controlled. Best results are obtained from applications made to seedling weeds. Follow all precautions, directions for use, and limitations on the tank mix partner labels.

Weeds controlled

- burdock
- chickweed[2]
- cleavers (1 - 8 whorl)[2]
- cocklebur
- flixweed
- hemp-nettle[1]
- kochia[1,2]
- lamb's-quarter
- plantain
- prickly lettuce
- ragweed
- red root pigweed
- Russian pigweed
- shepherd's-purse
- smartweed
- stinkweed
- stork's-bill (suppressed)
- sunflower (annual
- vetch
- volunteer canola
- volunteer flax[2]
- wild buckwheat[2]
- wild mustard
- wild radish

[1] Includes ALS resistant biotypes. [2] Also controlled by Outshine.

Registered tank mixes

Tank mix partner	Crops registered	Rate of herbicide tank mix partner	Remarks (adjuvant rate, crop staging and any other restrictions)
Axial	Spring wheat and spring barley	480 mL/acre	Annual grass weeds: wild oats, green foxtail, yellow foxtail, barnyard grass, volunteer oats, volunteer canary seed, proso millet
Simplicity/Simplicity GoDRI	Spring wheat and durum wheat	Simplicity: 150 - 200 mL/acre/Simplicity GoDRI: 21 - 28 g/acre. The use of Bindem Utility Modifier is required at 60 mL/acre when Stellar XL is mixed with Simplicity	Control of grasses and broadleaf weeds. Control of white cockle and suppression of narrow-leaved hawk's-beard

Corteva Agriscience supports the following, non-registered, tank mixes. They are Traxos and Tilt. Use the most restrictive use limitations for either product.

Stellar XL is an all-in-one formulation registered for use with all listed grass mixes. Outshine is registered for use with florasulam and MCPA or 2,4-D and is a separate package. Consult grass mixes for registrations.

Application information

Water volume: Ground equipment only (40 L/acre).

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Mixing instructions
Half fill sprayer with water and agitate. If mixing with a WDG or dry formulation, add the dry formulation to the mixture first. Add Stellar followed by the grassy herbicide tank mix partner.

How it works
Stellar XL/Outshine is readily absorbed by weed foliage. The florasulam component inhibits the ALS enzyme in plants resulting in a rapid halt in plant growth followed by yellowing, most noticeable after 1 to 2 weeks. The fluroxypyr and MCPA components mimic plant growth regulators causing swelling and thickening and twisted weed growth followed by yellowing and browning, resulting in plant mortality.

Expected results
Weeds start to discolour and twist shortly after application. Plant growth will cease or become erratic followed by browning and plant mortality.

Restrictions
Rainfall: Do not apply if rainfall is expected within 2 hours of application. **Re-cropping:** Fields previously treated with Stellar XL/Outshine can be seeded the following year to barley, canola, oats, pea or wheat or fields can be summerfallowed. **Grazing:** Do not cut the treated crop for hay or graze treated crop within 7 days after application. **Pre-harvest intervals:** Do not harvest the treated crop within 60 days after application. **Leaching:** This product has potential to leach. Do not apply excessive irrigation. **Buffer zone:** Use a buffer zone of 30 metres between area applied and sensitive terrestrial and aquatic habitats. **Re-entry interval:** 12 hours.

Toxicity
Stellar XL/Outshine: Acute oral LD_{50} (rats)> 2,000 mg/kg (males). MCPA ester: Acute oral LD_{50} technical = 700 - 800 mg/kg. Stellar XL: Acute oral LD_{50} (rats) > 2,000 mg/kg.

Storage
Store in original containers in a secure, dry heated storage. If product is frozen, bring to room temperature and agitate before use.

Strim MTZ

Group 5, 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Strim MTZ (PCP#33753)	UPL AgroSolutions	S-Metolachlor: 405 g/L Metribuzin: 135 g/L	Emulsifiable Concentrate	10.5 L, 375 L

Crops, staging and rates

Crop	Stage	Rate per acre
Potato	Pre-emergence or pre-plant incorporation	1.2 - 1.6 L

Weeds controlled and staging
Most effective weed control is achieved if Strim MTZ is applied prior to weed emergence.

barnyard grass
crab grass
fall panicum
green foxtail
witchgrass
yellow foxtail
common chickweed
common ragweed
dandelion (seedling)
Eastern black nightshade*
green smartweed
lady's-thumb
lamb's-quarter
redroot pigweed
wild mustard
yellow nutsedge** (suppression)

* Pre-emergent treatments sometimes give better control than pre-plant incorporated.
** Pre-plant incorporated treatment only.

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Registered tank mixes
None.

Application information
How to apply: Ground application only. **Water volume:** 60 - 120 L/acre for pre-emergence applications. 40 L/acre for pre-plant incorporation.

Mixing instructions
Use mixing instructions 'a' on page 15.

Application tips
In order to activate Strim MTZ a small amount of rainfall or irrigation is required within 10 days of a pre-emergence application. In areas of low rainfall, follow pre-emergence application with a light irrigation of 0.7 to 1.27 cm of water. For pre-plant incorporation a single incorporate is satisfactory; incorporate with implements that provide uniform, shallow incorporation.

How it works
Metribuzin is a systemic herbicide absorbed by leaves and roots and translocated to new growth. Metribuzin inhibits photosynthesis and the weeds turn brown and die. S-metolachlor inhibits germination of weeds, particularly grasses.

Expected results
Annual grasses do not germinate, or under dry conditions germinate, but die back soon after emergence. Initial yellowing of broadleaf weeds 5 to 7 days after application, weeds turn brown and die 14 to 16 days after application. Soil residual activity for a period of time will control shallow-rooted germinants.

Restrictions
Rainfall: No restrictions listed. **Grazing:** Do not graze or cut for hay. **Re-cropping:** Canola may be injured if planted in soil that was treated with Strim MTZ in the previous cropping year. **Pre-harvest intervals:** 60 days. **Re-entry interval:** 12 hours.

Environmental precautions
Toxic to aquatic organisms and non-target terrestrial plants. Observe spray buffer zones.

Toxicity
Acute oral LD_{50} (rats) = 2615 mg/kg

Storage
Store away from food or feed.

Sword/Tracker XP

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Sword (PCP# 27892)	Loveland Products Canada	MCPA: 275 g/L + mecoprop-P: 62.5 g/L + dicamba: 62.5 g/L	Solution	10 L, 160 L
Tracker XP (PCP# 27790)	IPCO			10 L

Crops, staging and rates
Rate: 400 - 600 mL/acre.

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Sword/Tracker XP (cont'd)

Crops	Staging	Specific remarks
Barley	2 - 4 leaf	Do not underseed to legumes. For wheat, oats and barley, a maximum of 1 application is permitted per year. For canary seed, a maximum of 2 applications are permitted per year, with a minimum retreatment interval of 90 days
Canary seed, oats, spring wheat (including durum)	2 - 5 leaf	
Winter wheat	Apply in the spring before the crop is more than 30 cm high (top leaf extended).	
Summerfallow or fall stubble (Canada thistle control program)	Summerfallow: Early bud stage Fall Stubble: 15 - 20 cm tall or across.	

Note: Applications made later than the recommended timing may result in flattening of the crop and shortening of the straw (particularly under stress conditions).

Sword only
Apply at 2 - 4 leaf stage

Seedling and established grasses grown for forages

creeping red fescue
crested wheatgrass
intermediate wheatgrass
meadow foxtail
orchard grass
smooth bromegrass
timothy

Established grasses grown for forages

kentucky bluegrass
meadow bromegrass
meadow fescue
pubescent wheatgrass
slender wheatgrass
tall fescue
tall wheatgrass
western wheatgrass

Weeds and staging

Apply at 2 - 3 leaf stage and actively growing for best results unless otherwise stated.

annual sow thistle
ball mustard
Canada thistle*
cleavers (1 - 2 whorl)
common ragweed
corn spurry
cow cockle
field bindweed*
flixweed
green smartweed
hedge bindweed*
hemp-nettle (before 2nd pair of true leaves)
knotweed
kochia
lady's-thumb
lamb's-quarter
night-flowering catchfly
perennial sow thistle*
prostrate pigweed
redroot pigweed
Russian thistle (<5 cm high)
shepherd's-purse
stinkweed
tall mustard
tame buckwheat
tartary buckwheat
volunteer rapeseed
volunteer sunflower
volunteer tame buckwheat
wild buckwheat
wild mustard
wormseed mustard
yellow mustard

* Top growth control only

Registered tank mixes

Tank mix partner	Tank mix partner rate	Additional weeds controlled
Wheat and barley		
Lorox	Sword/Tracker XP: 400 - 600 mL/acre + Lorox:172 mL/acre	Chickweed
metribuzin	Sword/Tracker XP: 400 - 600 mL/acre + metribuzin: 111 - 172 mL/acre	Chickweed

Application information

With: Apply with ground sprayers or by air. **Water volume:** Ground application – 40 L/acre. Aerial application: 12 L/acre (minimum).

Application tips

In winter wheat, spray winter annuals as soon as growth begins in spring. Use the 600 mL/acre rate when weeds are not actively growing due to extended periods of hot and dry, or cold and wet, weather prior to or following application or when weeds are beyond the 3-leaf stage or for heavy weed infestation. Do not let contents stand for long periods in the tank. Agitate every 8 hours.

How it works

A combination of 3 systemic hormonal herbicides that accumulate in the growing point of susceptible plants, produce abnormal growth and disrupt the transport system in plants.

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Expected results

Weeds: Can take up to 7 to 14 days depending on weather and growing conditions. Leaves curl, leaf edges turn brown, petioles twist, plant ceases growth and turns brown and dies.

Crop: Improper or untimely application can result in abnormal bending at the nodes of grain stalks, difficulty in head emergence from sheath, curled awns, malformed kernels and sterile florets. Under certain conditions, straw shortening may occur but yield will not be affected. Poor results may be expected if there is poor coverage, or weeds are too advanced.

Restrictions

Rainfall: Rainfall within 3 hours will reduce activity. **Grazing:** Do not graze within 7 days of application, and do not cut for forage or hay within 30 days. **Pre-harvest intervals:** Leave at least 60 days from application to harvest. **Re-cropping:** Cereal and broadleaf crops can be grown the year following application.
Re-entry interval: 12 hours.

Environmental precautions

Sword/Tracker XP are toxic to aquatic organisms and non-target terrestrial plants. Use a 1-metre buffer from aquatic and 5 metre buffer from sensitive terrestrial habitats.

Toxicity

Sword: Acute Oral LD_{50} (rats) = 1,188 mg/kg.

Tracker XP: Acute Oral LD_{50} (rats) = 1,400 mg/kg.

Storage

Heated storage required.

Tandem

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tandem A (PCP# 29985)	Corteva Agriscience	Pyroxsulam: 30 g/L	Oil dispersion	8 L
Tandem B (PCP# 29965)		Fluroxypyr: 333 gae/L	Emulsifiable concentrate	4.84 L

Crops, staging and rates

Crop	Staging	Rate
Spring, winter and durum wheat	Apply to actively growing wheat from the 3 - leaf stage to the first node stage	Low rate: Tandem A 150 mL/acre + Tandem B: 85 mL/acre High rate: Tandem A: 200 mL/acre + Tandem B: 125 mL/acre

Note: Occasionally slight yellowing or height reduction may be observed in the treated crop. These transient symptoms disappear within 14 days with no reduction to yield. Do not apply to crops suffering from drought, nutrient deficiency or exposed to frost or other agronomic factors affecting plant growth.

Weeds controlled and staging

High rate

- barnyard grass (1 - 5 leaf stage)
- common chickweed** (up to 10 cm)
- cow cockle (up to 8 leaf)
- cleavers (up to 8 whorl.)
- dandelion*
- downy brome (1 - 6 leaf) suppression
- flixweed (up to 10 cm)
- green foxtail* (1 - 5 leaf)
- hemp-nettle** (1- 8 leaf)
- lady's-thumb (1 - 5 leaf)
- Japanese brome (1 - 6 leaf)
- kochia**
- red root pigweed (1 - 8 leaf)
- stork's-bill*
- wild buckwheat* (1 - 4 leaf)
- wild oats (up to 4-leaf, 2 tillers)
- volunteer canola (excluding Group 2 tolerant)
- volunteer flax (1 - 12 cm)
- yellow foxtail (1 - 5 leaf)

* Suppression.
** Includes biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme.

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Tandem (cont'd)

Low rate

wild oats (up to 4-leaf, 2 tillers) cleavers (1 - 6 whorls)

Tandem A Rate: 150 mL/acre. Tandem B Rate: 84 mL/acre with conditions of low wild oat populations <75 wild oats/m^2.

Registered tank mixes

Tank mix partner with Tandem	Tank mix partner rate	Additional weeds controlled
2,4-D ester	Up to 241 mL/acre LV ester 700	Susceptible weeds such as bluebur, burdock, cocklebur, goat's-beard, lamb's-quarter, mustards (except dog and tansy), plantain, prickly lettuce, Russian thistle, shepherd's-purse, stinkweed, volunteer canola, wild buckwheat, wild radish. Consult 2,4-D ester label for stages and rates.
MCPA ester	Up to 374 m/acre LV ester 600	Susceptible weeds such as burdock (4-leaf stage), cocklebur, mustards (except dog and tansy), lamb's-quarter, plantain, prickly lettuce, ragweeds, Russian pigweed, shepherd's purse, stinkweed, annual or volunteer sunflower, volunteer canola, wild buckwheat, wild radish. Consult MCPA ester labels for stages and rates
Curtail M	600 mL/acre	Susceptible weeds such as Canada thistle (low infestations), burdock, cocklebur, field horsetail, lamb's-quarter, wild mustard, plantain, prickly lettuce, wild radish, ragweed, shepherd's-purse, stinkweed, annual sunflower, volunteer sunflower, vetch. Consult Curtail M label for weed stages and rates

* Under low wild oat populations (<75 plants/sq metre), can use a lower rate of Tandem at the low rate/acre when mixed with these products. Corteva will support the following tank mix not on the Tandem label: Exhilarate/IPCO Exhilarate.

Application information

With: Apply with ground equipment or by air. **Water volume:** 20 - 40 L/acre ground or 12 - 20 L for air application.

Mixing instructions

Half fill tank with water and agitate. Add Tandem A, then Tandem B, then any tank mix partner; add non-ionic surfactant, then finish filling tank.

Application tips

Only weeds emerged at time of application are controlled. For optimum results, apply Tandem to actively growing seedling weeds. Weed control may be reduced if Tandem is applied under stress conditions. Do not apply to crops that are stressed as crop injury may result. Under conditions of low crop competition and high weed density or wet foliage at time of application, control may be reduced.

How it works

Tandem A inhibits the production of the ALS enzyme in plants. This enzyme is essential for the production of certain amino acids, which are essential for plant growth. Tandem B is a plant growth regulator, which will cause twisting, bending and erratic growth of susceptible weeds.

Expected results

Tandem rapidly stops the growth of susceptible weeds. However, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks following application, depending on growing conditions and weed susceptibility. Degree of control and duration of symptoms depend on weed sensitivity, weed size, crop competition, growing conditions following treatment and spray coverage.

Restrictions

Rainfall: Rain within 2 hours of application may reduce control. **Grazing:** Livestock may be grazed on treated crops 7 days following application. **Pre-harvest intervals:** Do not harvest the treated crop within 60 days after application. **Re-cropping:** Eleven months following an application of Tandem, the following crops can be seeded: barley, brown mustard, canola, dry bean (of the species Phaseolus vulgaris), flax, canola quality Brassica juncea, lentil, oat, field pea, chickpea, spring wheat, soybean and yellow mustard, sunflower or summerfallowed.
Re-entry interval: 12 hours.

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Environmental precautions

Simplicity is toxic to aquatic organisms and non-target terrestrial plants. Avoid contamination of these sensitive areas by using the recommended buffer of 1 metre from water bodies and 2 metres from sensitive terrestrial areas.

Toxicity

Tandem A: Acute LD_{50} (rats) = > 3,129 mg/kg.

Tandem B: Acute oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in original container in a secure, dry, heated storage. This product will freeze at -10°C. Do not store below -9°C. Allow product to warm above 7°C before using, and thoroughly mix the product prior to use.

Telar® XP Herbicide

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Telar® XP (PCP# 30036)	Bayer	Chlorsulfuron: 75%	Dry flowable	500 g

Crops, staging and rates

Non-crop Areas: Total vegetation control programs on railroads, utility, highway rights-of-way, airports, plant sites, storage areas, fencelines, utility substations and petroleum storage areas. **Rate**: 6 - 48 g/acre.

Weeds, rates and staging

Apply when weeds are small (less than 10 cm tall or across) and actively growing.

Weeds controlled at 6 g/acre + 2,4-D amine: 320 - 450 mL/acre

annual sunflower	hemp-nettle	plantain	stinkweed
ball mustard	kochia	prickly lettuce	stork's-bill
common ragweed	lady's-thumb	redroot pigweed	sweet clover
cow cockle	lamb's-quarter	Russian pigweed	volunteer rapeseed
flixweed	narrow-leaved hawk's-beard	Russian thistle	wild mustard
green smartweed	(spring seedlings)	shepherd's-purse	

Weeds controlled at 12 g/acre alone

common chickweed	green smartweed	redroot pigweed	volunteer rapeseed (except Group 2 tolerant trait)
common groundsel	hemp-nettle	scentless chamomile	
corn spurry	lady's-thumb	shepherd's-purse	wild mustard
cow cockle	lamb's-quarter	stork's-bill	
flixweed	prickly lettuce		

Weeds controlled at 16 g/acre alone:
Above weeds controlled at 12 g/acre plus wild carrots.

Weeds controlled at 28 g/acre alone: Weeds controlled at 16 g plus following

Canada thistle*	horsetail	Russian thistle	wild strawberry*
dandelion*	kochia**	sweet clover	
golden rod*	perennial sow thistle*	wild rose*	

Broadleaf weed control in non-crop land (where vegetation is not desirable): Weeds controlled at 48 g/acre alone

Canada thistle	horsetail	perennial sow thistle*	wild strawberry*
dandelion	narrow-leaved hawk's-beard	wild buckwheat	willow*
goldenrod*		wild rose*	

* Suppression. **A recent survey of kochia fields has found 90% of kochia populations that are Group 2 herbicide resistant. Without testing to confirm, assume the kochia in your field is resistant and will not be controlled by this product alone.

Note: Addition of recommended surfactant (Ag-Surf, Agral 90, Companion or Super Spreader): 0.1% v/v may improve control of weeds growing under adverse conditions.

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Telar XP (cont'd)

Registered tank mixes

Tank mix partner	Tank mix rate	Remarks
Krovar + non-ionic surfactant	Telar: 48 g/acre + Krovar: 2.75 - 3.6 kg/acre + Non-ionic surfactant: 1% v/v	Apply when weeds are small (less than 10 cm tall)

Application information

With: Ground equipment only. Do not apply by air. **Water volume:** Not less than 40 L/acre. Spray volumes of 80 - 160 L/acre are recommended.

Application tips

Select a spray volume that will ensure thorough coverage and uniform spray pattern. Best results are obtained when weeds are actively growing.

How it works

Absorbed through the roots and foliage. Inhibits cell elongation.

Expected results

Telar rapidly inhibits growth of susceptible weeds. Typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 3 weeks after application depending on growing conditions and weed susceptibility. Degree of control and duration of effect depend on the following factors: rate used, weed sensitivity and weed size, growing conditions at and following treatment, precipitation, soil organic matter and pH.

Restrictions

Rainfall: Rainfall within 2 hours may lessen degree of weed control. For best results, sufficient rainfall to move Telar 5 to 7 cm deep into the soil is required after application before weeds develop an established root system and grow beyond the seedling stage. **Re-entry interval:** 12 hours.

Environmental precautions

Telar is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified under Directions for Use on the label.

Toxicity

Acute Oral LD_{50} (rats) = 3,053 mg/kg.

Storage

Store in a cool, dry place.

ThunderHawk

Group 2, 4, 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
ThunderHawk A	Nufarm Agriculture	Pyraflufen-ethyl: 13.5 g/L MCPA Ester: 420 g a.e./L	Emulsifiable concentrate	10.7 L
ThunderHawk B		Florasulam: 50 g/L	Suspension concentrate	3.2 L

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Crops, staging and rates

Crop	Staging	Rates
Spring wheat, barley, oats	Apply to emerged weeds pre-seed or post-seed, but prior to crop emergence. Applications can be made up to a maximum of 2 days after seeding.	ThunderHawk A: 134 ml/acre ThunderHawk B: 40 ml/acre

Weeds, rates and staging

Weeds controlled or suppressed with ThunderHawk alone:

annual sowthistle[1]
Canada fleabane[1]
cleavers
common chickweed
cow cockle
dandelion[1]
flixweed[1]
goat's-beard
hempnettle[1]
kochia (all herbicide resistant biotypes)
lamb's-quarter (all herbicide resistant biotypes)
mallow
mustards (except dog and tansy)
narrow-leaved hawk's-beard
night-flowering catchfly
perennial sowthistle[1]
redroot pigweed
shepherd's-purse
smartweed
stinkweed
volunteer canola (all biotypes)
wild buckwheat
wild mustard

[1] Suppression only.

Registered tank mixes

Glyphosate. If Thunderhawk is applied alone please use an NIS @ 0.25%v/v.

Application information

How to apply: Apply with ground equipment only. **Water volume:** Minimum 40 L/acre

Application tips

Do not apply during periods of dead calm. Do not apply with spray droplets smaller than medium classification. Keep booms lower than 60 cm from target. ThunderHawk will damage emerged crop plants, even in minute quantities. Apply ThunderHawk prior to the emergence of the crop, either as a pre-seed or pre-emergence application and no longer than 48 hours after seeding prior to any crop emergence. Only weeds that have emerged at the time of application will be controlled.

How it works

ThunderHawk A is designed for use as a contact and systemic herbicide for broadleaf weed control. Pyraflufen-ethyl, a member of the phenyl pyrazole class of herbicides, inhibits the protoporphyrinogen oxidase (PPO) enzyme which results in cell membrane destruction and necrosis.

MCPA, a member of the phenoxy class of herbicides, mimics the plant growth regulator indol-3-acetic acid (auxin), interfering with cell enlargement and division, and development in susceptible plants. ThunderHawk B inhibits the production of the ALS enzyme in plants. This enzyme is essential for the production of certain amino acids that are essential for plant growth.

Expected results

Contact activity will be apparent within hours. Initially, leaves will take on a water-soaked appearance before turning necrotic; systemic symptomology will appear over time. Plants will be necrotic and may exhibit epinasty (twisting) before death. Complete plant death will occur within a few days. However, for certain weeds controlled by ThunderHawk B, typical symptoms (discolouration) of dying weeds may not be noticeable for 1 to 2 weeks after application, depending upon growing conditions and weed susceptibility.

Restrictions

Rainfall: Rainfall within 2 hours of application may reduce control. **Grazing:** Do not permit lactating dairy animals to graze field within 7 days of application. Withdraw meat animals from treated fields 3 days before slaughter.
Re-cropping: Fields treated with ThunderHawk in the spring may be planted to barley, oats, wheat, durum.
Pre-harvest Intervals: Do not graze or cut treated crops for forage until 30 days after application.
Re-entry interval: 12 hours

Environmental precautions

Avoid application when heavy rain is forecast or to areas with steep slopes, and/or compacted clay soils. Overspray or drift to sensitive habitats should be avoided. A buffer zone of 30 meters is required near sensitive habitats.

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ThunderHawk (cont'd)

Toxicity

T Pyraflufen-ethyl: Acute oral LD_{50} (rats) = >5,000 mg/kg. MCPA: Acute oral LD_{50} (rats) = 700 mg/kg. Florasulam: Acute oral LD_{50} (rats) = >5,000 mg/kg.

Storage

Store in a cool, dry, secure space. Heated storage is required.

Thumper® Herbicide/Thrasher/Leader/ Thumb

Group 4, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Thumper® (PCP# 22659)	Bayer	Bromoxynil: 280 g/L + 2,4-D: 280 g/L	Emulsifiable concentrate	8 L, 128 L, 400 L
Thrasher (PCP# 30372)	ADAMA Canada	Bromoxynil: 225 g/L + 2,4-D ester: 225 g/L		10 L, 120 L
Leader (PCP# 28853)	IPCO			10 L, 115 L
Thumb (PCP # 34380)	Sharda CropChem Ltd	Bromoxynil: 280 g/L + 2,4-D ester: 280 g/L		8 L, 128 L, 400 L

Crops, staging and rates

Crop	Staging	Rate
Barley, spring wheat, durum wheat and winter wheat	4-leaf to early flag leaf	Thumper/Thumb: 405 mL/acre; Thrasher/Leader: 500 mL/acre

Weeds, rates and staging

Weeds controlled at 1 - 4 leaf stage

American nightshade	common ragweed	jimsomweed	redroot pigweed
ball mustard	cow cockle	lady's-thumb	shepherd's-purse
bluebur	flixweed	night-flowering catchfly	volunteer canola
cocklebur	green smartweed	pale smartweed	volunteer sunflower

Weeds controlled at 1 - 8 leaf stage

common groundsel	lamb's-quarter	tartary buckwheat	wild mustard
common buckwheat	stinkweed	wild buckwheat	

Weeds controlled at 1 - 12 leaf stage

kochia (5 cm tall)	Russian thistle (5 cm tall)

Registered tank mixes

Tank mix partner	Tank mix partner rate	Specific comments
Barley, spring wheat (including durum)		
Achieve Liquid + Turbocharge adjuvant/Nufarm Tralkoxydim (200 mL/acre) + Nufarm Tralkoxydim adjuvant 0.5% v/v or Bison 400L	Achieve Liquid: 200 mL/acre + Turbocharge: 0.5% v/v or 200 mL/acre of Nufarm Tralkoxydim + Nufarm adjuvant: 0.5% v/v or Bison 400L: 200mL/acre + Addit adjuvant: 0.5% v/v	Apply from the 4-leaf to early flag leaf stage. Application before the 4-leaf stage may injure the crop
Puma Advance, Leader*	Fenoxaprop-p-ethyl: 150 - 310 mL/acre, 412 mL/acre with Puma Advance	Wheat: Apply from 4 - 6 leaf stage on the main stem + 3 tillers Barley: Apply from 4 - 6 leaf stage on the main stem + 3 tillers

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Tank mix partner	Tank mix partner rate	Specific comments
Spring wheat (including durum) only		
Horizon NG*, NextStep NG* (no adjuvant needed), Signal, Ladder (adjuvant needed)	Horizon NG/NextStep NG: 376 mL Signal: 93 - 117 mL/acre +0.8* v/v of Enhance adjuvant	Apply from 4-leaf to flag leaf stage
Spring wheat (excluding durum)		
Everest + Ag-Surf or Agral 90 (Approve herbicide only)	Approve: 500 mL/acre + Everest: 17.4 g/acre + Ag-Surf or Agral 90: 0.25 % v/v or Ladder: 93 - 117 mL/acre + Mana 80: 0.25% v/v	Apply from 4 - 6 leaf stage (4-leaf on the main stem plus 2 tillers)
Spring, winter and durum wheat		
Varro	200 mL/acre	Wheat: 4 - 6 leaf stage plus 3 tillers but prior to jointing (presence of first node)

* Only Thumper and Approve are registered for this tank mix. Check labels for tank mix partners.
Bayer supports the following mixes that are not on the Thumper label. They are 2,4-D ester, Decis on spring and durum wheat and barley; Tilt and Sevin XLR on all wheats and barley. Apply mixes according to the most restrictive use limitations for either product.

Application information

How to apply: Apply with ground equipment or by air. **Water volume:** Ground application: 20 - 40 L/acre. Aerial application: 12 - 16 L/acre. Use the higher volume when majority of weeds are cow cockle, pigweed or smartweed or there is a heavy crop canopy.

Mixing instructions

Use mixing instructions "c" on page 15.

Application tips

Do not treat cereals underseeded with forages. For best results, spray when weeds are in the seedling stage and actively growing. Application before the 4-leaf stage may injure the crop.

How it works

Bromoxynil is a contact type herbicide; therefore, good spray coverage is essential. Inhibits photosynthesis and plant respiration. 2,4-D is a hormone type herbicide which causes abnormal growth, affects respiration, food reserves and cell division in broadleaf plants. Absorbed primarily by leaves and stems and translocated to the growing tips and roots.

Expected results

Small burn spots on the leaf can appear within hours; death takes up to 2 weeks.

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce weed control. **Grazing:** Do not graze or harvest for greenfeed until 30 days after treatment. Withdraw meat animals 3 days before slaughter. **Pre-harvest intervals:** Do not harvest within 30 days of application. **Re-cropping:** There are no re-cropping restrictions the year after application. **Re-entry interval:** 24 hours.

Environmental precautions

Bromoxynil + 2,4-D is toxic to small mammals, birds, aquatic organisms including fish and non-target terrestrial plants. Avoid contamination of sensitive areas by using appropriate buffer zones.

Toxicity

Acute oral LD_{50} (rats) = 361 mg/kg.

Storage

Does not require heated storage.

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Topline

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Topline co-pack of: florasulam (PCP# 30814) + MCPA (PCP# 31669)	ADAMA Canada	Florasulam: 50 g/L	Suspension	1.6 L
		MCPA ester: 600g/L	Solution	9.33 L

Topline 1.6 L treats 40 acres.

Crops, staging and rates

Crop	Stage	Rate
Spring wheat (including durum), barley, oats	3 - 6 leaf stage	Topline: 40 mL of florasulam + 233 mL of MCPA Ester

Weeds and staging

Weeds controlled at 2 - 4 leaf stage

annual sunflower	common ragweed	lamb's-quarter	stinkweed
ball mustard	cow cockle	Russian pigweed	wild buckwheat
burdock	flixweed	shepherd's-purse	wild mustard
chickweed	hempnettle	smartweed	volunteer canola*
cleavers			

Weeds suppressed at 2 - 4 leaf stage

annual sow thistle	dandelion (seedlings and overwintered	narrow-leaved hawk's-beard	plantain (top growth)
Canada thistle	rosettes less than 15 cm)	perennial sow thistle	stork's-bill

* Including all herbicide-tolerant canola varieties.

Registered tank mixes

See above for Topline rate/acre.

Tank mix partner	Frontline XL/Topline plus tank mix partner	Additional weeds controlled
In spring wheat (including durum) only:		
Everest	Topline + Everest: 17.4 g/acre + Agral 90: 0.25% v/v	wild oats and green foxtail
Horizon, Nextstep, Foothills, Signal	Topline + Horizon: 93 mL/acre + Score: 0.8% v/v	wild oats
Horizon, Nextstep, Foothills, Signal	Topline + Horizon: 117 mL/acre + Score: 0.8% v/v	wild oats and green foxtail
In spring wheat (excluding durum) and barley		
Axial	Topline + Axial: 243 mL/acre + Adigor: 283 mL/acre	wild oats, green foxtail and volunteer oats

Application information

With: Ground equipment only. Do not apply by air. **Water volume:** 40 L/acre.

Mixing instructions

Only use sprayers that have good agitation. Ensure the sprayer is properly cleaned prior to adding Topline. Use mixing instructions "b" on page 15.

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Application tips

Do not apply to crops underseeded to legumes. Apply Topline early post-emergence to the main flush of broadleaf weeds. Warm, moist conditions that promote active weed growth, small weed size and competitive crop and good growing conditions after application will optimize the weed control. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and regrowth may occur. For best results, ensure adequate spray coverage of the target weeds. Only weeds that are emerged at time of application will be controlled.
If the foliage of the weed is wet at the time of application, control may be reduced.

How it works

Topline herbicides contains a Group 2 and a Group 4 mode of action herbicide. The Group 2 mode of action herbicide inhibits the production of the ALS enzyme in plants. This enzyme is essential for the production of certain amino acids required for plant growth. The Group 4 mode of action herbicide disrupts normal plant growth regulation, resulting in death of susceptible plants.

Expected results

Weeds susceptible to Topline will stop growing almost immediately. The weeds turn yellow or reddish. Symptoms such as yellowing and red colouration may not be noticeable for 1 to 2 weeks. Some twisting may also be observed on weeds sensitive to MCPA. Warm, moist conditions, small weed size and competitive crop will optimize weed control provided by Topline.

Restrictions

Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage, and a repeat treatment may be required. Do not apply if rainfall is forecast for the time of application. **Grazing:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest forage or cut hay within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.
Pre-harvest intervals: Do not harvest the treated crop within 60 days after application. **Re-entry interval:** 12 hours.
Re-cropping: Barley, canola, pea, wheat or fields can be fallowed.

Environmental precautions

Highly toxic to aquatic organisms and non-terrestrial plants. Observe buffer zones specified under Directions for Use on the label.

Toxicity

Acute oral LD_{50} is > 2,000 mg/kg.

Storage

Store in a dry, heated storage. If products are frozen, bring to room temperature and agitate before use.

Tordon 22K

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tordon 22K (PCP# 9005)	Corteva Agriscience	Picloram: 240 g/L	Solution	10 L

Note: Available only through selected retail outlets.

Crops, staging and rates

Rangeland, permanent grass pastures and non-cropland. Apply at any stage of permanent grass pastures, rangeland and non-cropland. **Rate:** 0.45 - 3.6 L/acre.

Note: Legumes are susceptible to Tordon 22K. Do not spray pastures containing forage legumes unless the kill of such legumes can be tolerated.

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Tordon 22K (cont'd)

Weeds, rates and staging

Apply any time when green fully developed leaves are present.

Weeds	Rate	Acres treated per 10 L container
scentless chamomile	0.45 L/acre	20
diffuse or spotted knapweed	0.91 L/acre	11
poverty weed Canada thistle field bindweed (low density) leafy spurge (low density) pasture sage, perennial sow thistle Russian knapweed toadflax (low density)	1.8 L/acre	5
leafy spurge field bindweed toadflax	90 mL/100 m^2	High plant density: spot treatment only

Application information

With: Apply with ground sprayers, backpack sprayers or handgun. See label for application information for a backpack sprayer. **Water volume:** 160 - 324 L/acre.

Application tips

Tordon 22K is persistent. It will carry over in soil. Treated soil should not be moved out of the treated area. Tordon 22K is very difficult to clean from sprayers. Use a different sprayer for applying other materials to desirable plants or crops. Handguns equipped with proportioning devices and reservoirs for Tordon 22K are useful in preventing sprayer contamination. Spot treatment: Treat at rate of 90 mL/100 m^2. May be used to treat no more than a 1 acre patch.

How it works

Interferes with cell division, causing leaf cupping, stem distortion and eventual death of plant. Tordon 22K is absorbed through leaves and roots.

Expected results

Tordon 22K: Perennial weeds show distorted stems and cupped leaves, which turn yellow and then brown. Usually native grass increases in abundance as a result of reduced competition.

Restrictions

Rainfall: Heavy rainfall shortly after application may cause poor results. **Grazing:** Do not graze treated area by dairy animals within 6 weeks after treatment. Clippings from grass or crops which have been treated with Tordon 22K should not be used for composting or mulching, nor should the manure from animals grazing treated areas or fed treated forage be used around susceptible plants. **Re-cropping:** Picloram may persist in the soil for a period of up to 5 years; therefore, it should not be used in those areas where sensitive broadleaved crops such as sunflower and potato are grown in the rotations. Where wheat, oats or barley are the major crops in the rotations, it is recommended oats are grown in the first year, oat or barley the second year, then oats, barley or wheat the third year after treatment.

Environmental precautions

Buffer zones are 1 metre for aquatic habitats and 120 metres for sensitive terrestrial habitats. Tordon 22K is moderately toxic to fish. Do not apply to any water bodies or in areas where the runoff from treated areas will reach fish-bearing waters. **Leaching:** Picloram is highly mobile in the soil and will readily move with water. Do not apply to soils that are very permeable.

Toxicity

Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, dry place. Do not freeze. If freezing occurs, bring to room temperature and mix thoroughly.

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Tough 600EC

Group 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tough 600EC (PCP# 34031)	Belchim Crop Protection Canada	Pyridate: 600 g/L	Emulsifiable concentrate	1 L - 20,000 L

Crops, staging and rates

Crop	Staging	Rate per acre
Corn: field and sweet	Prior to crop emergence or directed over the top of the crop up to the 8th leaf stage	304 - 607 mL
Chickpea	Prior to crop emergence or post-emergence when crop is in the 1 - 4 node stage (maximum height of 20 cm)	304 - 607 mL
Canola	Prior to crop emergence	304 - 607 mL
Dry peas	Prior to crop emergence	304 - 607 mL
Lentils	Prior to crop emergence	304 - 607 mL

Weeds, rates and staging:

Weeds** controlled by Tough 600 EC Herbicide when applied post-emergent, pre-seed and pre-emergent, alone.

Common name	Product Rate
Black nightshade	304 mL/ac
Redroot pigweed	202 – 405 mL/ac
Kochia	405 – 607 mL/ac
Common lamb's quarters	304 – 405 mL/ac
False cleavers	202 mL/ac
Wild mustard	405 – 607 mL/ac

**Weeds which are listed as controlled by Tough 600 EC will be controlled even if they are resistant biotypes of those weeds belonging to the following groups: Group 2: ALS inhibitors; Group 5: Photosystem II inhibitors; Group 9: EPSP synthase inhibitors.

Weeds** suppressed by Tough 600 EC Herbicide when applied post-emergent, pre-seed and pre-emergent, alone.

Common name	Product Rate
Common waterhemp	607 mL/ac

**Weeds which are listed as controlled by Tough 600 EC will be controlled even if they are resistant biotypes of those weeds belonging to the following groups: Group 2: ALS inhibitors; Group 5: Photosystem II inhibitors; Group 9: EPSP synthase inhibitors.

Application information

How to apply: Ground application only. Do not apply by air. **Water Volume:** 40 L/acre minimum.

Do not apply more than 607 mL/acre Tough 600EC Herbicide per season.

Application tips

Tough 600EC must be applied to emerged, actively growing weeds. Warm, moist growing conditions promote active weed growth and enhance the activity of pyridate. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. For best results, ensure thorough spray coverage of target weeds.

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Tough 600 EC (cont'd)

How it works
Tough 600EC is a contact herbicide. It is absorbed through the leaves of actively growing plants inhibiting photosynthesis by disrupting the photosystem II complex.

Expected results
Symptoms in sensitive weeds include marginal yellowing, followed by yellowing and browning of the entire leaf, usually occurring within 4 - 7 days after application.

Registered tank mixes:
Herbicides: Field corn – Shieldex 400SC, Callisto 480SC, Armezon, Impact, Dicamba, Aatrex 480, Vios G3

Restrictions
Rainfall: Avoid application when heavy rain is forecast. **Re-entry interval:** Corn (field and sweet) – 7 days – Hand set /hand line irrigation, 3 days – scouting. All other activities 12 hours. Chickpeas – 7 days – Hand set / hand line irrigation, 3 days – scouting. All other activities 12 hours. Dry peas, lentils and canola – 12 hours. **Grazing:** Do not allow animals to graze treated corn forage within 45 days of the last application. Do not cut treated corn stover for feed or silage within 100 days of the last application. **Pre-harvest interval:** Field corn – 100 days, sweet corn – 45 days, chickpeas – 60 days, Dry peas, lentils and canola – at maturity.

Environmental precautions
Avoid spraying in situations where drift may occur. Do not apply during periods of dead calm. Field sprayer: A minimum 1-metre spray buffer zone is required for freshwater and estuarine/marine habitats.

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg.

Storage
Do not freeze. Store in a cool, dry, secure and well-ventilated area.

Travallas

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Travallas (PCP# 31685)	FMC of Canada Limited	Metsulfuron-methyl: 3 g/L + thifensulfuron-methyl: 30 g/L + fluroxypyr: 150 g/L	Suspension	8 L

Crops, staging and rates

Crop	Staging
Spring and durum wheat, barley	2 leaf - flag leaf
Winter wheat	Apply in spring up to the flag leaf stage

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Weeds controlled

Weeds less than 10 cm in height or diameter unless otherwise noted. Travallas applied at 200 mL/acre.

Canada thistle[1,2]
chickweed (1 - 6 leaf)
cleavers (1 - 9 whorl)
corn spurry
cow cockle
dandelion (rosettes up to 25 cm in diameter)
flixweed
hemp-nettle (1 - 8 leaf)
kochia (including Group 2 resistant)
lady's-thumb, green smartweed
lamb's-quarter
narrow-leaved hawk's-beard
night-flowering catchfly
redroot pigweed
round-leaved mallow[1]
Russian thistle
scentless chamomile (up to 10cm)
shepherd's-purse (up to 20 cm)
sow thistle (perennial)[1]
stinkweed
stork's-bill
volunteer canola (except Group 2 tolerant varieties)
volunteer flax
white cockle (<10 cm)
wild buckwheat (1 - 8 leaf)
wild mustard

[1] Suppression only. [2] Top growth control.

Registered tank mixes

Tank mix partner	Product rates	Additional pests controlled
Spring wheat (incl. durum), winter wheat and barley		
MCPA Ester 500 or 600	226 mL/acre for 500, 190 mL/acre for 600	All canola including volunteer Group 2 tolerant canola 2 - 4 leaf, annual sow thistle, round-leaved mallow (up to 6-leaf)
Acapela fungicide	175 - 350 mL/acre	Cereal leaf diseases controlled or suppressed by Acapela
Spring and durum wheat, barley		
Puma Advance	Puma Advance: 206 mL/acre (green foxtail rate), 412 mL/acre (wild oat rate)	Wild oats and green foxtail up to 6-leaf or up to 3rd tiller emerged
Puma Advance + MCPA ester 500 (600)	Puma Advance: 206 mL or 412 mL/acre + MCPA ester 500 (600): 226 mL (190mL)/acre	Wild oats and green foxtail up to 6-leaf or 3rd tiller emerged
Spring wheat (excluding durum), winter wheat and barley		
Axial 100 EC + Adigor adjuvant	243 mL/acre Axial + 283 mL/acre Adigor	Wild oats
Axial + MCPA Ester 500 (600)	Axial: 500 mL/acre + MCPA Ester 500 (600): 226 mL (190 mL)/acre	Volunteer Group 2 tolerant canola (2 - 4 leaf)
Spring and durum wheat		
Horizon 240 EC + Score	93 mL/acre Horizon 240 + 0.8 L/100 L spray of Score adjuvant	Wild oats
Traxos	500 mL/acre	Wild oats
Traxos + MCPA Ester 500 (600)	Traxos: 500 mL/acre + MCPA Ester 500 (600): 226 (190) mL/acre	Wild oats, volunteer Group 2 tolerant canola (1 - 4 leaf)
Spring and winter wheat only		
Everest 2.0 + adjuvant	19 - 29 mL/acre + 0.25% v/v of adjuvant	Wild oats
Everest 2.0 + MCPA Ester 500 (600) + adjuvant	Everest 3.0: 19 – 29 mL/acre + MCPA Ester 500 (600): 226 (190) mL/acre + 0.25% v/v adjuvant	Wild oats, volunteer Group 2 tolerant canola (1 - 4 leaf)
Spring, durum and winter wheat		
Simplicity + adjuvant	200 mL/acre Simplicity + 0.25% v/v of adjuvant	Wild oats
Simplicity + MCPA Ester 500 (600)	Simplicity: 200 mL/acre + MCPA Ester 500 (600): 226 (190) mL/acre	Wild oats, volunteer Group 2 tolerant canola (1 - 4 leaf)
Varro + MCPA 500 (600) Ester	Varro: 200 mL/acre + MCPA Ester 500 (600): 226 (190) mL/acre	Wild oats, volunteer Group 2 tolerant canola (1 - 4 leaf)
Varro	Varro: 200 mL/acre	Wild oats

FMC supports the following mixes not on the Travallas label. Herbicides: Everest 3.0 AG/Sierra 3.0 AG (spring wheat only), Simplicity GoDRI, clodinafop, Everest 3.0 AG+ MCPA Ester.

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Travallas (cont'd)

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 22 L/acre minimum.
Aerial – 10 L/acre minimum.

Application tips
Optimal herbicide activity requires an actively growing crop and weeds. Best temperature for application is between 12 and 24°C. Products work through maximum foliar uptake and contact activity. Frost 3 days before or after application may reduce weed control and crop tolerance. Consult label for mixing instructions.
Shake well before using.

How it works
A mix of 3 active ingredients from 2 modes of action. The thifensulfuron and metsulfuron methyls are absorbed by foliage and roots, translocating throughout the plants and concentrating in areas of rapid growth. There, they inhibit cell division. Fluroxypyr is a Group 4 herbicide, an artificial plant hormone, that disrupts normal growth, causing plant twisting and eventual death.

Expected results
Growth stops immediately. Discolouration of dying weeds may not be noticeable for 1 to 3 weeks after application, depending on growing conditions and weed species. Poor results may be expected if there is improper mixing, timing, coverage or when weeds are under drought stress.

Restrictions
Rainfall: Rainfast in 2 hours. **Grazing:** Do not graze or feed the treated crop to livestock within 7 days of application. **Pre-harvest intervals:** Do not harvest the treated crop within 60 days of application.
Re-cropping: The following crops may be seeded 10 months after application: canola, dry bean, flax, faba bean, field corn, soybean, oat, pea, spring wheat (including durum), spring barley ,winter wheat, lentil.
Re-entry interval: 12 hours.

Environmental precautions
Buffer zone of 1 to 5 metres for ground application from sensitive aquatic and terrestrial habitat. Avoid spraying areas potentially susceptible to runoff.

Toxicity
Metsulfuron-methyl, oral LD_{50} (rats) = > 5,000mg/kg; thifensulfuron-methyl, oral LD_{50} (rats) = > 5,000 mg/kg; fluroxypyr, oral LD_{50} (rats) = > 2,000 mg/kg.

Storage
If product is stored below freezing for an extended time, slowly warm to a minimum of 10°C and shake well before using.

Traxos

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Traxos (PCP# 29855)	Syngenta	Pinoxaden: 25 g/L + clodinafop propargyl: 25 g/L	Emulsifiable concentrate	10 L, 80 L, 400 L

Crops, staging and rates

Crop	Stage	Rate
Spring and durum wheat	Prior to 4th tiller (do not apply past flag leaf)	500 mL/acre

Note: Traxos contains a built-in adjuvant system, DO NOT add any adjuvant to the Traxos herbicide mixture.

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Weeds and staging

Grassy weeds controlled	Growth stage	Additional remarks
Wild oats, tame oats, volunteer canaryseed, proso millet	1 - 6 leaf on the main stem	Prior to emergence of 4th tiller
Green foxtail, yellow foxtail	1 - 5 leaf on the main stem	For optimum control apply prior to emergence of 3rd tiller
Barnyard grass, Persian darnel		For optimum control apply before tillering and while actively growing

Registered tank mixes

Tank mix partner	Product rates	Crop stage[1]
Buctril M [4], [5]	404 mL/acre	2-leaf to flag leaf
Curtail M [4]	606 - 810 mL/acre	3-leaf to just before flag leaf
Trophy [2], [4]	240 mL/acre of Trophy A + 453 mL/acre of Trophy B	3-leaf to flag leaf
Prestige [3], [4]	243 - 324 mL/acre of Prestige A + 606 - 810 mL/acre of Prestige B	3-leaf to flag leaf
Benchmark[4,5]	40 mL/acre of Benchmark A + 486 mL/acre of Benchmark B	2 - 6 leaf
Infinity[5]	336 mL/acre	1 - 5 leaf
Pulsar[3]	246 - 371 mL/acre	2 - 5 leaf
Pulsar[3] + MCPA Ester[4] 600	246 - 371 mL/acre + 234 mL/acre	2 - 5 leaf
MCPA Ester[4] 600	283 - 372 mL/acre	3-leaf to flag leaf
Mextrol 450[4]	500 mL/acre	2-leaf to flag leaf
Matador 120EC	26 - 33 mL/acre	Prior to emergence of 4th tiller
Tilt 250E	101 - 202 mL/acre	Prior to emergence of 4th tiller

[1] Always consult the label of the broadleaf herbicide, insecticide or fungicide prior to use. [2] Rates above 2.0 L/ha may cause crop injury. [3] Refer to broadleaf tank mix label for list of weeds controlled at low and high use rates. [4] A reduction in barnyard grass control may be observed when Traxos herbicide is tank mixed with these broadleaf herbicides. [5] A reduction in green foxtail control may be observed when Traxos herbicide is tank mixed with these broadleaf herbicides.

Application information

Water volume: Ground – 20 - 40 L/acre. Aerial – 12 L/acre.

Mixing instructions

Half fill tank with water using continuous agitation. Add tank mix partner, then add Traxos. Agitate for several minutes between application of herbicides.

Application tips

When tank mixing Traxos herbicide with a tank mix partner, ensure you read the tank mix partner label for minimum water recommendations. For optimum control, apply Traxos herbicide to actively growing weeds, ideally at the 2 - 3 leaf stage. An early application will maximize crop yields by reducing weed competition. Weeds emerging after application of Traxos herbicide will not be controlled.

Weed control under stress conditions can be reduced or delayed. Do not apply to crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

How it works

Traxos herbicide is absorbed by the leaves and is rapidly translocated to the growing points of leaves and stems. Thorough coverage of the plants is essential for consistent control.

Expected results

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within 1 to 3 weeks after application. Further colour changes and loss of vigour will be observed, followed by a browning and complete control 3 to 5 weeks after

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Traxos (cont'd)

application. Temporary crop injury may occur with tank mixes under extreme weather conditions or when the crop is suffering from stress due to inadequate or abnormally high moisture levels or extreme temperatures.

Restrictions

Rainfall: Traxos herbicide alone can be used 1 hour before rainfall. **Grazing:** Observe a minimum of 7 days before grazing livestock. **Pre-harvest intervals:** 60 days after treatment for grain and straw and 30 days after for hay. **Re-cropping:** There are no crop limitations the year following application of Traxos.
Re-entry interval: 12 hours.

Environmental precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Leave a 1-metre buffer between treated area and sensitive vegetation and aquatic habitats.

Toxicity

Pinoxaden: Acute oral LD_{50} (rats) = 3,129 mg/kg. Clodinafop-propargyl: Acute oral LD_{50} (rats) = 2,276 mg/kg.

Storage

Heated storage not required. Store the product in closed, original container in a well ventilated room.

TraxosTwo

Group 1, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
TraxosTwo Grass Component (PCP# 31674)	Syngenta	Pinoxaden: 25 g/L + clodinafop-propargyl: 25 g/L	Emulsifiable concentrate	10 L, 80 L
TraxosTwo Broadleaf Component (PCP# 31673)		Fluroxypyr: 90g/L 2,4-D: 360 g/L	Emulsifiable concentrate	9 L, 72 L

Crops, staging and rates

Crop	Stage	Rate
Spring wheat, durum	4-leaf, prior to the emergence of the 4th tiller	500 mL/acre of TraxosTwo Grass Component 445 mL/acre of TraxosTwo Broadleaf Component

Note: Traxos contains a built-in adjuvant system, DO NOT add any adjuvant to the TraxosTwo herbicide mixture.

Weeds, rates and staging

Grassy weeds

Crops	Staging	Notes
Wild oats, volunteer canary seed, volunteer (tame) oats, proso millet	1 - 6 leaf stage on the main stem	Prior to the emergence of the 4th tiller
Green foxtail, yellow foxtail (wild millet, pigeon grass)	1 - 5 leaf stage on the main stem	Prior to the emergence of the 3rd tiller and when foxtail is actively growing
Barnyard grass, Persian darnel	1 - 5 leaf stage on the main stem	Apply before tillering and when the plants are actively growing

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Broadleaf weeds controlled

bluebur
burdock
canola (volunteer)
cleavers (1 - 8 whorl)
clovers (sweet and grey tansy)
cocklebur
field horsetail*
flixweed
goat's-beard
hemp-nettle (2 - 6 leaf)
hoary cress*
kochia**
lamb's-quarter
mustards (except green tansy, dog wild buckwheat (1 - 6 leaf)
plantain
prickly lettuce
ragweed
round-leaved mallow (1 - 6 leaf)
shepherd's-purse
stinkweed
storks'-bill (1 - 8 leaf)
sunflower (annual)
vetch
volunteer flax (1 - 12 cm)
wild radish

Broadleaf weeds suppressed

common chickweed** (up to 8 cm)
red root pigweed
sow thistle (perennial)*

* Top growth control only.

** Including biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme.

Broadleaf weeds controlled with a tank-mix 2,4-D ester herbicide

To control or suppress the following weeds, use 445 mL/acre of TraxosTwo broadleaf component and with 68 mL/acre of 2,4-D ester 600.

Controlled

blue lettuce*
dandelion**
docks
dog mustard
field bindweed*
field peppergrass
hairy galinsoga
hedge bindweed
lady's-thumb
leafy spurge*
oak-leaved goosefoot
redroot pigweed
Russian thistle
smartweed
tansy mustard
tartary buckwheat
wild buckwheat (1 - 8 leaf)
gumweed

Suppressed

common chickweed*** (up to 8 cm)
Canada thistle*
sow thistle (perennial)*
sow thistle (annual)

* Top growth control. ** Spring rosettes. *** Including biotypes resistant to Group 2 herbicides that inhibit the ALS enzyme.

Registered tank mixes

Tank mix partner	Tank mix partner rate	Remarks
Spring wheat (incl. durum) and barley		
2,4-D Ester		
Matador 120 EC	25 - 34 mL/ac	Prior to emergence of 4th tiller
Tilt 240E Fungicide	101 - 202 mL/ac	Prior to emergence of 4th tiller

Application information

Water volume: Ground – 20 - 40 L/acre. Aerial – 12 L/acre minimum.

Mixing instructions

Fill tank half full, add TraxosTwo Broadleaf Component, keep filling and add TraxosTwo Grass Component. When adding a tank mix, always add the TraxosTwo Broadleaf Component, followed by the fungicide/insecticide and the TraxoTwo Grass Component last.

Application tips

Application before the 4-leaf stage of wheat may cause severe twisting of leaves and stem and head deformities, which may reduce yield up to 10%. Do not apply later than the flag leaf stag. Maximum 1 application per year.

How it works

Actively growing susceptible grasses stop growing within 48 hours of treatment. Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within 1 to 2 weeks of application.

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TraxosTwo (cont'd)

Expected results

Depending on species, growing conditions and crop competition, leaves and growing points turn yellow within 1 to 2 weeks of application. Further colour changes and loss of vigour will be observed, followed by browning and complete control within 3 to 5 weeks. The TraxosTwo Broadleaf Component is influenced by weather conditions. Optimum activity requires active crop and weed growth. The temperature range for optimum activity is 12 to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost before an application (3 days) or shortly after may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions, e.g., drought, heat or cold stress, or if weeds have initiated flowering or if heavy infestation exists.

Restrictions

Do not apply on barley or any crop other than spring wheat or durum, as crop damage will result. Do not allow spray to drift to adjacent fields seeded to crops other than spring wheat or durum wheat. Do not treat wheat underseeded to forage. **Rainfall:** Do not apply within 2 hours of rainfall. **Grazing:** Do not permit lactating dairy/beef animals to fields within 7 days of application. Do not harvest for grain or straw until 60 days after application. Withdraw meat animals from fields at least 3 days before slaughter. **Re-cropping:** Fields treated with TraxosTwo can be replanted to wheat, barley, oats, triticale, alfalfa, edible bean, canola, lentil, pea, potato, soybean, sugar beet and sunflower.
Re-entry interval: 12 hours.

Environmental precautions

Toxic to aquatic organisms, birds, small wild mammals and non-target terrestrial plants. **Buffer zones:** Field sprayer – 1 metre for fresh water, estuarine/marine habitats and terrestrial habitats. Aerial – 5 metres for fixed wing and 2 metres for rotary wing for fresh water and 1 metre for estuarine/marine habitats. 50 metres for fixed wing and 45 metres for rotary wing for terrestrial habitats.

Toxicity

Oral LD_{50} (female rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,050 mg/kg.

Storage

Store in original containers in secure, dry heated storage. If product is frozen, bring to room temperature and agitate before use. Keep away from feed and foodstuffs and out of reach of children and animals. Keep away from fire or open flame or other sources of heat.

Tridem

Group 2, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tridem A (PCP# 33290)	Corteva Agriscience	Pyroxsulam 21.5 %	Wettable granules	0.84 kg, 5.04 kg
Tridem B (PCP# 33289)		Florasulam 5 g/L Fluroxypyr 100 g/L	Emulsifiable concentrate	8.1 L, 97.2 L
Bindem Utility Modifier				2.4 L, 7.1 L

1 case treats 40 acres; 1 bulk unit treats 240 acres. Bindem Utility Modifier is included in the case/bulk package. The use of an additional surfactant is NOT required.

Crops, staging and rates

Crop	Stage	Rate
Spring wheat (including Durum) and winter wheat	3-leaf to just prior to flag leaf emergence	Tridem A at 21 g/acre Tridem B at 405 mL/acre + Bindem at 60 mL/acre

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Weeds, rates and staging

Grass weeds controlled from 1 - 6 leaf, prior to the 4th tiller

wild oats[1]
Japanese brome[2]

[1] For low wild oat population (<75 plants/m^2).
[2] For control of Japanese brome 1 - 4 leaf, 2 tiller stage under good growing conditions.

Broadleaf weeds controlled when tank mixed with 172 - 243 mL/acre of 2,4-D Ester 700 (Tridem is meant to be mixed with 2,4-D, which is not included)

bluebur	flixweed	redroot pigweed	thyme-leaved spurge
burdock	giant ragweed	round leaved mallow	volunteer canola
Canada thistle	goat's-beard	shepherd's-purse	volunteer flax
cleavers*	hemp-nettle	smartweed	wild buckwheat
cocklebur	kochia**	sowthistle, annual	wild mustard
common chickweed	lamb's-quarter	sow thistle, perennial	wild radish
cow cockle	plantain	stinging nettle	wild sunflower (annual)
daisy fleabane	prickly lettuce	stork's bill (1 - 8 leaf)	Russian pigweed
false flax	narrow-leaved hawk's-beard	sweet clover	Russian thistle
false ragweed	ragweed		

* Including Group 2 resistant biotypes. ** Including ALS resistant biotypes.

Registered tank mixes

Tridem is not intended to be used without the addition of 2,4-D Ester 700. Add at the rate of 172 - 243 mL/acre. 2,4-D Ester 700 is not included in the Tridem package and must be purchased separately.

Application information

How to apply: Ground application only. **Water volume:** 20 - 40 L/acre

Application tips

For optimum control, apply herbicide to actively growing weeds. Only weeds emerged at time of application will be controlled. Weed control may be reduced if applied under stress conditions such as drought, heat, prolonged cool temperatures, flooding and insufficient fertility. Under conditions of low crop and high weed density, control may be reduced. Optimum weed control will be obtained if application of Tridem herbicide is delayed until the stress conditions have ended and the weeds have resumed growth.

How it works

Tridem is absorbed by the leaves and rapidly translocated to the growing points and stems. Warm, moist growing conditions promote active weed growth and enhance the activity of Tridem by allowing maximum foliar uptake and activity.

Expected results

Actively growing, susceptible weeds stop growing. Depending on grass species, growing conditions and crop competition, leaf discolouration occurs within 1 to 3 weeks after application. Degree of grass control.

Restrictions

Rainfall: Rain within 1 hour of application may reduce control. **Grazing:** Do not graze for 7 days or silage/hay for 30 days following application. **Pre-Harvest interval:** Do not harvest the treated crop for grain within 60 days of application. **Re-cropping:** Fields previously treated with Tridem herbicide can be seeded the following year to alfalfa, barley, canola, corn, dry common beans, faba bean, flax, lentils, mustard (brown, oriental, and/or yellow), oats, pea, potato (except seed potato), soybean, sunflower, wheat or field can be summer-fallowed.
Re-entry interval: 12 hours.

Environmental precautions

Do not contaminate any body of water. Use a downwind buffer zone of 30 metres between boom edge and the closest edge of sensitive terrestrial habitat and a 15 metre buffer zone between the downwind edge of the boom and the closest edge of sensitive aquatic habitat.

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Tridem (cont'd)

Toxicity
Acute oral LD_{50} (rats) > 2,000 - 5,000 mg/kg.

Storage
Store in original containers in a secure, dry, well ventilated, heated storage.

trifluralin

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Bonanza 10G (PCP# 22744)	Loveland Products Canada	trifluralin: 10%	Granules	22.7 kg, 454 kg
Bonanza 480 EC (PCP# 28289)	Loveland Products Canada	trifluralin: 480 g/L	Emulsifiable concentrate	9.46 L, 984 L
Rival 10 G (PCP# 18926)	Nufarm Agriculture	trifluralin: 10%	Granules	22.7 kg, 454 kg
Rival EC (PCP# 18612)	Nufarm Agriculture	trifluralin: 500 g/L	Emulsifiable concentrate	9 L, 900 L
Treflan Liquid EC (PCP# 23933)	Gowan Company	trifluralin: 480 g/L	Emulsifiable concentrate	9.45 L, 115 L
Treflan MicroActiv (PCP# 21742)	Gowan Company	trifluralin: 10%	Granular	454 kg

Oilseed and special crops

Crops, staging and rates
Rate: see Rates table below 0.69 - 3.72 L/acre. Not all the trifluralin formulations are registered for the crops listed below. Please refer to the specific product label for details. Granules applied in the fall only (after Sept. 1 but before soil freeze-up). All products are for pre-plant-incorporated use only.

- alfalfa establishment (flax and canola cover crops only)
- asparagus (established - 3 years)
- barley (fall only for granular products)
- black beans
- canola
- dry common bean (kidney, white)
- faba bean
- flax (summer and fall only)
- forage legumes (seedling alsike clover, red clover, cicer milkvetch, bird's-foot trefoil)
- lentils (fall only)
- pea (field, canning)
- safflower
- Saskatoon berries
- soybeans
- strawberries
- sunflower
- sweet clover
- transplanted shelterbelts
- vegetables (broccoli, brussel sprouts, cabbage, cauliflower, carrots, rutabaga, transplanted tomato)

Weeds controlled

- annual bluegrass
- barnyard grass
- carpetweed
- cheatgrass (downy bromegrass)
- chickweed
- cow cockle
- crabgrass
- goosegrass
- knotweed
- lamb's-quarter
- millet (green and yellow foxtail)*
- meadow bromegrass
- Persian darnel
- pigweed
- purslane
- Russian thistle
- stink grass
- wild oats**
- wild buckwheat

* Excluding Group 3 resistant foxtails.

** Suppression.

Spring application: Trifluralin can be applied immediately prior to planting or up to 3 weeks before planting.

Summer application: Trifluralin can be applied to summerfallow between June 1 and Sept. 1 for weed control in canola or flax the following year. Apply the summer rate and incorporate (see Incorporation section). Not recommended for sand and sandy loam soils. Trifluralin must be incorporated at least twice with the implement operated in 2 different directions. The initial incorporation must be done within 24 hours after application. The second incorporation (and subsequent incorporations) may be done whenever necessary to destroy resistant weed growth during the remainder of the fallow season. Shallow tillage (5 - 8 cm) is necessary in the spring prior to planting.

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Summerfallow: Treflan MicroActiv/Bonanza 10G/Rival 10G can also be applied to summerfallow in May, June or July for weed control during both years of a fallow-wheat rotation or in the fall (Sept.: prior to soil freeze-up) prior to spring and durum wheat seeding.

Crop Year

wild millet (green foxtail and yellow)*	lamb's-quarter	wild buckwheat	wild oats

Summerfallow year (above weeds as well as)

barnyard grass	Persian darnel	Russian thistle
cow cockle	red root pigweed	

* Excluding Group 3 resistant foxtails.

Fall application: Trifluralin can be applied in the fall between Sept. 1 and prior to soil freeze-up for weed control the following year. Apply fall rates and incorporate twice. The initial incorporation must be done within 24 hours after application. It is preferred to do both incorporations in the fall followed by tillage (5 - 8 cm) in the spring prior to planting. However, 1 incorporation may be done in the fall and the second in the spring at the time of seedbed preparation, provided both operations are done at the recommended depth. Note: Do not apply to stubble when the previous crop was treated with another trifluralin product (Bonanza, Rival or Treflan). This includes the application the previous summer or fall.

Rates

Spring applications

Crop	Soil texture and soil organic matter (%)			
	Light (sand - sandy loam)		Medium - heavy (loam to clay)	
	2 - 6%	6 - 15%	2 - 6%	6 - 15%
Field crops: Black bean, crambe, dry bean (field and kidney), faba bean, mustard, pea (field and canning), canola, safflower, sainfoin, sunflower				
Bonanza EC	0.69 L/acre	0.69 L/acre	0.93 L/acre	0.93 L/acre
Rival EC	0.65 L/acre	0.89 L/acre	0.89 L/acre	0.89 - 1.13 L/acre
Treflan Liquid EC	0.69 L/acre	0.93 L/acre	0.93 L/acre	0.93 - 1.21 L/acre
Shelterbelts: American elm, caragana, green ash, Scotch pine, Siberian elm				
Bonanza EC	1.86 L/acre	3.72 L/acre	3.72 L/acre	3.72 L/acre
Rival EC	1.80 L/acre	3.6 L/acre	3.6 L/acre	3.6 L/acre
Treflan Liquid EC	1.9 L/acre			3.75 L/acre
Vegetables and berries: strawberry, broccoli, brussel sprouts, cabbage, cauliflower, carrot, rutabaga, tomato (transplanted), snap bean, sweetclover, Saskatoon				
Bonanza EC	0.69 L/acre	0.93 L/acre	0.93 L/acre	0.93 - 1.17 L/acre
Rival EC	0.65 L/acre	0.89 L/acre	0.89 L/acre	0.89 L/acre
Treflan Liquid EC	0.69 L/acre	0.93 L/acre	0.93 L/acre	0.93 - 1.21 L/acre
Forage Legumes: Alsike clover, red clover, cicer milkvetch, bird's-foot trefoil (seed production and forage)				
Bonanza EC	0.69 L/acre	0.93 L/acre	0.93 L/acre	0.93 L/acre
Rival EC	Not registered	Not registered	Not registered	Not registered
Treflan Liquid EC	0.69 L/acre	0.93 L/acre	0.93 L/acre	0.93 L/acre

For use in canola, pea, mustard, sunflower and faba bean (fall only). First incorporation should occur with 24 hours of application

Products	Soil type	
	Light soils with < 6% organic matter	Medium to heavy soils with 6 - 15% organic matter
Bonanza 10G/ Treflan MicroActiv	4.45 kg/acre	5.7 - 6.9 kg/acre

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trifluralin (cont'd)

Products	Soil type	
	Light soils with < 6% organic matter	Medium to heavy soils with 6 - 15% organic matter
Rival 10G	3.44 kg/acre	4.45 - 5.67 kg/acre

For use in flax or lentils (fall only)

Products	Soil type			
	Light soils with < 6% organic matter		Medium to heavy soils with 6 - 15% organic matter	
	Sand - sandy loam	Loam - clay	Sand - sandy loam	Loam - clay
Bonanza 10G/Rival 10G/ Treflan MicroActiv	4.45 kg/acre	4.45 - 5.6 kg/acre	5.67 kg/acre	5.67 - 6.88 kg/acre
Bonanza EC	0.93 L/acre	0.93 L/acre	1.17 L/acre	1.17 L/acre
Rival EC	0.89 L/acre	0.89 L/acre	1.13 L/acre	1.13 - 1.38 L/acre
Treflan Liquid EC	0.93 L/acre	1.21 L/acre	1.17 L/acre	1.17 L/acre

Cereals (barley and wheat)
Fall application (between Sept. 1 and freeze up) to stubble or summerfallow for the control of green foxtail* in barley.

Products	Soil type					
	2 - 4% organic matter		4 - 6 % organic matter		6 - 10 % organic matter	
	Soil texture classes					
	Sandy to sandy loam	Loam to clay	Sandy to sandy loam	Loam to clay	Sandy to sandy loam	Loam to clay
Bonanza 10G	3.44 kg/acre	3.44 kg/acre	4.45 kg/acre	4.45 kg/acre	4.45 kg/acre	5.67 kg/acre
Rival 10 G						
Treflan MicroActiv						

* Trifluralin (Bonanza/Rival) will not control trifluralin tolerant green foxtail.

Caution: For barley, do not apply Bonanza 10G, Rival 10G on Gray-Wooded soils or other soils containing less than 2% organic matter or on Black/Deep Black soils containing more than 6% organic matter.

Fall application (between Sept. 1 and freeze up) to stubble or summerfallow for control of green foxtail* in wheat

Products	All soils 2 - 8 % organic matter
Bonanza 10G/Rival 10G/Treflan MicroActiv	2.23 kg/acre

* Trifluralin (Bonanza/Rival) will not control trifluralin tolerant green foxtail.

Caution: 2.23 kg/acre is the maximum rate for wheat. Do not use higher rates for wheat as crop injury may result.

Spring application in wheat and barley for control of millet (green foxtail) – post-plant incorporated (harrowed in after seeding)

Products	Light textured soils	Medium textured soils	Heavy textured soils
Bonanza EC	0.49 L/acre	0.49 L/acre	0.70 L/acre
Rival EC		0.57 L/acre	0.65 L/acre
Treflan Liquid EC		0.49 L/acre	0.69 L/acre

Caution: Wheat or barley may be injured if seeded through a treated layer or into a deeply incorporated layer of trifluralin.

Registered tank mixes

Fertilizers: Liquid products may be mixed with liquid nitrogen fertilizer (e.g., 28-0-0) for pre-plant soil incorporated application. Before the herbicide is added to the tank, compatibility of herbicide to the liquid fertilizer should be tested following instructions on herbicide label.

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Trifluralin liquids may be blended with dry bulk fertilizer. Application should be made as soon as possible after blending. With the exception of ammonium nitrates, all other commonly used dry fertilizers may be used for trifluralin liquid impregnation.

Herbicides: Spring application – post-plant incorporated (harrowed in after seeding).

Crop	Tank mix	Soil texture	
		Light to medium	Heavy
Barley	Treflan or Bonanza or Rival + Avadex BW	Treflan or Bonanza or Rival EC: 0.49 L/acre Avadex BW: 1.70 L/acre	Treflan or Bonanza: 0.69 L/acre Rival EC: 0.65 L/acre Avadex BW: 1.70 L/acre
Wheat	Treflan or Bonanza or Rival EC+ Avadex BW	Treflan or Bonanza or Rival EC: 0.49 L/acre Avadex BW: 1.40 L/acre	Treflan or Bonanza: 0.69 L/acre Rival EC: 0.65 L/acre Avadex BW: 1.40 L/acre

Incorporation

Summerfallow: Fall (Sept 1. to soil freeze up) – Granular formulations must be incorporated at least twice with the implement operated in 2 different directions. The first incorporation should be in the same direction as application, within 24 hours of application. Second at the right angle to the first and should be delayed a minimum of 3 to 5 days. For best results, perform both incorporations in the fall followed by tillage (5 to 8 cm) in the spring prior to planting.

Summer (May to July): The initial incorporation must be done within 24 hours of application. The second incorporation (and subsequent incorporations) may be done whenever necessary to destroy resistant weed growth during the remainder of the summerfallow.

Fall applied liquids: All liquid formulations must be incorporated at least twice with the implement operated in 2 different directions. The initial incorporation must be done within 24 hours after application. The second incorporation (and subsequent incorporations) may be done whenever necessary to destroy resistant weed growth during the remainder of the fallow season. Shallow tillage (5 - 8 cm) is necessary in the spring prior to planting.

Fall applied granules in wheat and barley: Granules can be applied in the fall between Sept. 1 and prior to soil freeze-up for the control of green foxtail in the following year. Granules should be applied to standing stubble or pre-worked stubble. The initial incorporation must be done within 24 hours of application. For best results, it is recommended to do both incorporations in the fall followed by tillage (5 - 8 cm) in the spring prior to planting.

Caution: Fall application is not recommended in situations where lack of trash cover combined with required incorporation would leave the soil exposed to erosion.

Spring granules (in year of seeding): Granular formulations: incorporate twice in cross directions using a tandem disc, tandem disc, discer or field (vibrashank type) cultivator set to work 8 to 10 cm for the first incorporation. The first incorporation should be done as soon as possible after application, but can be delayed up to 24 hours. The second incorporation can be delayed for at least 3 to 5 days following the first incorporation. This allows time for greater release of granular trifluralin onto soil particles and assures more uniform distribution in soil.

Spring liquid formulations in canola and specialty crops: (in year of seeding) must be incorporated at least twice with the implement operated in 2 different directions. The initial incorporation must be done within 24 hours after application. The second incorporation should be a discing or cultivation in a cross direction at the same depth any time prior to planting. Shallow tillage (5 to 8 cm) is necessary in the spring prior to planting.

Spring liquid formulations in wheat and barley: Liquid formulations must be applied after seeding and shallowly (2 to 4 cm), incorporated with tyne or diamond tooth harrows into trash-free soil, operating at a minimum speed of 9 km/hr. The first incorporation should be performed in the same direction of application. The second incorporation should be performed at the right angle to the first. Both incorporations should be done within 24 hrs of application.

Application tips

Do not apply on soils that are wet, in poor tilth and contain 15% or more organic matter. Do not apply on soils with less than 2% organic matter. Application to severely eroded knolls is not recommended.

Do not apply to fields spread with manure during past 12 months. Do not apply to soils that are subjected to long-term flooding. Do not apply granular formulation on stubble in the fall for wheat when the crop harvested in the current calendar year was treated with trifluralin-based products. This includes applications made in the previous summer or fall. Seed into a firm, moist, weed-free seedbed using a double disc press drill or hoe drill set to seed 3 to 6 cm deep. If a discer or air seeder is used for seeding, separate spring tillage may not be necessary.

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trifluralin (cont'd)

However, care must be exercised such that the discer or air seeder is set to uniformly place the seed 3 to 6 cm deep and the seedbed should be firmly packed or harrowed after seeding to promote good germination. **Wheat:** Avoid deep seeding, loose seedbeds and seeding into cold soils. When seeding semi-dwarf wheat, special care should be taken to ensure shallow seeding. Apply only on trash-free or summerfallow fields. **Flax and lentils:** Shallowly till and pack the soil in the spring to ensure a firm seedbed and accurate depth of seeding. Seed into well-packed and moist seedbed. Do not seed deeper than 4 cm.

How it works

Kills weed seedlings as they germinate. Inhibits cell division in the actively growing points of roots ands shoots.

Expected results

Most weeds die before emerging. Weeds will exhibit swelling at the coleoptile region, stubby thick primary root development and lack of secondary roots, which leads to death due to inadequate moisture absorbing ability.

Restrictions

Rainfall: No effect once trifluralin is incorporated into the soil. **Re-cropping:** Oats, sugar beet and small-seeded grasses such as timothy, canaryseed grass and creeping red fescue should not be grown in rotation following a crop treated with trifluralin based products. Do not seed wheat as a rotational crop if trifluralin and/or ethalfluralin have been used at an oilseed/special crop/barley rate for 2 consecutive crops. Do not direct seed (zero till) a rotational crop into standing stubble on land that has been treated with trifluralin or ethalfluralin for the previous crop.
Grazing: Do not graze the treated crop or cut for hay; there is not sufficient data to support such use.
Re-entry interval: 12 hours.

Environmental precautions

Trifluralin is considered non-toxic to bees. Trifluralin is considered highly toxic to aquatic organisms on an acute basis, and essentially non-toxic to birds. Trifluralin is absorbed by the soil and is resistant to leaching.

Toxicity

Oral LD_{50}. (rats) = 10,000 mg/kg.

Storage

Granular formulations must be stored in a cool, dry location out of sunlight. Do not store Rival EC below 5°C. Do not freeze Treflan Liquid EC and Bonanza EC formulations.

Trophy 600/Foxxy M

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Trophy 600 A (PCP# 30194)	Nufarm Agriculture	Fluroxypyr: 180 g/L	Emulsifiable concentrate	4.8 L
Trophy 600 B (PCP# 27803)		MCPA: ester 600		7.5 L
Foxxy M co-pack of: Foxxy (PCP# 32952) + MPower MCPA (PCP# 32912)	NewAgco Inc	Fluroxypyr: 180 g/L MCPA Ester: 600 g/L	Emulsifiable concentrate	9.6 L, 230 L, 10 L, 230 L

Crops, staging and rates

Spring and durum wheat, barley, canary seed from 3-leaf to flag leaf (fully expanded): Trophy A – 240 mL/acre, Trophy B – 375 mL/acre. Foxxy – 240 mL/acre, MP MCPA – 250 mL/acre.

Weeds and staging

Unless otherwise noted, apply at 2 - 4 leaf

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annual sunflower
burdock
cleavers (1 - 4 whorl)
cocklebur
flixweed
green smartweed*
hempnettle (2 - 6 leaf)
kochia (including Group 2 resistant biotypes)
lamb's-quarter
prickly lettuce
ragweed
redroot pigweed (1 - 4 leaf)
shepherd's-purse
stinkweed
stork's-bill* (1 - 8 leaf)
sunflower
vetch
volunteer canola
volunteer flax (1 - 12 cm)
wild buckwheat* (1 - 4 leaf)
wild mustard
wild radish

* Suppression only.

Registered tank mixes

Tank mix partner	Tank mix rate	Additional weeds controlled
Spring wheat (including durum) and feed barley only		
Achieve Liquid/Nufarm Tralkoxydim/Bison + appropriate adjuvant 0.5% v/v	Trophy + Achieve/Nufarm Tralkoxydim/Bison + appropriate adjuvant 0.5% v/v	Wild oats and green foxtail.
Axial	Trophy + Axial: 500 mL/acre	Wild oats, green foxtail, yellow foxtail, barnyard grass
Puma Advance, Bengal	Trophy + Puma Advance: 412 mL/acre or Bengal: 312 mL/acre	Wild oats
Spring wheat (excluding durum)		
Horizon NG, NextStep NG, (no adjuvant, Foothills/Signal/ Ladder/Legend + adjuvant)	Trophy + Horizon NG/NextStep NG: 376 mL/ acre or Foothills/Signal/Ladder: 93 mL/acre + appropriate adjuvant	Wild oats and green foxtail
Spring wheat (including durum)		
Traxos	Trophy+ Traxos: 500 mL/acre	Wild oats, green foxtail, barnyardgrass, Persian darnel
Luxxur	Luxxur A: 6 g/acre + Luxxur B: 0.2 L/acre + Trophy	Additional weeds under the Luxxur label

* For Trophy 600 B, rate is 372 mL/acre. Respective labels for Trophy and Trophy 600 detail appropriate mixing procedures. NewAgco supports the following tank mixes: Aurora/Horizon, HellCat/Puma, Axial, Liquid Achieve, Traxos.

Application information

With: Apply with ground equipment only. Do not apply by air. **Water volume:** 40 L/acre.

Mixing instructions

Half fill tank with water, agitate continually, add Trophy A, then Trophy B, then complete filling with water.

Application tips

Spray under optimal conditions, which includes temperatures ranging from 12 to 24°C. Reduced activity will occur with temperatures below 8°C or above 27°C. Frost shortly before application or shortly after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions. Wet foliage at time of application may result in reduced weed control. Application on cleavers can be made up to 6-whorl (20 cm height) stage. Do not apply to wheat and barley underseeded to legumes. Make only 1 application per year. Application prior to 3-leaf stage of wheat and barley may cause severe twisting of leaves and leaf stem and head deformities, which may reduce yield. Do not apply later than flag leaf stage of crop.

How it works

Trophy/Rush M herbicide tank mix is non-residual. The components of Trophy/Rush M tank mix move within the plant to control exposed and underground plant tissue. It mimics naturally occurring plant hormones and controls weeds by disrupting normal plant growth patterns. Symptoms include twisting of stems and swollen nodes.

Expected results

Weeds start to twist shortly after spraying. After twisting and bending, plants stop growing, turn brown and die.

Restrictions

Rainfall: Do not apply if rain is expected in 1 hour. **Grazing:** Do not permit any grazing or cut for hay within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.
Pre-harvest intervals: Do not harvest the treated crop within 60 days after application.

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Trophy 600/Foxxy M (cont'd)

Re-cropping: Fields previously treated with Trophy/Rush M herbicide tank mix can be seeded the following year to wheat, barley, oats, rye forage grasses, flax, lentil, pea, canola and mustard or summerfallow. Do not seed crops other than those listed above for at least 1 year following treatment. **Re-entry interval:** 12 hours.

Environmental precautions

Trophy/Rush M is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application.

Toxicity

MCPA: Acute oral LD_{50} (rats) = technical 700 - 880 mg/kg. Fluroxypyr: Acute oral LD_{50} = > 2,000 mg/kg.

Storage

Store in a dry, heated area. If product is frozen, bring to room temperature and agitate before use.

Tropotox Plus/Clovitox Plus

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Clovitox Plus (PCP# 24336)	IPCO	MCPB (Na-salt): 375 g/L + MCPA (K-salt): 25 g/L (for IPCO, both constituents are present as Na salt)	Solution	10 L
Tropotox Plus (PCP# 8211)	Nufarm Agriculture			

Crops, staging and rates

Crop	Stage	Rate
Cereals: barley, oats, rye, wheat	Apply from 2-leaf stage to flag leaf stage	1.11 L - 1.72 L/acre
Field Pea	Apply when peas have 3 - 6 expanded leaves	
Field corn	After the crop is 45 cm high, but before the beginning of tasselling. Drop nozzles should be used	
Pasture	After grazing or cutting, when weeds are at a susceptible stage	
Seedling alfalfa	Apply at 3 - 6 trifoliate stage	
Seedling clover: wild white, dutch white, Ladino, alsike and red clovers	Apply after primary or spade leaf stage to 4th-true-leaf stage. Companion crop: wheat, oats, barley	
Seedling grasses: seedling smooth bromegrass, meadow bromegrass, altai fescue, creeping red fescue, meadow fescue, tall fescue, altai wild ryegrass, Russian wild ryegrass, timothy, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, tall wheatgrass, slender wheatgrass, streambank wheatgrass, northern wheatgrass, western wheatgrass, green needlegrass, reed canary grass	Apply at the 2 - 4 leaf stage of crop	

Weeds, rates and staging

Weeds controlled in seedling stage at 1.11 L/acre.

ball mustard	stinkweed	wormseed mustard
lamb's-quarter	wild mustard	

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Weeds controlled at 1.72 L/acre in seedling stage unless otherwise noted.

- annual sow thistle*
- bull thistle (rosette to early bud)
- buttercup (tall and creeping when rapidly growing**
- Canada thistle (15 cm to early bud)
- curled dock (rosette)
- field bindweed (spring-rapid growth)**
- field horsetail (15 cm tall)**
- hemp-nettle*
- perennial sow thistle (rosette)**
- plantain (rosette)
- ragweed
- redroot pigweed
- shepherd's-purse
- volunteer canola
- wild radish*

* Suppression only. ** Top growth control only.

Application information

With: Apply with ground sprayers only. Do not apply by air. **Water volume:** 60 - 80 L/acre.

Application tips

Spray in warm weather when plants are actively growing. Pea: Spray when growing conditions are good and the peas are not under stress from drought or disease. Seedling alfalfa: Alfalfa vigour may be reduced in the year of treatment; however, the crop recovers and yield will not be affected.

How it works

A systemic, absorbed by leaves and stems and translocated to actively growing regions. It disrupts cell division, stops cell growth and interferes with respiration and food reserves. Selectivity based on ability of plant to efficiently convert MCPB to MCPA.

Expected results

Broadleaf weeds should be dead within 2 to 3 weeks of treatment. Poor results and/or crop injury may be expected if Water volume is incorrect or weeds are too mature.

Restrictions

Rainfall: Rainfall before the foliage has dried from the spraying may decrease activity. **Grazing**: Seedling forage grasses – do not graze the treated crop or cut for hay in the year of establishment. **All other crops:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest for forage or cut hay within 7 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.
Re-cropping: None. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants.

Toxicity

Acute oral LD_{50} (rats) = 500 mg/kg.

Storage

Store in a heated area.

Tundra® Herbicide

Group 1, 6, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tundra® (PCP# 29367)	Bayer	Pyrasulfotole: 15.5 g/L	Emulsifiable concentrate	
		Fenoxaprop-p-ethyl: 46 g/L	Emulsifiable concentrate	
		Bromoxynil: 87.5 g/L	Emulsifiable concentrate	

8.1 L jug will do 10 acres.

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Tundra® herbicide (cont'd)

Crops, staging and rates

Crops	Staging	Rate
Barley, spring wheat (including durum)	1 - 6 leaf on main stem plus 3 tillers	810 mL/acre

Weeds and staging

Apply at 1 - 6 leaf stage unless otherwise noted.

Grassy weeds: 1 - 6 leaf, up to emergence of the 3rd tiller

barnyard grass
green foxtail
wild oats
yellow foxtail

Broadleaf weeds: Unless otherwise stated, 1 - 6 leaf stage

annual sow thistle
Canada thistle (suppression, up to 30 cm in height)
Canada fleabane (10 cm high or diameter)[1,4,5]
chickweed[2]
cleavers[1,2] (1 - 6 whorl)
common ragweed
dandelion[3] (suppression, up to 10 cm in height and 25 cm in diameter)
flixweed (up to 10 cm in height)
hemp-nettle
kochia[2] (up to 10 cm in height)
lamb's-quarter
narrow-leaved hawk's-beard (up to 10 cm, prior to bolting)
pale smartweed
perennial sow thistle (suppression)
redroot pigweed
round-leaved mallow (suppression)
Russian thistle (up to 10 cm in height)
shepherd's-purse
stork's-bill: only in tank mix with 2,4-D and AMS (1 - 8 leaf)
stinkweed
volunteer canola (all types)
wild buckwheat
wild mustard

[1] For control of cleavers at the 4 - 6 whorl growth stage and control of Canada fleabane, add ammonium sulphate at 202 g/acre (99%) or 0.4 L/acre (49%solution) or 0.5 L/ace (40% solution). If using an ammonium sulphate product with a different concentration, adjust the rate accordingly.
[2] Including Group 2 and Group 4 resistant biotypes. [3] Includes seedlings and overwintered rosettes. [4] Including glyphosate resistant biotypes. [5] Remove established Canada fleabane plants prior to planting via tillage or pre-ssed burn-off.

Registered tank mixes

Tank mix partner	Tank mix rate	Additional weeds controlled
Spring wheat (including durum), and barley		
2,4-D ester + AMS	280 g ai/ha + 0.5 L/acre (40% solution)	Weeds controlled by Tundra alone plus stork's-bill from the 1 - 8 leaf stage. Spring, durum wheat and barley may be treated from the 4 - 6 leaf stage on main stem plus 3 tillers.

Temporary crop injury may be observed when AMS is included for enhanced broadleaf weed control.

Bayer supports the following mixes that are not on the Tundra label. These are MCPA ester, Lontrel, Decis and Sevin XLR, all on spring and durum wheat and barley; Tilt on spring wheat and barley. Apply mixes according to the most restrictive use limitations for either product.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 19 L/acre. Aerial – 11.3 L/acre.

Mixing instructions

Fill the spray tank ¼ to ½ full with clean water and begin agitation. If mixing with AMS, add to the tank first. Add the appropriate amount of Tundra herbicide. Fill the spray tank with the balance of water required. Maintain sufficient agitation throughout mixing and application.

Application tips

Use higher water volumes under conditions of heavy crop or weed canopies. For best results apply to young, actively growing weeds. Under cool, dry conditions, activity may be reduced or delayed. Activity may be affected if weeds are dust covered or covered in heavy dew, mist or rain. Do not apply to a stressed crop but apply after plants resume normal growth.

How it works

Tundra is composed of 3 herbicides active ingredients, fenoxaprop-p-ethyl, bromoxynil and pyrasulfotole. Fenoxaprop-p-ethyl works by contact and systemically. It moves to the roots and shoots and kills the growing point. Pyrasulfatole is also systemic, inhibiting plant pigment formation and photosynthesis. Bromoxynil is a contact herbicide, inhibiting respiration and photosynthesis.

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Expected results

Typical symptoms include broadleaf weeds turning brown and dying within 3 to 5 days, reduced grassy leaf growth and chlorotic blotching within 3 days of application followed by leaf chlorosis and complete death by 2 to 3 weeks and leaf bleaching.

Restrictions

Rainfall: Rainfall within 1 hour of application may reduce effectiveness. **Grazing:** Do not graze or cut the treated crop for hay within 25 days of application. **Pre-harvest intervals:** Leave at least 65 days from application to harvest. **Re-cropping:** Alfalfa, barley, canary seed, canola, flax, (including low linolenic acid varieties) field pea*, tame oats, spring wheat including durum, potatoes and sunflowers may be planted 10 months after application. Lentils can be grown 22 months after application. Use a field bioassay for crops not listed above. **Re-entry interval:** 24 hours.

* Field pea may be grown the year following Infinity application in all Black, Gray-Wooded and Dark Brown soil zones. Do not plant field peas the year following Infinity application in the Brown soil zone where organic matter content is less than 2.5% and soil pH is above 7.5. Use a field bioassay for crops not listed above.

Environmental precautions

Tundra is toxic to aquatic organisms and non-target terrestrial plants. Leave at least a 15-metre buffer zone around sensitive terrestrial and aquatic habitats.

Toxicity

Toxic to aquatic organisms and sensitive terrestrial plants. Use of a hand-held backpack sprayer, inter-row hooded sprayer, spot treatment, soil drench and soil incorporation require no buffer zones. Otherwise, use recommended buffer zones of 3 to 10 metres when using ground application, 1 to 375 metres by air.

Storage

Store in a heated shed. Do not freeze.

Ultra Blazer

Group 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Ultra Blazer (PCP#32330)	UPL AgroSolutions	Acifluorfen: 240 g/L	Solution	10 L

Crops, staging and rates

Crop	Stage	Rate
Soybean	1 - 3 trifoliate	0.5*-1.0 L/acre

*Add Assist Oil concentrate at 0.5% v/v

Weeds, rates and staging

The following weeds are controlled at the 0.5 L/acre rate + Assist Oil concentrate at 0.5% v/v

redroot pigweed (4-leaf)
common ragweed (8-leaf)

The following weeds are controlled at the 1.0 L/acre rate

cocklebur (4-leaf)
jimsonweed (10-leaf)
lady's-thumb (8-leaf)
lamb's-quarter (2-leaf)
wild mustard (10-leaf)
Eastern black nightshade (6-leaf)
redroot pigweed (6-leaf)
common ragweed (8-leaf)

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Ultra Blazer(cont'd)

The following weeds are suppressed at the 1.0 L/acre rate

Canada thistle	field bindweed
hedge bindweed	common milkweed

Registered tank mixes

Ultra Blazer (255 mL/acre) + Basagran (709 mL/acre) + Assist Oil Concentrate (0.4 - 0.8 L/acre)

Ultra Blazer (255 - 506 mL/acre) + Basagran Forte (506 - 709 mL/acre)

Application information

How to apply: Ground application only. **Water volume:** No specific water volume is provided on the label, but good spray coverage is important as Ultra Blazer works mainly by contact action.

Mixing instructions

Use mixing instructions 'a' on page 15.

Application tips

Ultra Blazer and the tank mix of Ultra Blazer + Basagran or Basagran Forte provide the best weed control when maximum daily temperatures are expected to be above 21°C.

How it works

Acifluorfen is a contact herbicide that inhibits protoporphyrinogen oxidase (PPO). Cell membrane damaged induced by inhibition of PPO leads to plant death.

Expected results

Effects on susceptible weeds can be observed within 1 - 2 hours. Symptoms include water-soaking, speckling, leaf curling, and bronzing turning to necrosis.

Restrictions

Rainfall: Rain within 6 hours may reduce effectiveness. **Grazing:** Do not graze or cut for hay. **Re-cropping:** No restrictions listed. **Pre-harvest intervals:** No restrictions listed. **Re-entry interval:** 12 hours.

Environmental precautions

Observe spray buffer zones.

Toxicity

Acute oral LD_{50} (rats) = 2020 mg/kg.

Storage

Store away from food or feed.

UpBeet

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
UpBeet (PCP# 25813)	FMC of Canada Limited	Triflusulfuron methyl: 50%	Dry flowable	117 g

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Crops, staging and rates

Crops	Staging	Rate
Sugar beet	Apply any time after planting and after weeds have emerged.	UpBeet: 14 - 28 g/acre + surfactant: (Agral 90, Ag-Surf, Citowett Plus or Sure-Mix at 0.25% v/v) - if applied alone

Weeds and staging

Refer to Registered Tank Mixes table.

Registered tank mixes

Apply when weeds are in cotyledons to 4-leaf stage, approximately 5 cm tall or across.

Tank mix partner	Tank mix rate	Additional weeds controlled
Betamix*	UpBeet: 14 - 28 g/acre + Betamix: 0.7 - 1.4 L/acre. Note: Do not add surfactant to this tank mixture	Green foxtail (suppression), kochia (rosette stage <2.5 cm in diameter), redroot pigweed, lamb's-quarter

* Make 2 sequential applications. The total grams of product applied must not exceed 40 g/acre per growing season.

Application information

How to apply: Ground equipment only. Do not apply by air. Do not apply through any type of irrigation equipment.
Water volume: Minimum of 40 L/acre.

Mixing instructions

Use mixing instructions "b" on page 15.

Application tips

Applications should be made 5 to10 days apart or as weeds germinate. Weeds should be actively growing and not under stress. For best results, apply to small, emerged weeds between the cotyledon and 4 true leaf stage at approximately 5 cm tall or across. Applications made to larger weeds or to weeds under stress may result in unsatisfactory control. Since UpBeet has little or no soil activity, only weeds that have emerged above the soil surface will be controlled. Use sequential tank mix applications to control new weed flushes. Timely cultivation(s) can be used in addition to UpBeet tank mixes for optimum weed control in a sugar beet management program. Dry, dusty field conditions may reduce weed control in wheel track areas. Higher water volumes may improve control in these conditions.

How it works

Absorbed through foliage. Inhibits cell elongation.

Expected results

UpBeet herbicide rapidly stops the growth of susceptible weeds; weeds turn yellow usually 7 to 21 days after post-emergent application, followed by the death of the growing plant. Cool and/or dry conditions may reduce or delay herbicidal activity. Large weeds or weeds stressed due to frost, drought or water-saturated soil, disease or insect damage may not be controlled adequately.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Re-entry interval:** 12 hours. **Grazing:** No restrictions on grazing or feeding of crop residue to livestock. **Pre-harvest intervals**: Do not apply within 60 days of harvest. **Cropping restrictions:** Do not harvest within 60 days of treatment. In case of crop failure, only sugar beets may be replanted 30 days after application of UpBeet. However, if a total of 100 g/ha of UpBeet has already been applied to the first crop of sugar beets, then no more UpBeet may be applied to the second crop of sugar beets. Cereal crops (spring wheat, durum wheat, winter wheat, barley) may be planted the following year after application of UpBeet. For all other crops, a field bioassay must be conducted. Avoid application when heavy rain is forecast.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Leave a 1-metre buffer around freshwater habitats and 3 metres near sensitive land habitats.

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UpBeet (cont'd)

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
To prevent contamination, store away from food or feed.

Valtera WG/Chateau/Valtera EZ

Group 14

Formulation

Product	Company	Acti8ve ingredient	Formulation	Container size
Valtera WG/Chateau (PCP# 29231)	**Valent Canada distributed by Nufarm Agriculture**	Flumioxazin: 51.1%	Water dispersable granules	4.54 kg, 1.13 kg
Valtera EZ (PCP # 33523)	**Valent Canada distributed by Nufarm Agriculture**	Flumioxazin: 479 g/L	Suspension concentrate	4.8 L

Crops, staging and rates – pre-emergence

Crop	Staging	Rate
Potato (Chateau)	After hilling for the pre-emergence suppression of labelled weeds	43 g/acre (coarse and medium textured, with <5% organic matter)
Field pea, soybean, chickpea and spring wheat*, field corn, lentil, winter wheat (Valtera WG and Valtera EZ)	Fall application: prior to ground freeze – do not apply on top of snow. Spring application: field pea, chickpea, soybean – apply up to a maximum of 3 days after seeding. Do not apply after ground crack. Spring wheat, corn, lentil (small red and large green varieties) – apply a minimum 7 days before seeding	Fall applications - field pea, soybean, chickpea, spring wheat, field corn and lentil: Valtera WG: 57 - 85 g/acre; Valtera EZ 60 -90 mL/acre. Spring applications: field pea, chickpea, lentil, winter wheat, spring wheat (no/min till) - Valtera: 57 g/acre; Valtera EZ: 60 mL/acre; soybeans, field corn (no/min till): Valtera WG: 57 - 85 g/acre; Valtera EZ 60 -90 mL/acre
Desiccation on dry beans, chickpea, field pea, lentil, wheat, sunflower	Desiccation use for dry beans, pea, lentil and chickpea: apply after 90% leathery pod stage or after 90% leaf drop. Dessication for wheat: 30% or less grain moisture. Dessication for sunflower: 35% or less grain moisture	Valtera WG: 43 - 57- 57 g/acre; Valtera EZ: 45 - 60 mL/acre. desiccation use. Dessication use requires the addition of Nufarm Enhance (NIS) at 0.25% v/v
Sunflower	Fall application prior to ground freeze. Do not apply on snow. Spring application must be 30 days before seeding. 2.5 cm of rain must fall between spraying Valtera and seeding	Fall application: Valtera WG: 57 - 85 g/acre; Valtera EZ 60 -90 mL/acre. Spring application: Valtera: 57 g/acre. Valtera EZ: 60 mL/acre
Established, dormant alfalfa	Apply Valtera WG to established, dormant alfalfa with a maximum of 15 cm of growth or less. Application to alfalfa with greater than 15 cm of regrowth may cause unacceptable crop injury. For fall applications: Application should be made in the fall, just before freeze-up. Do not apply to snow covered or frozen soil."	Spring and fall application: Valtera WG only: 113 g/acre (grown for seed) for pre-emergent weed control.

For fall application, crops being seeded the following year must be "No Till" or minimum disturbance. Seed wheat at least 1 inch (2.5 cm) deep. For lentils, a seeding depth of 1 to 2.5 inch (2.5 to 6 cm) is recommended. Any tillage or soil disturbance after a Valtera application can reduce residual weed control. *Durum can be seeded 30 days or more after application of Valtera.

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Weeds and staging

If Valtera WG is used without a tank mix partner, a non-ionic surfactant should be used at a rate of 0.25% v/v.

- annual sowthistle**
- Canada fleabane*
- cleavers (suppression with Valtera)
- common chickweed
- common lamb's-quarter*
- common ragweed*
- common waterhemp
- dandelion seedlings
- eastern black nightshade*
- green foxtail (suppression with Valtera)
- green pigweed*
- hairy nightshade*
- kochia* (Including Group 2 and Group 9 resistant)
- palmer amaranth
- redroot pigweed*
- Russian thistle (suppression with Valtera)
- volunteer canola (suppression with Valtera)
- waterhemp (including Group 2, 5 and 9 resistant biotypes)
- wild buckwheat (suppression with Valtera)

* Suppression only with Chateau in potato. Control with Valtera. ** Including Group 2 resistant biotypes.

Registered tank mixes

Tank mix partner	Product rates
glyphosate product, present as isopropyl amine or potassium salt	180 - 360 gae/acre glyphosate

Supported tank mix with Goldwing at 133 - 266 mL/acre and Blackhawk at 300 mL/acre.

Application information

How to apply: Ground equipment only. Use 50 mesh screens.

Water volume: 40 L/acre.

Application tips

Significant crop injury may occur from applications made to poorly drained soils and/or applications made under cool, wet conditions. Severe crop injury will result when soils are flooded following applications of Chateau or Valtera WG/Valtera EZ. Treated soil that is splashed onto newly emerged crops may result in temporary crop injury.

Valtera WG/Valtera EZ should be tank mixed with glyphosate and/or other tank mix partners to control any emerged weeds at the time of application. Glyphosate can also be tank mixed with Valtera WG/Valtera EZ and Nufram Enhance for desiccation applications. Moisture is necessary to activate Valtera WG/Valtera EZ/Chateau in soil for residual weed control. Dry weather following applications of Valtera WG/Valtera EZ/Chateau may reduce effectiveness.

Chateau/Valtera WG/Valtera EZ may not control weeds that germinate after application but before an activating rainfall/irrigation or weeds that germinate through cracks resulting from dry soil.

How it works

Flumioxazin is a Group 14 herbicide. Flumioxazin controls weeds by inhibiting protoporphyrinogen oxidase, an essential enzyme required by plants for chlorophyll biosynthesis. Seedling weeds are controlled pre-emergence when exposed to sunlight following contact with the soil applied herbicide. Pre-emergence weed control with Valtera WG/Valtera EZ/Chateau WDG is most effective when applied to clean, weed-free soil surfaces. Disturbing soil surfaces after application may reduce herbicide efficacy.

Expected results

Will prevent growth of susceptible weeds.

Restrictions

Mechanical incorporation into the soil or disturbance of the soil surface will reduce weed control. Do not apply more than 43 g/acre Chateau WDG during a single growing season with potato. Chateau WDG may be applied to potato after hilling for the pre-emergence suppression of labelled weeds. A minimum of 5 cm of soil must cover the vegetative portion of the potato plant at the time of Chateau WDG application. Application to potato with less than 5 cm of soil covering the vegetative portion of the potato may result in unacceptable crop injury. Suppression of the weeds that emerge post-hilling will not be achieved if applications are made prior to hilling. Crop injury may occur if Chateau WDG is applied at hilling. **Grazing:** Valtera EZ – field corn – do not permit livestock to graze fields within 93 days after application. Do not harvest as green feed or silage within 93 days after application. Soybean – do not harvest as green feed or permit livestock to graze fields within 21 days after application. Do not cut hay/fodder within 50 days after application. Wheat – do not harvest as green feed or permit livestock to graze fields within 26 days after application. Do not cut hay/fodder within 52 days after application. For all other crops – do not graze, cut or feed treated crops to livestock. Valtera WG/Chateau – do not graze treated fields or feed treated forage or hay to livestock.

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Valtera WG/Chateau/Valtera EZ (cont'd)

Re-cropping: Valtera WG/Chateau – for use rate 42.5 - 56.7 g/acre – 7 days for winter wheat. For use rate 56.7 g/acre – soybean, field corn, chickpea, field pea – no restrictions. Sunflower – 30 days. Spring wheat, lentils (small red and large green varieties) – 7 days. Durum wheat – 30 days. Winter wheat – 4 months. Sorghum, dry common bean and Canola – 9 months. Alfafa and barley – 11 months. All other crops not listed – 12 months. For use rate 85 g per acre – soybean, field corn, chickpea, field pea – no restrictions. Sunflower – 2 months. Spring wheat – 7 days. Winter wheat – 4 months. Lentils (small red and large green varieties) – 6 months. Sorghum, dry common bean – 9 months. Alfalfa, barley and canola – 11 months. All other crops not listed – 12 months. Valtera EZ: Soybean, field corn, chickpea, field pea — no restrictions. Spring wheat, lentils (small red and large green) – 7 days. Durum wheat, sunflower — 30 days. Sorghum, dry common beans and canola – 9 months. Alfalfa and barley – 11 months. All other crops not listed – 12 months. **Re-entry interval:** 12 hours.

Environmental precautions

This product is toxic to aquatic organisms and non-target terrestrial plants.

Toxicity

Acute Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, dry, secure place. Heated storage is required.

Vanquish/VMD 480/Disha 480

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Vanquish (PCP# 26980)	Syngenta	Dicamba: 480 g/L	Liquid	10 L
VMD 480 (PCP# 29251)	Adjuvants Plus Inc.	Dicamba: 480 g/L	Liquid	10 L
Disha 480 (PCP # 33851)	Sharda Cropchem Ltd	Dicamba: 480 g/L	Solution	10 L

Crops, staging and rates

Non-crop areas such as established turf, roadsides, hydropower lines, pipeline and railway rights-of-way, airports, military bases and wasteland. **Rate**: 0.5 L/acre - 5.2 L/acre.

Weeds, rates and staging

Broadleaf weeds: When actively growing, normally between May and July.

Brush control: When leaves are fully expanded (spring, early summer) and stop applications at least 3 weeks prior to a change of leaf colour in the fall.

Vanquish/VMD 480 at 0.5 L/acre (top growth control only)

absinthe	leafy spurge	poverty weed
Canada thistle	perennial sow thistle	scentless chamomile

Vanquish/VMD 480 at 0.7 L/acre + 2,4-D amine 500: 0.9 L/acre: Above weeds plus poison ivy.
Vanquish/VMD 480 at 0.85 L/acre + 2,4-D amine 500: 1.8 L/acre: All of the above weeds plus wild carrot.

Vanquish/VMD 480 at 0.93 L/acre

Canada thistle	English daisy	giant ragweed	tansy ragwort
common ragweed	false ragweed	goldenrod	
curled dock (top growth)	field bindweed	perennial sow thistle	

Vanquish/VMD 480 at 1.90 L/acre

diffuse knapweed	ground cherry	poverty weed	thyme-leaved spurge
goat's-beard	pasture sage	sheep sorrel	

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Vanquish/VMD 480 at 3.7 L/acre Controls:

baby's-breath	lambkill	Russian knapweed	
bracken fern (top growth)	perennial cinquefoil	(top growth control)	
fringed sage brush	(top growth control)	velvet grass	

Brush control chemical amounts mixed in 1000 L of solution

Vanquish/VMD 480: 2.1 L/acre + 2,4-D amine 500: 4.0 L or 2,4-D ester 600: 3.3 L

alder	cherry	wild rose	
aspen poplar	western snowberry	wolf willow	

Vanquish/VMD 480: 4.0 L/acre + 2,4-D amine 500: 8.0 L or 2,4-D ester 600: 6.6 L

balsam fir	black cottonwood	hickory	spruce
balsam popular	bur oak	pine	tamarack
birch	elm	red oak	vine maple, white cedar

Vanquish/VMD 480: 5.2 L/acre + 2,4-D + dichlorprop: 7.1 L

sugar maple	white ash

Vanquish/VMD 480 for Turf: 202 mL/acre in 45 L/acre water

clover	erect knotweed	mouse-eared chickweed	sheep sorrel

Roadside vegetation control

Vanquish/VMD 480 can be used in a tank mix with glyphosate (356 g/L formulation) for annual vegetation control on 1 - 2 metre wide roadside shoulders. Vanquish tank mixes with glyphosate and 2,4-D offer a broader spectrum of total control of roadside vegetation. Apply to actively growing weeds between May and July at following rates:

Vanquish/VMD 480: 0.5 - 1 L/acre + glyphosate (356 g/L formulation); 0.3 - 0.4 L/acre or Vanquish/VMD 480; 121 mL/acre + 2,4-D amine 500; 485 mL/acre + glyphosate (356 g/L formulation); 0.3 - 0.4 L/acre.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground: Turf weeds: 45 L/acre; Weeds: 45 - 90 L/acre; Brush: rate/1,000 L of water. Aircraft: 35 L/acre minimum.

Application tips

Thorough coverage of weed and wetting brush to the point of runoff are essential for control. Brush and trees over 2 metres should be cut and regrowth sprayed. Do not use on bentgrass. Do not rake, mow or water turf within 24 hours after treatment. 2,4-D ester tank mix may improve brush control, especially under drought stress. Tank mix with 2,4-D (amine or ester) for control of a broader range of weeds. Avoid spraying if temperatures exceed 30°C, to reduce risk of vapour drift. Avoid spraying onto soil over root system of desirable trees and shrubs. Thoroughly clean application equipment after use.

How it works

Dicamba is a systemic herbicide absorbed through roots or leaves and translocated in most plants. Disrupts the metabolic and growth activities in the plant.

Expected results

Excellent control of brush can be expected within a year of application. Effect on broadleaf weeds may be seen in 10 to 14 days with twisting and bending of main stem, cupping of leaves, increase in root size and increase in fibrous roots.

Restrictions

Rainfall: Rainfall 4 hours after application will not reduce effectiveness. **Grazing:** Do not permit lactating dairy animals to graze fields within 7 days after application. Do not harvest forage or cut hay within 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Environmental precautions

Vanquish is toxic to aquatic organisms and non-target terrestrial plants.

Toxicity

Acute oral LD_{50} (rats) = > 3,512 mg/kg.

Storage

Heated storage not required. Freezing may cause crystalization but no activity is lost if completely resuspended.

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Varro® Herbicide

Group 2

Formulation

Product	Company	Active ingredient	Formulation	Container size
Varro® (PCP# 29070)	Bayer	Thiencarbazone-methyl: 10 g/L	Suspension	8.0 L

Crops, staging and rates

Crop	Staging	Rate
Spring and durum wheat	1 - 6 leaves on main stem plus 3 tillers but prior to the presence of the first node (jointing)	0.2 L/acre
Winter wheat	Apply either in fall or spring when the majority of plants have 1-leaf to full tillering but prior to the presence of the first node (jointing)	

Weeds controlled and staging

For best results, apply to emerged, young, actively growing weeds according to the weed stages listed. Under stressed conditions and/or heavy crop canopy, early application will result in improved weed control.

Grassy weeds: Apply at 1 to 6 leaves, up to emergence of the 3rd tiller

- barnyard grass
- volunteer canary seed (1 - 6 leaf, up to emergence of 2nd tiller)
- green foxtail
- Japanese brome (suppression, 1 - 6 leaf)
- Persian darnel (suppression)
- yellow foxtail (suppression)
- wild oats

Broadleaf weeds: Unless otherwise stated, apply at 1 - 6 leaf stage

- cleavers (1 - 6 whorl)
- hemp-nettle
- lamb's-quarter (suppression)
- pale smartweed
- redroot pigweed
- shepherd's-purse
- stinkweed
- volunteer canola[1]
- wild buckwheat
- wild mustard
- round-leaved mallow (suppression)
- Russian thistle (suppression, up to 10 cm in height)

[1] Excluding Group 2 resistant canola.

Spring wheat only

For improved and more consistent control of wild oats in areas of heavy infestation, advanced staging or cool temperatures and more consistent control of Japanese brome, add ammonium sulphate at 202 g/acre (99% solution), 0.5 L/acre (40% solution) or 0.4 L/acre (49% solution) to the tank before adding other components.

Durum wheat

For more consistent weed control add a non-ionic surfactant (Agral 90, AgSurf or Surf 92) at 0.25% v/v.

Registered tank mixes

Tank mix partner	Varro plus tank mix partner rate	Crop stage/comments
In spring wheat (including durum)		
2,4-D ester	Varro: 0.2 L/acre + 2,4-D ester up to 142 g ai/acre	Wheat: 4 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)
MCPA ester	Varro: 0.2 L/acre + MCPA ester up to 142 g ai/acre	Wheat: 3 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)
Buctril M	Varro: 0.2 L/acre + Buctril M: 0.4 L/acre	Wheat: 2 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)
Thumper	Varro: 0.2 L/acre + Thumper: 0.4 L/acre	Wheat: 4 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)
Infinity	Varro: 0.2 L/acre + Infinity: 0.335 L/acre	Wheat: 1 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)

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Tank mix partner	Varro plus tank mix partner rate	Crop stage/comments
Infinity FX	Infinity: 335 mL/acre + FX: 0.16 L/acre	Wheat: 1 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)
Spring wheat (excluding durum)		
Attain XC	Varro: 0.2 L/acre + Attain XC: A 0.13 L/acre + B 0.34 L/acre	Wheat: 4 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)
Curtail M	Varro: 0.2 L/acre + Curtail M: 0.6 L/acre	Wheat: 3 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing). When tankmixing in spring wheat always add ammonium sulphate
Frontline XL	Varro: 0.2 L/acre + Frontline XL: 0.5 L/acre	Wheat: 2 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)
Refine SG	Varro: 0.2 L/acre + Refine SG: 12 g/acre	Wheat: 2 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)
Refine SG + MCPA ester	Varro: 0.2 L/acre + Refine SG: 12 g/acre + MCPA ester up to 142 g ai/acre	Wheat: 3 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)
Refine SG + 2,4-D ester	Varro: 0.2 L/acre + Refine SG: 12 g/acre + 2,4-D ester up to 142 g ai/acre	Wheat: 4 - 6 leaf stage plus 3 tillers but prior to presence of first node (jointing)
Winter wheat		
Infinity	Varro: 0.2 L/acre + Infinity: 0.335 L/acre	Apply either in fall or spring when the majority of plants have 1 leaf to full tillering but prior to presence of first node (jointing)
Thumper	Varro: 0.2 L/acre + Thumper: 0.4 L/acre	Apply either in fall or spring when the majority of plants have 4 leaves to full tillering but prior to presence of first node (jointing)

Bayer supports the following mixes that are not on the Varro label. These are Attain XC on durum wheat; Buctril M on winter wheat; Stellar and Momentum on spring wheat; OcTTain XL, Barricade, Retain SG, Prestige XC, Paradigm, Pixxaro and Refine M/Broadside on spring and durum wheat; Travallas on spring wheat only; Tilt on spring and winter wheat (not durum). Apply mixes according to the most restrictive use limitations for either product.

Rate

Varro: 0.2 L/acre.

Application information

How to apply: Apply with ground equipment or by air. **Water volume:** Ground – minimum 18.9 L/acre. Air – minimum 11.3 L/acre.

Application tips

Under drought conditions, do not apply if there is > 35 days between seeding and spraying, as drought hastens crop development. Do not apply to crop that is under stress due to abnormal environmental conditions such as frost, extreme heat, low fertility, drought, flooding or disease and/or insect damage as crop injury may result. Do not spray Varro 3 days prior to or following cold temperatures (3°C or lower) Do not apply to crops underseeded to legumes. Apply only once per season.

Do not use Varro if another Group 2 grass herbicide has been previously applied in the same season. For best results, apply to emerged, young, actively growing weeds. Weed control may also be reduced if application is made when weeds are dust covered or in the presence of heavy dew, fog or mist/rain.

How it works

Varro: Thiencarbazone-methyl: Uptake is primarily via foliage and is transported to areas on new shoot growth where it inhibits the enzyme acetolactate synthase (ALS). Inhibition of this enzyme prevents protein production, which leads to gradual death of target weeds.

Expected results

Growth of susceptible plants stops rapidly. After a few days, plants develop chlorotic discolouration on the leaves, which sometimes turn red. Complete control may take 2 to 4 weeks.

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Varro® Herbicide (cont'd)

Restrictions

Rainfall: Rainfall within 60 minutes of application may reduce effectiveness. **Grazing restrictions:** Do not graze the treated crop or cut for forage within 7 days or cut for hay within 30 days after application. **Pre-harvest intervals:** Do not harvest spring or durum wheat for grain or straw within 60 days of application. Do not harvest winter wheat for grain or straw within 72 days of application. **Re-cropping:** The following crops can be planted 10 months after application – alfalfa, barley, canary seed, field corn, canola, chickpea, dry bean, flax (including low linolenic acid varieties), lentil, mustard, oats, field pea, soybean, sunflower, timothy, wheat (spring, durum and winter). Use a field bioassay for crops not listed above. **Re-entry interval:** 12 hours.

Environmental precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones of 1 metre with ground application.

Toxicity

Acute oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool, dry place. Do not store below freezing. Shake well before using.

Velocity m3 All-In-One

Group 2, 6, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Velocity m3 All-In-One (PCP# 29584)	Bayer	Thiencarbazone-methyl: 5 g/L Pyrasulfotole: 31.3 g/L Bromoxynil: 175 g/L	Suspension	8.1 L, 129.6 L

One (1) 8.1 L jug of Velocity m3 All-In-One will treat 20 acres.

Crop, staging and rates

Crop	Staging	Rate
Spring and durum wheat	1 - 6 leaves on main stem, plus 3 tillers but prior to presence of first node (jointing)	Velocity m3 All-In-One: 0.4 L/acre
Winter wheat	Apply either in fall or spring when the majority of plants have 1 leaf to full tillering but prior to presence of first node (jointing)	

Weeds and staging

For best results, apply to emerged, young, actively growing weeds according to the weed stages listed. Under stressed conditions and/or heavy crop canopy, early application will result in improved weed control.

Grassy weeds: Apply at 1 - 6 leaf, up to emergence of the third tiller

barnyard grass
volunteer canary seed (1 - 6 leaf, up to emergence of 2nd tiller)
green foxtail
Japanese brome (suppression) (1 - 6 leaf)
Persian darnel (suppression)
yellow foxtail (suppression) 1 - 6 leaf
wild oats[3]

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Broadleaf weeds: Unless otherwise stated, apply at 1 - 6 leaf stage

annual sow thistle
Canada thistle (suppression) (up to 30 cm in height)
Canada fleabane (10 cm high or diameter)[1,4,5]
chickweed
cleavers[1,2]
common ragweed
dandelions[3] (suppression) (up to 10 cm in height and 25 cm in diameter)
flixweed (up to 10 cm in height)
hemp-nettle
giant ragweed (suppression)[3,4]
kochia[2] (up to 10 cm in height)
lamb's-quarter
narrow-leaved hawk's-beard (up to 10 cm and prior to bolting)
pale smartweed
perennial sow thistle (suppression)
redroot pigweed
round-leaved mallow
Russian thistle (up to 10 cm in height)
shepherd's-purse
stinkweed
stork's-bill: only in tank mix with 2,4-D and AMS (1 - 8 leaf)
volunteer canola (all types)
wild buckwheat
wild mustard

[1] In spring wheat only. For improved and more consistent control of wild oat in areas of heavy infestation, Group 2 resistant cleavers at the 4 - 6 whorl growth stage, improved control of larger kochia and Japanese brome, and suppression of Canada thistle and dandelion in advanced staging or cool temperatures, add ammonium sulphate at 202 g/acre (99% solution), 0.5 L/acre (40% solution) or 0.4 L/acre (49% solution) to the tank before adding other components. [2] Including Group 2 and 4 resistant biotypes. [3] Includes seedlings and overwintered rosettes. [4] Including glyphosate resistant biotypes. [5] Remove established Canada fleabane plants prior to planting via tillage or pre-seed burn-off.

Durum wheat: for more consistent weed control, add a non-ionic surfactant (Agral 90, AgSurf or Surf 92) at 0.25% v/v.

Registered tank mixes

Tank mix partner	Tank mix partner rate	Additional weeds controlled and comments
Spring wheat		
2,4-D ester + AMS	280 g ai/ha + 0.5 L/acre (40% solution)	Weeds controlled by Velocity M3 All-In-One alone plus stork's-bill from the 1 - 8 leaf stage. Spring wheat 4-leaf to 6-leaf stage on main stem plus 3 tillers but prior to presence of first node (jointing)

Bayer supports the following mixes that are not on the Velocity m3 label: MCPA ester on spring, durum and winter wheat, Lontrel, Decis and Sevin XLR on spring and durum wheat, Tilt on spring and winter wheat. Apply mixes according to the most restrictive use limitations for either product.

Application information

How to apply: Apply with ground equipment or by air. **Water volume:** Ground – minimum 18.9 L/acre. Air – minimum 11.3 L/acre.

Application tips

Under DROUGHT conditions, do not spray Velocity M3 if time between seeding and spraying exceeds 35 days as (drought hastens crop development). Do not spray Velocity M3 3 days prior to or following cold temperatures (3°C or lower). Do not apply to crops underseeded to legumes. Do not use Velocity m3 if another Group 2 grass herbicide has been previously applied in the same season. For best results, apply to emerged, young, actively growing weeds. Weed control may also be reduced if application is made when weeds are dust covered or in the presence of heavy dew, fog, mist or rain. Do not apply to crop that is under stress due to abnormal environmental conditions such as frost, extreme heat, low fertility, drought, flooding or disease and/or insect damage as crop injury may result. Apply only once per season.

How it works

Thiencarbazone-methyl: Uptake is primarily via foliage and is transported to areas on new shoot growth where it inhibits the enzyme acetolactate synthase (ALS). Inhibition of this enzyme prevents protein production, which leads to gradual death of target weeds.

Pyrasulfotole: Absorbed through leaves and is translocated to meristematic regions where it inhibits the HPPD enzyme. Pyrasulfotole inhibits plant pigment biosynthesis and photosynthesis. Bromoxynil: Works on contact, interfering with photosynthesis, disrupting plant growth, which ultimately leads to the plant's death.

Expected results

Grass weeds: Growth of susceptible plants stops rapidly, and after a few days plants, develop chlorotic discolouration on the leaves, which sometimes turn red. Complete control may take 2 to 4 weeks.

Broadleaf weeds: Small burnt spots on leaf can appear in hours. Lack of plant pigments shuts down the photosynthetic pathway resulting in bleaching symptoms and rapid death, normally in 6 to 14 days.

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Restrictions

Rainfall: Rainfall within 60 minutes of application may reduce effectiveness. **Grazing restrictions:** Do not graze the treated crop or cut for forage within 25 days or cut for hay within 30 days of application. **Pre-harvest intervals:** Do not harvest spring or durum wheat for grain or straw within 60 days of application. Do not harvest winter wheat for grain or straw within 72 days of application. **Re-cropping:** The following crops can be planted 10 months after application – alfalfa, barley, canary seed, canola, flax (including low linolenic acid varieties), field pea*, oats, spring, winter and durum wheat and sunflower. The following crops can be planted 22 months after application – lentils, potato. Use a field bioassay for crops not listed above. **Re-entry interval:** 24 hours.

* Field pea may be grown the year following Velocity m3 application in all Black, Grey Wooded and Dark Brown soil zones. DO NOT plant field peas the year following a Velocity m3 application in the Brown soil zone where organic matter content is below 2.5 % and where soil pH is above 7.5.

Environmental precautions

This product is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones of 1 to 5 metres with ground application.

Toxicity

Acute oral LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool, dry place. Do not store below freezing.

Velpar DF CU

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Velpar DF CU (PCP# 25225)	Tessenderlo Kerley	Hexazinone: 75%	Water dispersible granule	2 kg

Crops, staging and rates

Rate: Alfalfa - Velpar DF: 272 - 544 g/acre

Crop	Timing
Established, grown for seed alfalfa, forage alfalfa	Apply in late fall or early spring when alfalfa is dormant. It must be seed or forage alfalfa established for at least 18 months

Weeds and staging

In alfalfa

dandelion
narrow-leaved hawk's-beard (high rate)
quackgrass
scentless chamomile (high rate)
sow thistle

Application information

How to apply: Apply with ground equipment only. Do not apply by air. **Water volume:** 81 L/acre minimum.

Application tips

Do not apply to frozen soils or soils with less than 1% soil organic matter. Do not use on fields that will be seeded to other crops within 24 months of application. Do not apply to slopes as soil erosion may occur. Best results are obtained when Velpar is present in the root zone during active growth of the target vegetation. Symptoms usually appear in herbaceous plants within 2 weeks after application under warm, humid conditions, while 4 to 6 weeks may be required when weather is cool. If rainfall after application is inadequate to activate Velpar in the soil, plants may recover from contact effects and continue to grow until sufficient rainfall moves Velpar into the root zone.

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How it works
A systemic herbicide readily absorbed through the roots and foliage and translocated upwards. Inhibits photosynthesis.

Restrictions
Rainfall: Rainfall is beneficial for activation of product. **Grazing:** Do not apply within 30 days of harvest (cutting for hay) or feeding of forage or grazing. **Re-cropping:** Information enabling specific recommendations for rotational crops and re-cropping intervals is limited. Do not seed any crop following alfalfa that has been treated with Velpar L herbicide until a successful field bioassay shows that the crop in question may be grown safely. A successful field bioassay means growing to maturity a test strip of the crop across the field. **Re-entry interval:** 48 hours.

Environmental precautions
Apply with a 1 metre buffer between aquatic habitats and a 5 metre buffer between sensitive terrestrial habitats and the treated area.

Toxicity
Acute oral LD_{50} (rats) = technical 1,690 mg/kg.

Storage
Store in a cool, dry place. Keep away from heat, sparks and open flame.

Viper ADV/Python/Benz/Boa Pro

Group 2, 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Viper ADV (PCP# 30626)	BASF Canada	Imazamox: 20 g/L Bentazon: 429 g/L	Solution	8.1 L, 129 L
UAN (28-0-0)*		UAN: 28%	Liquid	
Python co-pack of: Python A (PCP# 33279) + Python B (PCP# 33282)**	ADAMA Canada	Imazamox: 80 g/L	Solution	4 L
		Bentazon: 480 g/L		7.26 L
Benz (PCP # 33830)	Sharda CropChem	Imazamox: 20 g/L	Solution	8.1 L
		Bentazon: 429 g/L		
Boa Pro co-pack of: Samurai (PCP# 33033) + Boa (PCP# 33011) + UAN (28-0-0)***	NewAgco Inc	Imazamox: 70%	Water dispersable granule	117 g
		Bentazon: 480g/L	Solution	14.5 L, 348 L
		UAN: 28%	Liquid	7.25 L

2 cases of UAN are required per 1 case of Viper. * BASF 28% UAN is required and is sold separately. ** Add a non-ionic adjuvant. It can be 1 of Merge, ADAMA Adjuvant 80, Norac MSO, Hasten NT Ultra, or Agral 90.

Crops, staging and rates

Crop	Staging	Rate
Field pea	3 - 6 above ground nodes	Viper ADV: 0.404 L/acre OR Python A: 100 mL/acre + Python B: 364 mL/acre OR Samurai: 11.7 g/acre + Boa 363 mL/acre + 0.81 L/acre UAN (for Viper, Python, Boa Pro)

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Crop	Staging	Rate
Dry edible bean*[1]	After first trifoliate leaf has fully expanded up to 2nd trifoliate leaf	Viper ADV 0.404 L/acre OR Python A: 100 mL/acre + Python B: 364 mL/acre + 0.145 L/acre Basagran Forte + 0.81 L/acre UAN (for both Viper and Python)
Soybean[1]	Cotyledon - 4-leaf stage	Viper ADV: 0.404 L/acre OR Python A: 100 mL/acre + Python B: 364 mL/acre + 0.81 L/acre UAN (for both Viper and Python)
Viper ADV Only		
Succulent peas	3 - 6 above-ground nodes	Viper ADV: 0.404 L/acre + 0.81 L/acre UAN
Faba bean		
Red clover	After 3rd trifoliate (seedling clover), prior to canopy closure and flowering (established clover)	
Alsike clover		
Sainfoin	After 3rd trifoliate (seedling application only)	
Alfalfa	After 3rd trifoliate (seedling), prior to canopy closure and flowering (established clover)	Viper ADV: 0.404 L/acre + 0.145 L/acre Basagran Forte + 0.81 L/acre UAN

* Dry bean require a tank mix with additional Basagran Forte. Note: Temporary crop yellowing may be observed shortly after application.
[1] Not registered on the Boa Pro label.

Weeds and staging

Grassy weeds: 1 to 4 main leaves or until early tillering.

barnyard grass
green foxtail
Japanese brome*
Persian darnel
volunteer barley
volunteer canaryseed
volunteer tame oats
volunteer wheat (excluding Group 2 tolerant wheat)
wild oats
yellow foxtail

Broadleaf weeds: Cotyledons to 4-leaf stage.

annual sowthistle*[1]
cleavers*
cow cockle
green smartweed
kochia* (including Group 2 resistant biotypes)[1]
lamb's-quarter
perennial sowthistle*[1]
redroot pigweed
round-leaved mallow*[1]
Russian thistle[1]
shepherd's-purse
stork's-bill (Python only)
stinkweed
volunteer canola (all types)
wild buckwheat*
wild mustard (including Group 2 resistant biotypes)

* Suppression only. [1] Viper only

BASF 28 % UAN: 0.81 L/acre. BASF 28% UAN (sold separately) must be used with Viper and Python at 0.81 L/acre.

Application information

How to apply: Apply with ground equipment only. Do not apply by air. **Water volume:** 40 L/acre.

Mixing instructions

Use mixing instructions "b" on page 15.

Application tips

If agitation is stopped for more than 5 minutes, re-suspend spray solution by full agitation prior to commencing spraying again. Do not spray Viper ADV if temperatures of 5°C or lower are forecasted within 3 days of application. Cold temperatures near freezing will negatively affect herbicide performance, as weeds are not actively growing. Initial transient crop yellowing may be observed after application, but this is outgrown and should not affect yield. Apply Viper ADV when broadleaf weeds are small and actively growing and before weeds reach the maximum size recommended for control. DO NOT apply VIPER ADV Herbicide to field peas that have been subjected to stress from conditions such as hail damage, flooding, drought, hot, humid weather, widely fluctuating temperature conditions, prolonged cold weather or injury from prior herbicide applications, as crop injury may result.

Failure to include UAN will result in significantly reduced product performance.

How it works

Imazamox is a systemic herbicide absorbed by foliage and roots that disrupts plant metabolism causing growth to stop. Bentazon is a contact herbicide taken up primarily through the leaves and interferes with photosynthesis. Thorough coverage of foliage is important for consistent weed control.

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Restrictions

Rainfall: Rainfall within 6 hours of application may reduce activity. **Re-entry interval:** 12 hours. **Grazing:** Do not graze treated field pea or cut for feed within 20 days of application. **Pre-harvest intervals:** Do not apply within 60 days of harvest. **Re-cropping (Viper only):** The following crops may be grown safely the year following an application: field pea, field corn, canary seed*, Group 2 tolerant canola, non-Group 2 tolerant canola*, lentils, spring wheat, durum wheat*, spring barley, sunflower, tame oats*, flax*, chickpea. The following crop may be grown safely 2 years following an application: mustard* (condiment type only). Winter wheat can be grown 3 months after treatment*. There are insufficient data for other following crops. Conduct a field bioassay (a test strip grown to maturity) the year before growing any crop other than those listed above.

* If drought conditions are experienced between June 1 and September 1 in the year of application, delay planting of winter wheat, durum wheat, canary seed, tame oats, flax, or canola (non-Clearfield) by an additional year. If drought is received between June 1 and September 1 in the year of application OR between June 1 and September 1 in the year following application, delay planting of mustard by an additional year. In the grey, black, and dark brown soil zones, drought is defined as less than 125 mm of total precipitation between June 1 and September 1. In the brown soil zone, drought is defined as less than 125 mm of total precipitation between June 1 and September 1, OR less than 15 mm of precipitation in any month between June 1 and September 1. **Re-entry interval:** 12 hours.

Do not apply Viper ADV more than once per year.

Environmental precautions

Viper tank mixture is highly toxic to non-target plants. Observe buffer zones specified under Directions for Use.

Toxicity

Imazamox: Acute oral LD_{50} (rats) = > 5,000 mg/kg.
Bentazon: Acute oral LD_{50} (rats) = > 1,089 mg/kg.

Storage

Do not freeze. Store in a cool, dry place above 5°C.

Voraxor

Group 14

Formulation

Product	Company	Active ingredient	Formulation	Container size
Voraxor (PCP#33968)	BASF Canada	Trifludimoxazin: 125 g/L Saflufenacil: 250 g/L	Suspension concentrate	1.56 L
Merge (PCP# 24702)	BASF Canada	Surfactant blend: 50%		8.1 L

Crops, staging and rates

Crop	Stage	Rate per acre Voraxor	Rate per acre Merge
Peas(dried field)	Pre-seed or pre emergent	19.5 - 58 mL	200 - 400 mL
Lentils	Pre-seed or pre emergent	19.5 mL[1]	200 - 400 mL
Field corn and soybeans	Pre-seed or pre emergent	19.5 - 40.5 mL[2]	200 - 400 mL
Wheat(durum, spring and winter), barley	Pre-seed or pre emergent	19.5 - 58mL	200 - 400 mL
Chemfallow	Apply to actively growing weeds less than 15cm in height	19.5 - 29mL	200 - 400 mL

[1] Do not use higher than 19.6mL/acre or injury could result. 2 Do not use higher than 40.5mL/acre or injury could result.

Note: Crop seeds must be planted 2.5cm deep.

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Voraxor (cont'd)

Weeds, rates and staging

Broadleaf weeds (up to 8-leaf except where indicated)[1]:
Canada fleabane
cleavers (up to 4-whorl stage)[2]
kochia (up to 15cm in height)[2]
lamb's- quarters
narrow-leaved hawk's-beard (up to 8cm)
round-leaved mallow
shepherd's-purse [3]
stinkweed [2]
volunteer canola[2 4]
wild buckwheat[2]
wild mustard[2]

[1] Voraxor applied at 19.5-29mL/acre provides rapid burndown control of all weeds listed below. [2] Apply Voraxor at a rate of 41.5-57mL/acre for suppression of secondary flushes. [3] Suppression only. [4] All types including Roundup Ready.

Registered tank mixes

Voraxor should be tank mixed with glyphosate at 0.5-1L/acre of 360 g/L equivalent. Voraxor may be applied as a pre-seed or pre-emergent treatment to lentils, dry field peas, field corn and soybeans in tank mix combination with Zidua SC or Zidua SC and glyphosate.

Application information

How to Apply: Ground application only. Do not apply by air. **Water Volume:** 20 - 40 L/acre.

Mixing instructions

Add products to the spray tank in the following order: Voraxor, Glyphosate, Merge.

Application tips

Use higher water volumes for dense weed infestations and thick canopies. Do not apply during periods of dead calm or when winds are gusty. Avoid when ready rain if forecast.

How it works

Voraxor is rapidly absorbed by root and foliar uptake. Voraxor is a potent inhibitor of protoporphyrinogen oxidase (PPO). Cell membrane damage induced by inhibition of PPO leads to plant death.

Expected results

Susceptible weeds will develop injury symptoms shortly after application, then death of the weeds will be 3 - 5 days after application depending on growing conditions. Susceptible emerging weed seedlings will usually die as they reach the soil surface or shortly after emergence.

Restrictions

Rainfall: Follow the glyphosate manufacturers recommendation for rain fastness. Rainfall shortly after product application can result in slight injury to the crop. Lentils will be more susceptible to injury on coarse textured (sandy or gravely) and low organic matter soils. Injury will appear usually as burning on the outer edges of the leaves. Lentils will grow out of injury symptoms, and yield will not be impacted at recommended rates under normal growing conditions **Grazing:** Field corn forage and silage can be harvested, used as feed or grazed 60 days or more days after application. Legume forage (field peas and lentils) may be used as feed or grazed 60 or more days after application. Wheat and barley forage and hay may be used as feed or grazed 30 or more days after application. Soybeans may be used as feed or grazed 60 days or more days after application. **Re-cropping:** Winter wheat[1] – 3 months after application. Plant back crops barley, dry field pes, lentil, field corn, soybean, wheat (spring, winter, durum).[2] Following a spring application of Voraxor – barley, canola, dry field pea, flax, field corn, lentil, mustard, soybean, wheat (spring, durum). **Re-entry interval:** 12 hours.

[1] Follow spring application of Voraxor. [2] To be planted in the same season in case of crop failure. Rate restrictions apply. Lentils, field corn and soybeans can only be grown as plant back crops provided that a maximum product rate of 19.5mL/ac for lentils and 40.5mL/ac for field corn and soybeans was applied in the previous crop. a second application of Voraxor cannot be made in the rescue crop. Crops can also be planted in the next season following chemfallow treatment applied after August 1.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on label. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay.

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Toxicity
Acute oral toxicity (rats): LD_{50} > 2,000 mg/kg.

Storage
Prevent from freezing. If the product freezes, allow to thaw at room temperature for 24 hours and agitate well prior to use. Store in original container in a cool, secure and well-ventilated area.allow the product to reach room temperature and roll or shake periodically until crystals have re-dissolved.

Xtendimax® with VaporGrip® Technology Herbicide

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Xtendimax® with VaporGrip® Technology (PCP# 31896)	Bayer	Dicamba	350 g a.e./L dicamba as diglycolamine salt	10 L, 450 L

Crops, staging and rates

Crop	Stage	Rate
Roundup Ready 2 Xtend Soybeans	Pre-plant or pre-emergence: apply any time prior to emergence of the crop Post-emergence: apply once or twice, at least 2 weeks apart, up to the early flower stage (R1)	333 - 692 mL/acre per application and do not exceed 1.38 L/acre during a single growing season. 692 mL/acre rate can be used only ONCE per season and is recommended early, with up to 2 applications of 333 mL/acre prior to R1. The third application should only be made for the control of glyphosate-resistant weed populations
Corn hybrids with Roundup Ready 2 Technology	Pre-emergence: prior to the crop Post-emergence: spike to 5-leaf stage	333 - 692 mL/acre
Spring rye, spring barley, oats, spring wheat, winter wheat	Crop specific; refer to label	127 - 161 mL/acre
Summerfallow, pastures, non-crop areas	Refer to label	Various; refer to label

Weeds, rates and staging
Rate (mL per acre): 333 mL/acre to 692 mL/acre Xtendimax with VaporGrip Technology + 675 mL/acre Roundup WeatherMAX.

Annual broadleaf weeds
- biennial wormwood[1]
- buckwheat (wild, tartary)
- Canada fleabane
- chickweed
- cleavers
- cocklebur
- common lamb's-quarter
- corn spurry
- cow cockle
- Eastern black nightshade
- flixweed
- hemp-nettle
- kochia
- lady's-thumb
- mustard (hare's-ear, Indian, tumble, wild, wormseed)
- narrow-leaved hawk's-beard
- night-flowering catchfly
- non-glyphosate tolerant canola (rapeseed)
- pigweed (redroot, Russian, smooth)
- ragweed (common, false, giant)
- Russian thistle
- shepherd's-purse
- smartweed (green, Pennsylvania)
- stinkweed
- stork's bill
- wild tomato

Annual grass weeds
- barnyard grass
- crabgrass (smooth, large)
- fall panicum
- foxtail (green, yellow, giant)
- volunteer barley
- volunteer wheat
- wild oats
- wild proso millet

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Xtendimax® with VaporGrip® Technology herbicide (cont'd)

Perennial weeds

Following weeds can be controlled using Xtendimax and glyphosate. Refer to label for specific instructions for controlling specific weeds.

Canada thistle	dandelion	perennial sow thistle	wire stemmed muhly
common milkweed	field bindweed	quackgrass	yellow nutsedge

Rate (L per acre): 333 mL/acre to 692 mL/acre Xtendimax with VaporGrip Technology + 1.35 L/acre Roundup WeatherMAX. All weeds listed above plus tall water hemp and horsenettle.

Rate (L per acre): 333mL/acre to 692 mL/acre Xtendimax with VaporGrip Technology + 1.89 L/acre Roundup WeatherMAX. All weeds listed above plus volunteer alfalfa and bromegrass.

[1]1 application including Roundup WeatherMAX at 676 mL/acre applied at the 2 - 8 leaf stage of actively growing biennial wormwood.

Notes: Weeds will be more easily controlled and early crop competition avoided with applications made when the weeds are small. Control of annual weeds greater than 25 cm in height will be inconsistent, although some weeds may be controlled.

The 692 mL/acre rate is to be used only once in a growing season. DO NOT exceed the maximum season total of 1.38 L/acre.

Application information

Refer to label for a full description of application requirements. **Water volume:** Minimum 40 L/acre. **Aerial Application:** DO NOT apply by air. Apply when air temperature is between 10 and 25°C. DO NOT spray when the temperature is expected to exceed 30°C. DO NOT allow herbicide solution to mist, drip, drift or splash onto desirable vegetation because severe injury or destruction to desirable broadleaf plants could result. When applying Roundup Xtend adjacent to sensitive crops, apply as a pre-plant, pre-emergent or early post-emergent treatment to avoid potential drift onto the sensitive crops.

Application tips

Nozzles and pressure: Use only spray nozzles that produce **extremely coarse (XC) to ultra coarse (UC)** spray qualities and minimal amounts of fine spray droplets. **DO NOT use conventional flat fan nozzles that produce medium or fine spray qualities.** Use at least 30 psi (207 kPa) to ensure proper pattern overlap. DO NOT apply during a temperature inversion as drift potential is high.

Registered tank mixes

Herbicides: Glyphosate (Roundup brands) with Roundup WeatheMAX with Transorb 2 Technology. Numerous herbicides tank mixes depending on crop; refer to label. DO NOT add acidifying buffering agents, acidic pH adjusting agents or adjuvants other than agriculturally approved NIS to the spray solution. DO NOT add ammonium sulfate (AMS), AMS-containing adjuvants, water conditioners or sprayable fluid fertilizers.

Restrictions

Rainfall: Rain within 4 hours of application may reduce control. **Grazing:** 7 to 10 days for soybean forage and 13 to 15 days for soybean hay. Minimum 7 days prior to grazing lactating dairy cattle. Harvest for forage or hay minimum of 30 days after application. Withdraw meat animals from treated fields at least 3 days before slaughter. **Re-cropping:** A plant-back interval of 120 days is required for those crops not on the label of Roundup Xtend with VaporGrip Technology. Do not count days when the ground is frozen. Moisture is essential for the degradation of this herbicide in soil. If dry weather persists after application, crop injury may occur the following spring.
Re-entry interval: 12 hours.

Environmental precautions

Buffer zones: refer to label. **Runoff:** Be aware of site considerations that may lead to runoff. Using a grassed buffers between treated area and sensitive environments is recommended. **Leaching:** Leaching can occur in coarse soil or where water table is shallow.

Toxicity

Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store above -10°C to keep product in solution. If the product freezes and crystals form, place in a warm room (20°C), allow the product to reach room temperature and roll or shake periodically until crystals have re-dissolved.

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Zidua SC

Group 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Zidua SC (PCP# 32542)	BASF Canada	Pyroxasulfone: 500 g/L	Suspension concentrate	4.05 L

Crops, staging and rates

Crop	Stage	Rate per acre
Corn	Pre-plant, pre-emergence or post emergence up to the 4 leaf.	Dependent on soil texture and organic matter –see table below
Soybeans*	Pre-plant or pre-emergence	Dependent on soil texture and organic matter -see table below
	Post Emerge (emergence to 3rd trifoliate leaf)	73 mL
Sunflowers**	Pre-plant or pre-emergence	49 - 97 mL
Lentils**	Pre-seed or pre-emergent	49 - 73 mL
	Fall application (prior to ground freeze)	73 - 97 mL
Dry field pea**	Pre-seed or pre-emergent	49 - 97 mL
Chickpeas**	Pre-seed or pre-emergent	49 - 97 mL
Mint**	Dormant application in early spring prior to active green growth	73 mL
Potatoes**	After planting and hilling, before crop emergence	49-97 mL

Rate per acre by soil texture			
Coarse	**Medium – Fine soil**		**Fine**
	Organic matter< 3%	3% < Organic matter < 7%	
101 ml/ac	134 mL/acre	169 mL/acre	200 mL/acre

*Seeds must be planted a minimum of 4 cm deep. **Do not apply to soils classified as sand.

Weeds, rates and staging

Stage – Zidua must be applied before weeds emerge.

Weeds controlled at a rate of 101 - 200 mL/acre: Barnyard grass, crabgrass (large), foxtail (green, yellow, giant), ryegrass, common water hemp and redroot pigweed. Weeds suppressed (early season residual suppression) at 49 - 97 mL/acre: Foxtail (green and yellow), wild oats, common water hemp, kochia, lamb's quarters and redroot pigweed.

Registered tank mixes

See label for crop specific tank mixes.

Application information

How to Apply: Ground application only, do not apply by air. **Water Volume:** 20 - 40L/acre.

Do not use on peat or muck soils and soils with 7% or more organic matter content.

Mixing instructions

Do not over agitate at any point in the mixing process.

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Zidua SC (cont'd)

Application tips

Zidua SC must be applied before weeds emerge. Moisture is necessary to activate the active ingredient in the soil for proper control. Dry weather following applications may reduce effectiveness. Zidua SC may not control weeds that germinate after application but before an activating rainfall/irrigation, or weeds that germinate through cracks resulting from dry soil. When adequate moisture is not received after application, weed control may be improved by irrigation.

How it works

Zidua SC is a group 15 herbicide and controls weeds by inhibiting the synthesis of very long chain fatty acids, which halts growth at the apical meristem and coleoptile by reducing cell division and expansion.

Expected results

Weeds affected do not emerge or may emerge with irregular leaf margins and reduced growth.

Registered tank mixes

Restrictions

Rainfall: ½ - ¾ inch of rain required for activation. **Grazing:** Do not feed or graze treated hay or forage to livestock. **Re-cropping:** In the event of crop failure, only labeled crops may be seeded on fields treated with Zidua SC (some restrictions apply). All other crops may be seeded 1 year after treatment. Winter wheat may be seeded 4 months following an application. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms and to non-target terrestrial plants. Observe buffer zones specified on label. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay.

Toxicity

Oral (rats) LD_{50} > 2000 mg/kg. Dermal (rats) LD_{50} > 5000 mg/kg.

Storage

Store in original container in cool, dry, well-ventilated location.

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Notes

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Notes

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Herbicide selector chart – cereals

Crop	American nightshade	Annual smartweed/lady's-thumb			Annual sow thistle	
Barley	Buctril M♦ Enforcer M♦ Hotshot Koril Pardner♦ Thumper♦	2,4-D Ally♦ Avenza Axial X iPak Barricade II♦ Broadband Buctril M♦ Cirpreme Curtail M♦ Distinct[7] Draft CT Embutox♦,[1] Enforcer M♦ Engenia♦ Estaprop♦ Exhilarate	Express FX[7] Express Pro[7] Express SG[7] Flurox-24♦ Foxxy MR Frontline XL♦ Hotshot Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) MP Foxxy CRX Battlestar Deathstar MPower RX♦ OcTTain XL♦	Pardner♦ Paradigm Pixxaro[1] Prestige XC♦ Priority♦[7] Refine M♦ Refine SG Rezuvant[1] Sentrallas Spectrum♦ Squadron Sword♦ Thumper♦ Travallas Trophy♦,[1]	2,4-D[1] Ally[1,♦] Ammo DR[1] Avenza Axial X Ipak[1] Broadband[1] Cirpreme Clever♦,[1] Conquer[1,7] Curtail M♦ Estaprop♦ Exhilarate Flurox-24♦[1] Foxxy MR[1] Frontline XL♦ Goldwing[7,1] Hotshot[1]	Infinity Infinity FX MCPA[1] (all forms) Battlestar[1] Deathstar[1] OcTTain XL♦[1] Paradigm[1] Prestige XC♦ Priority♦[1,7] Prominex[1] Refine M[1] Retain♦,[1] Rezuvant[1] Spectrum♦ Sword♦ Tropotox Plus♦,[1] Tundra
Wheat (C - Group 2 tolerant wheat)	Batalium Buctril M♦ Enforcer M♦ Hotshot Pardner♦ Thumper♦	2,4-D Ally♦ Avenza Axial X iPak Barricade II♦ Basagran♦ Batalium Broadband Buctril M♦ Cirpreme Curtail M♦ Draft CT Distinct[7] Embutox♦ Enforcer M♦ Engenia♦ Erebus Xtreme Estaprop♦ Everest Exhilarate	Express FX[7] Express Pro[7] Express SG[7] Flurox-24♦ FMC Precision Pac[9] Foxxy MR Frontline 2,4-D♦ Frontline XL♦ Hotshot Infinity FX Intruvix[7] MCPA[1] (all forms) MP Foxxy CRX Battlestar Deathstar MPower RX♦ OcTTain XL♦ Pardner♦ Paradigm	Pixxaro[1] Predicade Prestige XC♦ Priority♦,[7] Refine M♦ Refine SG Rezuvant[1] Sentrallas Signal SFU Simplicity Spectrum♦ Squadron Tandem Sword♦ Thumper♦ Travallas Tridem Trophy[1,♦] Varro	2,4-D Ally♦,[1] Ammo DR[1] Avenza Axial X iPak Broadband[1] Cirpreme Clever♦,[1] Conquer[1,7] Curtail M♦ Estaprop♦ Exhilarate Flurox-24♦[1] FMC Precision Foxxy MR[1] Pac[9] Frontline XL♦,[1] Frontline 2,4-DXC Goldwing[7,1] Hotshot[1]	Infinity Infinity FX MCPA[1] (all forms) Battlestar[1] Deathstar[1] OcTTain XL♦[1] Paradigm[1] Prestige XC♦ Priority♦,[1,7] Refine M[1] Retain♦,[1] Rezuvant[1] Signal SFU[1] Spectrum♦ Sword♦ Tridem[1] Tropotox Plus♦,[1] Tundra Velocity m3
Oats	Buctril M♦ Hotshot Pardner♦	Barricade II[8] Buctril M♦ Curtail M♦ Distinct[7] Embutox♦ Engenia♦ Express SG[7] Frontline XL♦	Hotshot Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) MPower RX♦ Pardner♦ Prestige XC♦	Priority♦,[7] Refine M♦ Refine SG Sentrallas Spectrum♦ Sword♦	Conquer[1,7] Curtail M♦ Frontline XL♦,[1] Goldwing[7,1] Hotshot[1] MCPA[1] (all forms)	Refine M[1] Prestige XC♦ Priority♦,[1,7] Spectrum♦ Sword♦ Tropotox Plus♦,[1]
Fall rye (spring application)	Buctril M♦ Pardner♦	2,4-D Buctril M♦	MCPA[1] (all forms) Pardner♦		2,4-D[1] Conquer[1,7] Goldwing[7,1]	MCPA[1] (all forms) Tropotox Plus♦,[1]
Triticale	Pardner♦	Distinct[7]	Pardner♦		Conquer[1,7] Goldwing[7,1]	Infinity

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 18 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Pre-seed treatment
[8] Refer to entry in guide for any tank-mix requirements
[9] Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Barnyard grass	Bluebur	Canada thistle			
Barley	Aim♦[7] Avenza Axial♦ Axial X iPak Axial Xtreme Broadband Cirray Clever♦ Exhilarate Liquid Achieve SC♦ Prominex Puma♦ Rezuvant	2,4-D Ally♦ Ammo DR Buctril M♦ Enforcer M♦ Estaprop♦ Flurox-24♦ Hotshot MCPA (all forms) OcTTain XL♦ Pardner♦ Thumper♦ Trifluralin♦ Tundra	Akito[5] Ally♦[,1] Ammo DR[5] Avenza[1] Axial X iPak[1] Barricade II♦[,1] Buctril M♦[,1] Cirpreme Curtail M♦ Distinct[1,7] Draft CT[5] Embutox♦[,1] Enforcer D[1]	Enforcer M♦[,1] Engenia♦[,1] Estaprop[1,5] Exhilarate[1] Express FX[7,1] Express SG[1] Express Pro♦[,1] Flurox-24♦[1] Foxxy MR[5] Frontline XL♦[,1,5] Infinity[1] Infinity FX[1] Intruvix[1,7]	Lontrel♦ Lorox + MCPA♦[,1] MCPA[1] (all forms) Mecoprop[5] Momentum[5] MP Foxxy CRX[1] Battlestar[1] Deathstar[1] MPower RX♦[1] MPower Extra♦[,1] OcTTain XL♦[1]	Prestige XC♦ Prominex Refine M♦[,1] Refine SG[1] Retain♦[,1] Rezuvant[1] Spectrum♦ Sword♦[,5] Travallas[1] Tropotox Plus♦[,5] Tundra[1]
Wheat (C - Group 2 tolerant wheat)	Altitude FX (C) Avenza Axial♦ Axial X iPak Axial Xtreme Batalium[1] Broadband Cirray Clever♦ Everest Exhilarate FMC Precision Pac[9] Focus[2,7] Horizon♦ Liquid Achieve SC♦ Predicade Prominex Puma♦ Rexade Rezuvant Signal SFU Tandem Traxos Traxos Two Tundra Varro Velocity m[3]	2,4-D Ally♦ Ammo DR Batalium Buctril M ♦ Enforcer M♦ Estaprop♦ Frontline XL♦ Hotshot MCPA[1] (all forms) OcTTain XL♦ Pardner♦ Rexade Thumper♦ Traxos Two	2,4-D[1] Akito Allyt[1] Ammo DR[5] Avenza[1] Axial X iPak[1] Barricade II♦[,1] Basagran♦[,1,3] Buctril M♦[,1] Cirpreme Curtail M♦ Denali CM[1] Distinct[1,7] Draft CT[5] Embutox♦ Enforcer D Enforcer M♦[,1]	Engenia♦[,1] Erebus Xtreme[1] Estaprop♦[,5] Exhilarate[1] Express FX[1,7] Express SG[1,7] Express Pro♦[,1,7] Flurox-24♦[1] FMC Precision Pac[9] Foxxy MR[5] Frontline[1] Frontline XL♦[,1] Infinity[1] Infinity FX[1] Intruvix[1,7] Lontrel♦ Lorox + MCPA♦[,5]	MCPA[1] (all forms) Mecoprop[5] Momentum[5] Battlestar[1] Deathstar[1] MPower RX♦[1] MP Foxxy CRX[1] MPower Extra♦[,1] OcTTain XL♦[1] Predicade[1] Prestige XC♦ Prominex Refine M♦[,1] Refine SG[1]	Retain♦[,1] Rexade[1] Rezuvant[1] Signal SFU[1] Simplicity[1] Spectrum♦ Sword♦[,5] Travallas[1] Tropotox Plus♦[,5] Tundra[1] Velocity m3[1]
Oats		Buctril M♦ Hotshot MCPA (all forms) Pardner♦	Akito Barricade II[1,8] Engenia♦[,1] Buctril M♦[,5] Curtail M♦	Distinct[1,7] Embutox♦ Express SG[1,7] Frontline XL♦[,1] Intruvix[1,7]	Lontrel♦ Lorox + MCPA♦[,5] MCPA[1] (all forms) Mecoprop[5] MPower RX♦[1]	Prestige XC♦[,1] Refine M♦[,1] Refine SG[1] Spectrum♦ Sword♦[,5]
Fall rye (spring application)	Liquid Achieve SC♦	Buctril M♦ MCPA (all forms) Pardner♦	Buctril M♦[,1] MCPA[1] (all forms)	Tropotox Plus♦[,5]		
Triticale		Pardner♦	Distinct[1,7]	Infinity[1]		

♦ Other similar products can be found listed under this product.
1 Suppression only
2 All spring wheat except durum
3 All spring wheats (including durum when tank mixed with 2,4-D ester)
4 See page 18 for resistance information
5 Top growth control
6 Spring rosettes only
7 Pre-seed treatment
8 Refer to entry in guide for any tank-mix requirements
9 Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Cleavers			Common chickweed[4]		Common groundsel
Barley	Aim♦[7] Akito Ammo DR Avenza Axial X iPak Axial Xtreme Barricade II♦ Broadband Cirpreme Clever♦ Conquer[7] Draft CT[1] Enforcer D Enforcer M♦ Engenia♦ Exhilarate Express Pro[7] Flurox-24♦ Foxxy MR	Frontline XL♦ Goldwing[7] Heat[7] Hotshot Infinity Infinity FX Mecoprop Momentum MP Foxxy CRX Battlestar Deathstar MPower RX♦ OcTTain XL♦ Paradigm Pixxaro Prestige XC♦ Priority♦[,7] Prominex Pulsar	Refine M♦[,1] Refine SG[1] Retain Rezuvant Sentrallas Spectrum♦ Stellar♦ Sword♦ Travallas Trophy♦ Tundra	Akito Ally♦ Ammo DR Avenza Axial X iPak Barricade II♦ Broadband Cirpreme Draft CT Enforcer M♦ Exhilarate Express Pro♦ Flurox-24♦[1] Foxxy MR Frontline XL♦ Hotshot Infinity Infinity FX Lorox + MCPA♦ Mecoprop	MP Foxxy CRX Battlestar Deathstar MPower RX♦ OcTTain XL♦[1] Paradigm Pixxaro Priority♦[,7] Prestige XC♦ Prominex Refine M♦ Refine SG Retain Rezuvant Sentrallas Spectrum♦ Squadron Stellar♦ Travallas Tundra	Ally♦ Buctril M ♦ Curtail M♦ Enforcer D Enforcer M♦ Foxxy MR Hotshot Lontrel♦ MP Foxxy CRX MPower RX♦ Pardner♦ Prestige XC♦ Refine M♦ Refine SG Retain Squadron Thumper♦
Wheat (C - Group 2 tolerant wheat)	Aim♦[7] Akito Altitude FX (C) Ammo DR Avenza Axial X iPak Axial Xtreme Barricade II♦ Basagran♦ Batalium Broadband Cirpreme Clever♦ Conquer[7] Denali CM Draft CT[1] Enforcer D Enforcer M♦[,7] Engenia♦ Erebus Xtreme Express Pro[7] Flurox-24♦ FMC Precision Pac[9] Focus[2,7] Foxxy MR Frontline XL♦	Frontline 2,4-D♦ Goldwing[7] Heat[7] Hotshot Inferno Trio♦[2,7] Infinity Infinity FX Luxxur Mecoprop Momentum Foxxy CRX Battlestar Deathstar MPower RX♦ OcTTain XL♦ Paradigm Pixxaro Predicade Prestige XC♦ Priority♦[,7] Prominex Pulsar Refine M♦[,1] Refine SG[1] Retain Rexade	Rezuvant Sentrallas Signal SFU[1] Simplicity Spectrum♦ Stellar♦ Tandem Sword♦ Travallas Traxos Two Tridem Trophy♦ Tundra Varro Velocity m3	2,4-D Akito Ally♦ Altitude FX (C) Ammo DR Avenza Axial X iPak Barricade II♦ Basagran♦[,2] Broadband Cirpreme Draft CT Enforcer M♦ Erebus Xtreme Express Pro♦[,7] Flurox-24♦[1] FMC Precision Pac[9] Foxxy MR Frontline XL♦ Frontline 2,4-D♦ Hotshot Inferno Trio♦[2,7] Infinity Infinity FX Lorox + MCPA Mecoprop Foxxy CRX[1]	Battlestar Deathstar MPower RX♦ OcTTain XL♦[1] Paradigm Pixxaro Predicade Prestige XC♦[,1] Priority♦[,7] Prominex Refine M♦ Refine SG Retain Rexade Rezuvant Sentrallas Signal SFU Simplicity Spectrum♦ Squadron Stellar♦ Tandem Traxos Two[1] Travallas Tridem Tundra Velocity m3	2,4-D Ally♦ Basagran♦[,2] Batalium Buctril M♦ Curtail M♦ Enforcer D Enforcer M♦ Foxxy CRX Foxxy MR Hotshot Lontrel♦ MPower RX♦ Pardner♦ Prestige XC♦ Refine M♦ RefineG Retain Signal SFU Squadron Thumper♦
Oats	Aim♦[7] Akito Barricade II[8] Conquer[7] Enforcer M♦ Engenia♦ Frontline XL♦	Goldwing[7] Heat[7] Mecoprop MPower RX♦ Prestige XC♦ Priority♦[,7]	Refine M♦[,1] Refine SG[1] Sentrallas Spectrum♦ Stellar♦ Sword♦	Akito Barricade II[8] Enforcer M♦ Frontline XL♦ Hotshot Lorox + MCPA Mecoprop MPower RX♦	Prestige XC♦ Priority♦[,7] Refine M Refine SG Sentrallas Spectrum♦ Stellar♦	Buctril M ♦ Curtail M♦ Hotshot Lontrel♦ Pardner♦ Prestige XC♦ Refine M♦ Refine SG
Fall rye (spring application)	Aim♦[7] Conquer[7]	Goldwing[7]				Buctril M♦ Pardner♦
Triticale	Aim♦[7] Conquer[7] Enforcer M♦	Goldwing[7] Infinity		Infinity		Pardner♦

♦ Other similar products can be found listed under this product.

1 Suppression only

2 All spring wheat except durum

3 All spring wheats (including durum when tank mixed with 2,4-D ester)

4 See page 18 for resistance information or 0.5 L/acre of 40% solution to control weed

5 Top growth control

6 Spring rosettes only

7 Pre-seed treatment

8 Refer to entry in guide for any tank-mix requirements

9 Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Corn spurry	Cow cockle		Creeping buttercup	Dandelion		Field bindweed
Barley	Aim♦[7] Ally♦ Ammo DR Draft CT Engenia♦ Foxxy MR Lorox + MCPA♦ Mecoprop MP Foxxy CRX MPower RX♦ Refine M♦ Refine SG Sentrallas Retain Squadron Sword♦	Ally♦ Ammo DR Avenza Barricade II♦ Buctril M♦ Cirpreme Conquer[1,7] Enforcer M♦ Engenia♦ Exhilarate Express FX[7] Express Pro♦[,7] Express SG[7] Foxxy MR Goldwing[7] Hotshot Intruvix[7]	Lorox + MCPA♦ MP Foxxy CRX Battlestar Deathstar MPower RX♦ MPower Extra♦ Pardner♦ Priority♦[,7,1] Prominex Refine M♦ Refine SG Retain Sentrallas Sword♦ Thumper♦ Travallas Trifluralin♦	Tropotox Plus♦[,5]	2,4-D[1] Akito Avenza Axial X iPak[1] Cirpreme Conquer[1,7] Curtail M♦ Distinct [1,7] Embutox♦[,1] Enforcer D Exhilarate Express FX[7] Express Pro[7] Express SG[7] Flurox-24♦ Goldwing[7,1]	Infinity[1] Infinity FX[1] Intruvix[7] MCPA amine[1] MCPA ester[1] MCPA K-salt Battlestar[1] Deathstar[1] OcTTain XL♦ Prestige XC♦ Refine M♦ Rezuvant[1] Spectrum♦[,1] Travallas Tundra[1]	Embutox♦ Engenia♦[,1] Intruvix[7] MCPA[1] (all forms) Sword♦[,5] Tropotox Plus♦[,1]
Wheat (C - Group 2 tolerant wheat)	Aim♦[7] Ally♦ Ammo DR Basagran♦[,2] Draft CT Engenia♦ Erebus Xtreme FMC Precision Pac[9] Foxxy MR Lorox + MCPA♦ Mecoprop Foxxy CRX MPower RX♦ Refine M♦ Refine SG Retain Rexade Sentrallas Signal SFU Simplicity Squadron Sword♦	Ally♦ Altitude FX (C) Ammo DR Avenza Batalium Barricade II♦ Buctril M♦ Cirpreme Conquer[1,7] Enforcer M♦ Engenia♦ Erebus Xtreme Express FX[7] Express Pro♦[,7] Express SG[7] FMC Precision Pac[9] Foxxy MR Goldwing[7] Hotshot Intruvix[7] Lorox + MCPA	Battlestar Deathstar MPower RX♦ Foxxy CRX Pardner♦ Predicade Priority♦[,7,1] Prominex Refine M♦ Refine SG Retain Rexade Sentrallas Signal SFU Simplicity Tandem Sword♦ Thumper♦ Travallas Tridem Triton K	Tropotox Plus♦[,5]	2,4-D[1] Akito Avenza Axial X iPak[1] Cirpreme Conquer[1,7] Curtail M♦ Distinct[1,7] Embutox 625♦ Enforcer D Erebus Xtreme[1] Estaprop♦ Express FX[7] Express Pro[7] Express SG[7] Flurox-24♦ FMC Precision Pac[9] Frontline XL♦ Frontline 2,4-DXC Goldwing[7,1] Inferno Duo♦[1,2,7]	Inferno Trio♦[1,2,7] Infinity[1] Infinity FX[1] Intruvix[7] MCPA Amine[1] MCPA Ester[1] MCPA K-salt Battlestar[1] Deathstar[1] OcTTain XL♦ Predicade Prestige XC♦ Refine M♦ Rexade[1] Rezuvant[1] Simplicity[1] Spectrum♦[,1] Tandem[1] Travallas Tundra[1] Velocity m3[1]	2,4-D[1,2] Basagran♦ Embutox♦ Engenia♦[,1] Intruvix[7] MCPA[1] (all forms) Sword♦[,5] Tropotox Plus♦[,1]
Oats	Aim♦[7] Engenia♦ Lorox + MCPA♦ Mecoprop MPower RX♦ Refine M♦ Refine SG Sentrallas Sword♦	Barricade II[8] Buctril M♦ Conquer[1,7] Engenia♦ Express SG[7] Goldwing[7] Hotshot Intruvix[7]	Lorox + MCPA♦ MPower RX ♦ Pardner♦ Priority♦[,7,1] Refine M♦ Refine SG Sentrallas Sword♦	Tropotox Plus♦[,5]	Akito Conquer[1,7] Curtail M♦ Distinct[1,7] Embutox♦ Express SG[7] Goldwing[7,1] Intruvix[7]	MCPA Amine[1] MCPA Ester[1] MCPA K-salt Prestige XC♦ Refine M♦ Spectrum♦[,1]	Embutox♦ Engenia♦[,1] Intruvix[7] MCPA[1] (all forms) Sword♦[,5] Tropotox Plus♦[,1]
Fall rye (spring application)	Aim♦[7]	Buctril M♦ Conquer[1,7]	Goldwing[7] Pardner♦	Tropotox Plus♦[,5]	2,4-D[1] Conquer[1,7] Goldwing[7,1]	MCPA Amine[1] MCPA Ester[1] MCPA K-salt	MCPA[1] (all forms) Tropotox Plus♦[,1]
Triticale	Aim♦[7]	Conquer[1,7] Goldwing[7]	Pardner♦		Distinct[1,7] Conquer[1,7]	Goldwing[7,1] Infinity[1]	

♦ Other similar products can be found listed under this product.
1 Suppression only
2 All spring wheat except durum
3 All spring wheats (including durum when tank mixed with 2,4-D ester)
4 See page 18 for resistance information
5 Top growth control
6 Spring rosettes only
7 Pre-seed treatment
8 Refer to entry in guide for any tank-mix requirements
9 Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Field horsetail	Flixweed			Green foxtail[4]	
Barley	2,4-D[1] Cirpreme[5] Embutox♦ Enforcer D MCPA[1] (all forms) Pixxaro[1] Rezuvant[1] Tropotox Plus♦,[5]	2,4-D Aim♦[7] Ally♦ Ammo DR Avenza Axial X iPak Barricade II♦ Blackhawk[7] Buctril M♦ Cirpreme Conquer[1,7] Curtail M♦ Draft CT Enforcer D Enforcer M♦ Exhilarate Estaprop♦	Express FX[7] Express Pro♦,[7] Express SG[7] Flurox-24♦ Foxxy MR Frontline 2, 4-D Frontline XL♦ Goldwing[7] Infinity Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA (all forms) Foxxy CRX MPower Extra♦ Battlestar Deathstar	MPower RX♦ OcTTain XL♦ Pixxaro Prestige XC♦ Prominex Refine M♦,[1] Refine SG Rezuvant Spectrum♦ Stellar♦ Sword♦ Thumper♦ Travallas Trophy♦ Tundra	Avenza Axial Axial X iPak Axial Xtreme Broadband Clever♦ Cirray Express FX[7] Express Pro♦,[7]	Express SG[7] Fortress Intruvix[7] Liquid Achieve SC♦ Lorox[1] + MCPA Puma♦ Rezuvant Trifluralin♦ Tundras
Wheat (C - Group 2 tolerant wheat)	Cirpreme[5] Embutox♦,[1] Enforcer D MCPA[1] (all forms) Rezuvant[1] Traxos Two[5] Tropotox Plus♦,[5]	2,4-D Aim♦[7] Ally♦ Altitude FX (C) Ammo DR Avenza Axial X iPak Barricade II♦ Batalium Blackhawk[7] Buctril M♦ Cirpreme Conquer[1,7] Curtail M♦ Denali CM Draft CT Enforcer D Enforcer M♦ Erebus Xtreme Estaprop♦ Exhilarate	Express FX[7] Express Pro♦,[7] Express SG[7] Flurox-24♦ FMC Precision Pac[9] Foxxy MR Frontline XL♦ Frontline 2,4-D♦ Goldwing[7] Inferno Trio♦[2,7] Infinity Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA (all forms) Foxxy CRX Battlestar Deathstar MPower RX♦ MPower Extra♦ OcTTain XL♦	Pixxaro Predicade Prestige XC♦ Prominex Refine M♦,[1] Refine SG Rexade Rezuvant Signal SFU Simplicity Spectrum♦ Stellar♦ Sword♦ Tandem Thumper♦ Travallas Traxos Two Trophy♦ Tundra Velocity m3	Altitude FX (C) Avenza Axial Axial X iPak Axial Xtreme Batalium Broadband Cirray Clever♦ Denali CM Erebus Xtreme[1] Everest Express FX[7] Express Pro[7] Express SG[7] Focus[2,7] Fortress FMC Precision Pac[9]	Horizon♦ Inferno Trio♦[2,7] Intruvix[7] Liquid Achieve SC♦ Lorox[1] + MCPA Predicade Puma♦ Rexade[1] Rezuvant Signal SFU Simplicity[1] Tandem Traxos Traxos Two Trifluralin♦ Tundra Varro Velocity m3
Oats	Embutox♦ MCPA[1] (all forms) Tropotox Plus♦,[5]	Aim♦[7] Barricade II[8] Buctril M♦ Conquer[1,7] Curtail M♦ Express SG[7] Frontline XLt	Goldwing[7] Intruvix[7] Lorox + MCPA♦ MCPA (all forms) MPower RX♦ Prestige XC♦	Refine M♦,[1] Refine SG Spectrum♦ Stellar♦ Sword♦	Express SG[7] Intruvix[7] Lorox + MCPA♦,[1]	
Fall rye (spring application)	MCPA[1] (all forms) Tropotox Plus♦,[5]	2,4-D Aim♦[7] Buctril M♦	Conquer[1,7] Goldwing[7] MCPA (all forms)		Liquid Achieve SC♦	
Triticale		Aim♦[7] Conquer[1,7]	Goldwing[7] Infinity		Liquid Achieve SC♦	

♦ Other similar products can be found listed under this product.
1 Suppression only
2 All spring wheat except durum
3 All spring wheats (including durum when tank mixed with 2,4-D ester)
4 See page 18 for resistance information
5 Top growth control
6 Spring rosettes only
7 Pre-seed treatment
8 RRefer to entry in guide for any tank-mix requirements
9 Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Hemp-nettle			Knotweed	Kochia[4]		
Barley	Ally♦ Ammo DR Avenza Axial X iPak Barricade II♦ Broadband[1] Cirpreme Draft CT Enforcer D Enforcer M♦ Exhilarate Express FX[7] Express Pro[7] Express SG[7] Flurox-24♦[1] Foxxy MR	Frontline XL♦ Hotshot[1] Infinity Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) Foxxy CRX Battlestar Deathstar MPower RX♦ OcTTain XL♦[1] Paradigm[1] Pixxaro Prestige XC♦,[1]	Priority♦,[7,1] Prominex Refine M♦ Refine SG Retain♦ Rezuvant Sentrallas Spectrum♦ Squadron Stellar♦ Sword♦ Travallas Trophy♦ Tropotox Plus♦ Tundra	Sword♦ Trifluralin♦	2,4-D Akito Aim♦[7] Ally♦ Ammo DR Authority 480[7] Avenza Axial X iPak Axial Xtreme Barricade II♦ Blackhawk[7] Buctril M♦ Cirpreme Conquer[7] Curtail M♦,[1] Distinct[7] Enforcer D Enforcer M♦ Estaprop♦ Exhilarate[1]	Express FX[7] Express Pro♦,[7] Flurox-24♦ Foxxy MR Express SG[7] Fortress Frontline XL♦ Goldwing[7] Heat[8] Hotshot Infinity Infinity FX Intruvix[7] MCPA amine MCPA ester MCPA K-salt Momentum Foxxy CRX Deathstar MPower RX♦	MPower Extra♦ OcTTain XL♦ Pardner♦ Paradigm[1] Pixxaro Prestige XC♦ Prominex Pulsar Refine M♦ Refine SG Retain♦ Rezuvant Sentrallas Stellar♦ Sword♦ Thumper♦ Travallas Trophy♦ Tundra
Wheat (C - Group 2 tolerant wheat)	Ally♦ Altitude FX (C) Ammo DR Avenza Axial X iPak Barricade II♦ Broadband[1] Cirpreme Draft CT Enforcer D Enforcer M♦ Erebus Xtreme Exhilarate Express FX[7] Express Pro[7] Express SG[7] Flurox-24♦[1] FMC Precision Pac[9] Foxxy MR Frontline XL♦ Frontline 2,4-D♦,[1]	Hotshot[1] Inferno Trio♦[1,2,7] Infinity Infinity FX Intruvix[7] Lorox + MCPA♦ Luxxur MCPA[1] (all forms) MP Foxxy CRX OcTTain XL♦[1] Battlestar Deathstar MPower RX♦ Paradigm[1] Pixxaro Predicade Prestige XC♦,[1] Priority♦,[7,1] Prominex Refine M♦	Refine SG Retain♦ Rexade Rezuvant Sentrallas Signal SFU Simplicity Spectrum♦ Squadron Stellar♦ Tandem Sword♦ Travallas Traxos Two Tridem[1] Trophy♦ Tropotox Plus♦ Tundra Velocity m3	Sword♦ Varro	2,4-D Aim♦[7] Akito Ally♦ Altitude FX (C) Ammo DR Avenza Axial X iPak Axial Xtreme Barricade II♦ Batalium Blackhawk[7] Buctril M ♦ Cirpreme Conquer[7] Curtail M♦,[1] Denali CM Distinct[7] Enforcer D Enforcer M♦ Erebus Xtreme Estaprop♦ Exhilarate[1] Express FX[7] Express SG[7]	Express Pro♦,[7] Flurox-24♦ FMC Precision Pac[9] Focus[1,2,7] Fortress[1] Foxxy MR Frontline XL♦ Frontline 2,4-D♦ Goldwing[7] Heat[7] Hotshot Intruvix[7] Inferno Trio♦[2,7] Infinity Infinity FX MCPA amine MCPA ester MCPA K-salt Momentum Foxxy CRX MPower Extra♦ MPower RX♦ OcTTain XL♦ Paradigm[1]	Pardner♦ Pixxaro Predicade Prestige XC♦ Prominex Pulsar Refine M♦ Refine SG Retain♦ Rexade[1] Rezuvant Sentrallas Signal SFU Stellar♦ Tandem Sword♦ Thumper♦ Travallas Traxos Two Tridem Trophy♦ Tundra Velocity m3
Oats	Barricade II[8] Express SG[7] Frontline XL♦ Hotshot[1] Intruvix[7] Lorox + MCPA♦,[1] MCPA[1] (all forms) Prestige XC♦,[1] MPower RX♦	Priority♦,[8,1] Refine M♦ Refine SG Sentrallas Spectrum♦ Stellar♦ Sword♦ Tropotox Plus♦		Sword♦	Aim♦[7] Akito Barricade II[8] Buctril M♦ Conquer[7] Curtail M♦,[1] Distinct[7] Enforcer M♦ Express SG[7]	Frontline XL♦ Goldwing[7] Heat[7] Hotshot Intruvix[7] MCPA MCPA amine MCPA ester MPower RX♦	MCPA K-salt Prestige XC♦ Pardner♦ Refine M♦ Refine SG Sentrallas Stellar♦ Sword♦
Fall rye (spring application)	MCPA[1] (all forms)	Tropotox Plus♦			2,4-D Aim♦[7] Buctril M♦	Conquer[7] Goldwing[7] MCPA amine MCPA ester	MCPA K-salt Pardner♦
Triticale	Infinity				Aim♦[7] Distinct[7] Conquer[7]	Enforcer M♦ Goldwing[7]	Infinity Pardner♦

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 18 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Pre-seed treatment
[8] Refer to entry in guide for any tank-mix requirements
[9] Refer to FMC Precision Pac entry to determine which product options control/ suppress this weed

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Herbicide selector chart – cereals

Crop	Lady's-thumb/annual smartweed			Lamb's-quarter		
Barley	2,4-D Ally♦ Ammo DR Avenza Axial X iPak Barricade II♦ Broadband Buctril M♦ Cirpreme Distinct[7] Embutox♦[,1] Enforcer D Enforcer M♦ Engenia♦ Estaprop♦	Express FX[7] Express Pro♦[,7] Express SG[7] Flurox-24♦ Hotshot Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) Foxxy CRX MPower RX♦ OcTTain XL♦ Pardner♦ Pixxaro[1]	Prestige XC♦ Refine M♦ Refine SG Retain♦ Rezuvant[1] Squadron Stellar♦ Sword♦ Thumper♦ Travallas Trophy♦[,1] Tundra	2,4-D Aim♦[7] Ally♦[,1] Ammo DR Avenza Axial X iPak Barricade II♦ Buctril M♦ Cirpreme Conquer[7] Curtail M♦ Distinct[7] Embutox♦ Enforcer D Enforcer M♦ Estaprop♦ Exhilarate Express FX[7] Express Pro♦[,7] Express SG[7]	Flurox-24♦ Foxxy MR Frontline XL♦ Fortress[1] Goldwing[7] Heat[7] Hotshot Infinity Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA (all forms) Mecoprop Foxxy CRX Battlestar Deathstar MPower RX♦ MPower Extra♦ OcTTain XL♦	Pardner♦ Pixxaro Prestige XC♦ Prominex Pulsar Refine M♦ Refine SG Retain♦ Rezuvant Sentrallas Spectrum♦ Squadron Stellar♦ Sword♦ Thumper♦ Travallas Tropotox Plus♦ Trophy♦ Tundra
Wheat (C - Group 2 tolerant wheat)	2,4-D Ally♦ Ammo DR Avenza Axial X iPak Barricade II♦ Batalium Broadband Buctril M♦ Cirpreme Curtail M♦ Distinct[7] Embutox♦[,1] Erebus Xtreme Everest Enforcer M♦ Engenia♦ Express FX[7] Express Pro♦[,7]	Express SG[7] Flurox-24♦ FMC Precision Pac[9] Frontline XL♦ Frontline 2,4-D♦ Hotshot Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) MP Foxxy CRX MPower RX♦ OcTTain XL♦ Pardner♦ Pixxaro[1] Predicade Prestige XC♦	Refine M♦ Refine SG Retain♦ Rezuvant[1] Signal SFU Simplicity Spectrum♦ Squadron Stellar♦ Tandem Sword♦ Thumper♦ Travallas Tridem Trophy♦[,1] Tundra	2,4-D Aim♦[7] Ally♦[,1] Ammo DR Altitude FX (C) Avenza Axial X iPak Barricade II♦ Batalium Buctril M♦ Cirpreme Conquer[7] Curtail M♦ Denali CM Distinct[7] Embutox♦ Enforcer D Enforcer M♦ Estaprop♦ Exhilarate Express FX[7] Express Pro♦[,7] Express SG[7] Flurox-24♦	FMC Precision Pac[9] Focus[1,2,7] Fortess Foxxy MR Frontline XL♦ Frontline 2,4-D♦ Goldwing[7] Heat[7] Hotshot Inferno Trio♦[2,7] Infinity Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) Mecoprop Foxxy CRX Battlestar Deathstar MPower RX♦ MPower Extra♦ OcTTain XL♦ Pardner♦ Prestige XC♦	Pixxaro Predicade Prominex Pulsar[1] Refine M♦ Refine SG Retain♦ Rexade Rezuvant[1] Sentrallas Signal SFU Spectrum♦ Squadron Stellar♦ Sword♦ Thumper♦ Travallas TraxosTwo Tridem Trophy♦ Tropotox Plus♦ Tundra Varro[1] Velocity m3
Oats	Barricade II[8] Buctril M♦ Curtail M♦ Distinct[7] Embutox♦ Engenia♦ Express SG[7] Frontline XL♦	Hotshot Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) MPower RX♦ Pardner♦	Prestige XC♦ Refine M♦ Refine SG Spectrum♦ Stellar♦ Sword♦	Aim♦[7] Barricade II[8] Buctril M♦ Conquer[7] Curtail M♦ Distinct[7] Embutox♦ Enforcer M♦ Express SG[7]	Frontline XL♦ Goldwing[7] Heat[7] Hotshot Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) MPower RX♦ Pardner♦	Prestige XC♦ Refine M♦ Refine SG Sentrallas Spectrum♦ Stellar♦ Sword♦ Tropotox Plus♦
Fall rye (spring application)	2,4-D Buctril M♦	MCPA[1] (all forms) Pardner♦		2,4-D Aim♦[7] Conquer[7]	Buctril M ♦ Goldwing[7] MCPA (all forms)	Pardner♦ Tropotox Plus♦
Triticale	Distinct[7]	Pardner♦		Aim♦[7] Conquer[7] Distinct[7]	Enforcer M♦ Goldwing[7]	Infinity Pardner♦

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 18 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Pre-seed treatment
[8] Refer to entry in guide for any tank-mix requirements
[9] Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Leafy spurge	Narrow-leaved hawk's-beard		Night-flowering catchfly	Perennial sow thistle	
Barley	2,4-D Flurox-24♦[1] MCPA[1] (all forms) OcTTain XL♦[1]	2,4-D Akito[1] Ally♦ Ammo DR Avenza Barricade II♦ Blackhawk[7] Cipreme Conquer[1,7] Embutox♦ Exhilarate Express FX[7] Express Pro♦[,7] Express SG[7] Foxxy MR Goldwing[7]	Heat[7] Hotshot[1] Infinity Infinity FX Intruvix[7] Foxxy CRX Battlestar[1] Deathstar[1] MPower RX♦[1] MPower Extra♦ Priority♦[,7,1] Refine M♦ Refine SG Retain♦ Travallas Tundra	Barricade II♦ Buctril M♦ Conquer[7] Enforcer D Enforcer M♦ Estaprop♦ Exhilarate[1] Express Pro[7] Goldwing[7] Squadron Sword♦ Thumper♦ Travallas	2,4-D[1] Akito Ally♦[,1] Ammo DR[5] Avenza[1] Axial X iPak[1] Barricade II♦ Broadband[1] Buctril M♦[,1] Cipreme Clever♦[,1] Curtail M♦[,5] D/DX[5] Embutox♦ Enforcer M♦[,1] Engenia♦[,1] Estaprop♦[,5] Exhilarate[1] Flurox-24♦[1] Foxxy MR Frontline♦[,1]	Hotshot[1] Infinity[1] Infinity FX[1] Lontrel♦[,5] MCPA[1] (all forms) Foxxy CRX[1] MBattlestar[1] Deathstar[1] MPower RX♦[1] OcTTain XL♦[1] Paradigm[1] Prestige XC♦[,5] Priority♦[,7,1] Refine M♦[,1] Refine SG[1] Retain♦[,1] Rezuvant[1] Spectrum♦[,1] Sword♦[,5] Tropotox Plus♦[,1] Tundra[1]
Wheat (C - Group 2 tolerant wheat)	2,4-D Flurox-24♦[1] MCPA[1] (all forms) OcTTain XL♦[1]	2,4-D[1] Akito[1] Ally♦ Ammo DR Avenza Barricade II♦ Blackhawk[7] Cirpreme Conquer[1,7] Embutox♦ Express FX[7] Express Pro♦[,7] Express SG[7] FMC Precision Pac[9] Frontline 2,4-D♦ Goldwing[7] Heat[7] Hotshot[1] Inferno Duo♦[2,7]	Inferno Trio♦[1,2,7] Infinity Infinity FX Intruvix[7] Foxxy CRX Battlestar[1] Deathstar[1] MPower RX♦ MPower Extra♦ Predicade Priority♦[,7,1] Refine M♦ Refine SG Retain♦ Signal SFU Travallas Tridem[1] Tundra Velocity m3	Barricade II♦ Batalium Buctril M♦ Conquer[7] Enforcer D Enforcer M♦ Estaprop♦ Exhilarate[1] Express Pro[7] FMC Precision Pac[9] Goldwing[7] Predicade Rexade[1] Squadron Sword♦ Thumper♦ Travallas	Akito Ally[1,]♦ Ammo DR[5] Avenza[1] Axial X iPak[1] Barricade II♦ Broadband[1] Buctril M♦[,1] Cirpreme Clever♦[,1] Curtail M♦[,5] Embutox♦[,1] Enforcer M♦[,1] Engenia♦[,1] Estaprop♦ Exhilarate[1] Flurox-24♦[1] FMC Precision Pac[9] Frontline XL♦[,1] Frontline2,4-D[5] Hotshot[1] Infinity[1] Infinity FX[1]	Lontrel♦[,5] MCPA[1] (all forms) Foxxy CRX[1] Battlestar[1] Deathstar[1] MPower RX♦[1] OcTTain XL♦[1] Paradigm[1] Predicade Prestige XC♦ Priority♦[,7,1] Refine M♦[,1] Refine SG[1] Retain♦[,1] Rezuvant[1] Signal SFU Spectrum♦[,1] Sword♦[,5] Traxos Two[1] Tridem[1] Tropotox Plus♦[,1] Tundra[1] Velocity m3[1]
Oats	MCPA[1] (all forms)	Akito[1] Barricade II[8] Conquer[1,7] Embutox♦ Express SG[7] Goldwing[7] Heat[7]	Hotshot[1] Intruvix[7] MPower RX♦ Priority♦[,7,1] Refine M♦ Refine SG	Barricade II[8] Buctril M♦ Conquer[7] Goldwing[7] Sword♦	Akito Buctril M♦[,1] Curtail M♦[,5] Embutox♦[,1] Engenia♦[,1] Frontline XL♦[,1] Hotshot[1] Lontrel♦[,5] MCPA[1] (all forms)	MPower RX♦[1] Prestige XC♦[,5] Priority♦[,7,1] Refine M♦[,1] Refine SG[1] Spectrum♦[,1] Sword♦[,5] Tropotox Plus♦[,1]
Fall rye (spring application)	2,4-D MCPA[1] (all forms)	2,4-D[1] Conquer[1,7]	Goldwing[7]	Buctril M♦ Conquer[7] Goldwing[7]	Buctril M♦[,1] MCPA[1] (all forms)	Tropotox Plus♦[,1]
Triticale		Conquer[1,7] Infinity	Goldwing[7]	Conquer[7] Goldwing[7]	Infinity[1]	

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 18 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Pre-seed treatment
[8] Refer to entry in guide for any tank-mix requirements
[9] Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Persian darnel	Prostrate pigweed	Quack grass	Ragweed		
Barley	Cirray Express FX[7] Express Pro♦ Express SG Intruvix[7] Liquid Achieve SC♦ Trifluralin♦	2,4-D Aim♦[7] Ally♦ Blackhawk[7] MCPA K-salt Sword♦	glyphosate (pre-harvest)	2,4-D Ammo DR Avenza Axial X iPak Buctril M♦ Cirpreme Distinct[7] Embutox♦ Enforcer M♦ Estaprop♦ Exhilarate Express FX[7]	Express Pro[7] Express SG[7] Flurox-24♦ Foxxy MR Frontline XL♦ Hotshot Infinity Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA (all forms) Battlestar	Deathstar OcTTain XL♦ Pardner♦ Pixxaro Prominex Rezuvant Stellar♦ Sword♦ Thumper♦ Trophy♦ Tropotox Plus♦
Wheat (C - Group 2 tolerant wheat)	Altitude FX (C) Cirray Express FX[7] Express Pro♦ Express SG FMC Precision Pac[9] Horizon♦ Intruvix[7] Liquid Achieve SC♦ Predicade[1] Traxos Traxos Two Varro[1] Velocity m3[1]	2,4-D Aim♦[7] Ally♦ Blackhawk[7] MCPA K-salt Sword♦	glyphosate (pre-harvest)	2,4-D Ammo DR Avenza Axial X iPak Basagran♦[2] Batalium Buctril M♦ Cirpreme Denali CM Distinct[7] Embutox♦ Enforcer M♦ Estaprop♦ Exhilarate	Express FX[7] Express Pro[7] Express SG[7] Flurox-24♦ Foxxy MR Frontline XL♦ Frontline 2,4-D♦ Hotshot Infinity Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA (all forms) Battlestar	Deathstar OcTTain XL♦ Pardner♦ Pixxaro Prominex Rexade Rezuvant Stellar♦ Sword♦ Thumper♦ Traxos Two Trophy♦ Tropotox Plus♦
Oats	Express SG[7] Intruvix[7]	Aim♦[7] MCPA K-salt Sword♦	glyphosate (pre-harvest)	Buctril M♦ Distinct[7] Embutox♦ Express SG[7]	Frontline XL♦ Hotshot Intruvix[7] Lorox + MCPA♦ MCPA (all forms)	Pardner♦ Stellar♦ Sword♦ Tropotox Plus♦
Fall rye (spring application)	Liquid Achieve SC♦	2,4-D Aim♦[7] MCPA K-salt		2,4-D Buctril M♦	MCPA (all forms) Pardner♦	Tropotox Plus♦
Triticale	Liquid Achieve SC♦	Aim♦[7]		Distinct[7]	Infinity	Pardner♦

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 18 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Pre-seed treatment
[8] Refer to entry in guide for any tank-mix requirements
[9] Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Redroot pigweed			Round-leaved mallow		Russian pigweed
Barley	2,4-D Aim♦[7] Ally♦ Ammo DR Avenza Axial X iPak Barricade II♦ Blackhawk[7] Broadband[1] Buctril M♦ Cirpreme Conquer[7] Curtail M♦ Distinct[7] Draft CT Embutox♦ Enforcer D Enforcer M♦ Estaprop♦ Exhilarate Express FX[7]	Express Pro♦,[7] Express SG[7] Flurox-24♦ Fortress[1] Foxxy MR Frontline XL♦ Goldwing[7] Heat[7] Hotshot[1] Infinity Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) Foxxy CRX Battlestar Deathstar MPower RX♦ MPower Extra♦ OcTTain XL♦ Paradigm	Pardner♦ Pixxaro Prestige XC♦ Priority♦,[7,1] Prominex Pulsar[1] Refine M♦ Refine SG Retain♦ Rezuvant Sentrallas Spectrum♦ Squadron Stellar♦ Sword♦ Thumper♦ Travallas Trophy♦ Tropotox Plus♦ Tundra	Aim♦[7] Ammo DR[1] Axial X iPak Barricade II♦ Cirpreme Draft CT[1] Enforcer D Estaprop♦ Exhilarate Flurox-24♦ Foxxy MR[1] Goldwing[7]	Heat[7] Infinity[1] Infinity FX[1] MP Foxxy CRX MPower RX♦[1] OcTTain XL♦ Prestige XC♦ Prominex Refine M♦,[1] Refine SG[1] Retain♦,[1] Rezuvant	Ammo DR 2,4-D Blackhawk[7] Curtail M♦ Estaprop♦ Express Pro♦[7] Frontline XL♦ Hotshot MCPA (all forms) Battlestar Deathstar MPower Extra♦ Prestige XC♦ Stellar♦
Wheat (C - Group 2 tolerant wheat)	2,4-D Aim♦[7] Ally♦ Altitude FX (C) Ammo DR Avenza Axial X iPak Barricade II♦ Batalium Blackhawk[7] Broadband[1] Buctril M♦ Cirpreme Conquer[7] Curtail M♦ Denali CM Distinct[7] Draft CT Embutox♦ Enforcer D Enforcer M♦ Erebus Xtreme Estaprop♦ Everest GBX Express FX[7] Exhilarate	Express SG[7] Flurox-24♦ FMC Precision Pac[9] Focus[2,7] Foxxy MR Frontline XL♦ Frontline 2,4-D♦ Goldwing[7] Heat[7] Hotshot[1] Inferno Trio♦[2,7] Infinity Infinity FX Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) Foxxy CRX Battlestar Deathstar MPower RX♦ MPower Extra♦ OcTTain XL♦ Paradigm Pixxaro Predicade Prestige XC♦	Priority♦,[7,1] Prominex Pulsar[1] Refine M♦ Refine SG Retain♦ Rexade Rezuvant Sentrallas Signal SFU Simplicity Spectrum♦ Squadron Stellar♦ Tandem Sword♦ Thumper♦ Travallas Traxos Two[1] Tridem[1] Trophy♦ Tropotox Plus♦ Tundra Varro Velocity m3	Aim♦[7] Altitude FX[1](C) Ammo DR[1] Axial X iPak Barricade II♦ Cirpreme Draft CT[1] Enforcer D Erebus Xtreme Estaprop♦ Exhilarate Flurox-24♦ Foxxy MR[1] FMC Precision Pac[9] Goldwing[7] Heat[7]	Infinity[1] Infinity FX[1] MP Foxxy CRX MPower RX♦[1] OcTTain XL♦ Predicade Prestige XC♦ Prominex Refine M♦,[1] Refine SG[1] Retain♦,[1] Rexade Rezuvant Traxos Two Varro[1]	2,4-D Ammo DR Blackhawk[7] Curtail M♦ Erebus Xtreme[1] Estaprop♦ Express Pro♦,[7] Frontline XL♦ Hotshot MCPA (all forms) Battlestar Deathstar MPower Extra♦ Prestige XC♦ Simplicity[1] Stellar♦ Velocity m3
Oats	Aim♦[7] Barricade II[8] Buctril M♦ Conquer[7] Curtail M♦ Distinct[7] Embutox♦ Enforcer M♦ Express SG[7]	Frontline XL♦ Goldwing[7] Heat[7] Hotshot[1] Intruvix[7] Lorox + MCPA♦ MCPA[1] (all forms) MPower RX♦ Prestige XC♦	Priority♦,[7,1] Refine M♦ Refine SG Sentrallas Spectrum♦ Stellar♦ Sword♦ Tropotox Plus♦	Aim♦[7] Barricade II[8] Goldwing[7] Heat[7] MPower RX♦[1] Prestige XC♦ Refine M♦,[1] Refine SG[1]		Curtail M♦ Frontline XL♦ Hotshot MCPA (all forms) Stellar♦
Fall rye (spring application)	2,4-D Aim♦[7] Buctril M♦	Conquer[7] Goldwing[7]	MCPA[1] (all forms) Tropotox Plus♦	Aim♦[7] Goldwing[7]		2,4-D MCPA (all forms)
Triticale	Aim♦[7] Conquer[7]	Distinct[7] Enforcer M♦	Goldwing[7] Infinity	Aim♦[7] Goldwing[7] Infinity[1]		

♦ Other similar products can be found listed under this product.
1 Suppression only
2 All spring wheat except durum
3 All spring wheats (including durum when tank mixed with 2,4-D ester)
4 See page 18 for resistance information
5 Top growth control
6 Spring rosettes only
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Herbicide selector chart – cereals

Crop	Russian thistle[4]		Scentless chamomile	Shepherd's-purse		
Barley	2,4-D Aim♦[7] Ally♦[,1] Ammo DR Avenza Axial X iPak Barricade II♦ Blackhawk[7] Buctril M♦ Draft CT Enforcer D Enforcer M♦ Estaprop♦ Express FX[7] Express Pro♦[,7] Express SG[7] Flurox-24♦ Fortress[1] Hotshot	Infinity Infinity FX Intruvix[7] MP Foxxy CRX MPower Extra♦ MPower RX♦ OcTTain XL♦ Pardner♦ Pulsar Refine M♦ Refine SG Retain♦ Sentrallas Squadron Sword♦ Thumper♦ Travallas Trifluralin♦ Tundra	Akito Ally♦ Ammo DR[1] Buctril M♦ Curtail M♦ Draft CT Enforcer M♦ Express FX[7] Express Pro[7] Express SG[1,7] Foxxy MR[1] Intruvix[1,7] Lontrel♦ MP Foxxy CRX[1] MPower RX♦[1] Prestige XC♦ Refine M♦[,1] Refine SG[1] Retain♦[,1]	2,4-D Aim♦[7] Akito Ally♦ Ammo DR Avenza Axial X iPak Barricade II♦ Blackhawk[7] Broadband Buctril M♦ Cirpreme Curtail M♦ Draft CT Embutox♦ Enforcer D Enforcer M♦ Exhilarate	Estaprop♦ Express Pro♦[,7] Flurox-24♦ Foxxy MR Frontline XL♦ Hotshot Infinity Infinity FX Lorox + MCPA♦ MCPA (all forms) Foxxy CRX Battlestar Deathstar MPower RX♦ MPower Extra♦ OcTTain XL♦ Paradigm Pixxaro	Prestige XC♦ Priority♦[,7] Prominex Refine M♦ Refine SG Retain♦ Rezuvant Spectrum♦ Stellar♦ Sword♦ Thumper♦ Travallas Trophy♦ Tropotox Plus♦ Tundra
Wheat (C - Group 2 tolerant wheat)	2,4-D Aim♦[7] Ally♦[,1] Altitude FX[1](C) Ammo DR Avenza Axial X iPak Barricade II♦ Batalium Blackhawk[7] Buctril M♦ Draft CT Enforcer D Enforcer M♦ Estaprop♦ Express FX[7] Express Pro♦[,7] Express SG[7] Flurox-24♦ FMC Precision Pac[9] Fortress[1] Frontline 2,4-D♦ Hotshot Inferno Trio♦[2,7]	Infinity Infinity FX Intruvix[7] Foxxy CRX MPower Extra♦ MPower RX♦ OcTTain XL♦ Pardner♦ Pulsar Predicade Refine M♦ Refine SG Retain♦ Rexade Sentrallas Signal SFU Squadron Sword♦ Thumper♦ Travallas Tundra Varro[1] Velocity m3	Akito Ally♦ Ammo DR[1] Batalium Buctril M♦ Curtail M♦ Draft CT[1] Enforcer M♦ Express FX[7] Express Pro[7] Express SG[1,7] FMC Precision Pac[9] Foxxy MR[1] Intruvix[1,7] Lontrel♦ Foxxy CRX[1] MPower RX♦[1] Predicade Prestige XC♦ Refine M♦[,1] Refine SG[1] Retain♦[,1] Signal SFU[1]	2,4-D Akito Aim♦[7] Ally♦ Altitude FX (C) Ammo DR Avenza Axial X iPak Barricade II♦ Batalium Blackhawk[7] Broadband Buctril M♦ Cirpreme Curtail M♦ Denali CM Draft CT Embutox♦ Enforcer D Enforcer M♦ Erebus Xtreme Estaprop♦ Everest♦[,1] Exhilarate	Express Pro♦[,7] Flurox-24♦ FMC Precision Pac[9] Foxxy MR Frontline XL♦ Frontline 2,4-D♦ Hotshot Inferno Duo♦[2,7] Inferno Trio♦[2,7] Infinity Infinity FX Lorox + MCPA♦ MCPA (all forms) MP Foxxy CRX Battlestar Deathstar MPower Extra♦ OcTTain XL♦ Paradigm Pixxaro Predicade Prestige XC♦	Priority♦[,7] Prominex Refine M♦ Refine SG Retain♦ Rexade Rezuvant Signal SFU Simplicity Spectrum♦ Squadron Stellar♦ Sword♦ Thumper♦ Travallas Traxos Two Tridem Trophy♦ Tropotox Plus♦ Tundra Varro Velocity m3
Oats	Aim♦[7] Barricade II[8] Buctril M♦ Express SG[7] Hotshot Intruvix[7]	Pardner♦ MPower RX♦ Refine M♦ Refine SG Sentrallas Sword♦	Akito Buctril M♦ Curtail M♦ Express SG[1,7] Intruvix[1,7] Lontrel♦ Prestige XC♦ Refine M♦[,1] Refine SG[1]	Aim♦[7] Akito Barricade II[8] Buctril M♦ Curtail M♦ Deploy♦ Embutox♦	Frontline XL♦ Hotshot Intruvix[1] Lorox + MCPA♦ MCPA (all forms) MPower RX♦ Prestige XC♦	Priority♦[,7] Refine M♦ Refine SG Spectrum♦ Stellar♦ Sword♦ Tropotox Plus♦
Fall rye (spring application)	2,4-D Aim♦[7]	Buctril M♦ Pardner♦	Buctril M♦	2,4-D Aim♦[7] Buctril M♦	MCPA (all forms) Tropotox Plus♦	
Triticale	Aim♦[7] Infinity	Pardner♦		Aim♦[7] Infinity		

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 18 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Pre-seed treatment
[8] Refer to entry in guide for any tank-mix requirements
[9] Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Stinkweed				Stork's-bill	
Barley	2,4-D Aim♦[7] Ally♦ Ammo DR Avenza Axial X iPak Barricade II♦ Blackhawk[7] Broadband Buctril M♦ Cirpreme Conquer[1,7] Curtail M♦ Embutox♦ Enforcer D	Enforcer M♦ Estaprop♦ Exhilarate Express FX[7] Express Pro♦[,7] Express SG[7] Flurox-24♦ Foxxy MR Frontline XL♦ Goldwing[7] Heat[7] Hotshot Infinity Infinity FX Intruvix[7]	Lorox + MCPA♦ MCPA (all forms) Foxxy CRX Battlestar Deathstar MPower RX♦ MPower Extra♦ OcTTain XL♦ Paradigm Pardner♦ Pixxaro Prestige XC♦ Priority♦[,7] Refine M♦	Refine SG Retain♦ Rezuvant Sentrallas Spectrum♦ Squadron Stellar♦ Sword♦ Thumper♦ Travallas Trophy♦ Tropotox Plus♦ Tundra	Ally♦ Ammo DR Avenza Axial Xtreme[1] Barricade II♦ Cirpreme Draft CT[1] Enforcer D Enforcer M♦[,1] Estaprop♦ Exhilarate Flurox-24♦ Foxxy MR[1] FrontlineXL[1] Infinity FX Lorox + MCPA♦ Momentum[1]	Foxxy CRX[1] Battlestar[1] Deathstar[1] MPower RX♦[1] OcTTain XL♦ Prestige XC♦ Prominex Pulsar[1] Refine M♦[,1] Refine SG[1] Retain♦[,1] Rezuvant Spectrum♦ Stellar♦[,1] Travallas Trophy♦[,1]
Wheat (C - Group 2 tolerant wheat)	2,4-D Aim♦[7] Ally♦ Altitude FX (C) Ammo DR Avenza Axial X iPak Barricade II♦ Batalium Blackhawk[7] Broadband Buctril M♦ Cirpreme Conquer[1,7] Curtail M♦ Denali CM Embutox♦ Enforcer D Enforcer M♦	Erebus Xtreme Estaprop♦ Everest♦ Exhilarate Express FX[7] Express Pro♦[,7] Express SG[7] Flurox-24♦ FMC Precision Pac[9] Focus[1,2,7] Foxxy MR Frontline XL♦ Frontline 2,4-D♦ Goldwing[7] Heat[7] Hotshot Inferno Trio♦[2,7] Infinity Infinity FX	Intruvix[7] Lorox + MCPA♦ MCPA (all forms) Foxxy CRX Battlestar Deathstar MPower RX♦ MPower Extra♦ OcTTain XL♦ Paradigm Pardner♦ Pixxaro Predicade Prestige XC♦ Priority♦[,7] Refine M♦ Refine SG Retain♦	Rexade Rezuvant Sentrallas Spectrum♦ Signal SFU Squadron Stellar♦ Sword♦ Thumper♦ Travallas Traxos Two Tridem Trophy♦ Tropotox Plus♦ Tundra Varro Velocity m3	Ally♦ Altitude FX[1] (C) Ammo DR Avenza Axial Xtreme[1] Barricade II♦ Cipreme Denali CM[1] Draft CT[1] Enforcer D Enforcer M♦[,1] Erebus Xtreme[1] Estaprop♦ Exhilarate Flurox-24♦ FMC Precision Pac[9] Foxxy MR[1] Frontline XL♦[,1] Infinity FX Lorox + MCPA♦ Momentum[1]	Foxxy CRX[1] Battlestar[1] Deathstar[1] MPower RX♦[1] OcTTain XL♦ Predicade Prestige XC♦ Prominex Pulsar[1] Refine M♦[,1] Refine SG[1] Retain♦[,1] Rezuvant Signal SFU[1] Spectrum♦ Stellar♦[,1] Tandem[1] Travallas TraxosTwo Trophy♦[,1]
Oats	Aim♦[7] Barricade II[8] Buctril M♦ Conquer[1,7] Curtail M♦ Embutox♦ Express SG[7]	Frontline XL♦ Goldwing[7] Heat[7] Hotshot Intruvix[7] Lorox + MCPA♦ MCPA (all forms)	MPower RX♦ Pardner♦ Prestige XC♦ Priority♦[,7] Refine M♦ Refine SG	Sentrallas Spectrum♦ Stellar♦ Sword♦ Tropotox Plus♦	Barricade II[8] Frontline XL♦[,1] Lorox + MCPA♦ MPower RX♦[1] Prestige XC♦	Refine M♦[,1] Refine SG[1] Spectrum♦ Stellar♦[,1]
Fall rye (spring application)	2,4-D Aim♦[7]	Buctril M♦ Conquer[1,7]	Goldwing[7] MCPA (all forms)	Pardner♦ Tropotox Plus♦		
Triticale	Aim♦[7] Conquer[1,7]	Goldwing[7]	Infinity	Pardner♦		

♦ Other similar products can be found listed under this product.
1 Suppression only
2 All spring wheat except durum
3 All spring wheats (including durum when tank mixed with 2,4-D ester)
4 See page 18 for resistance information
5 Top growth control
6 Spring rosettes only
7 Pre-seed treatment
8 Refer to entry in guide for any tank-mix requirements
9 Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Tall buttercup	Tartary buckwheat			Toadflax
Barley	MCPA amine MCPA Na-salt Tropotox Plus♦,5	Ally♦ Ammo DR Buctril M♦ Curtail M♦ Draft CT Enforcer M♦ Engenia♦ Estaprop♦ Flurox-24♦1	Hotshot Lorox + MCPA♦ MCPA1 (all forms) Foxxy CRX MPower RX♦ OcTTain XL♦ Pardner♦	Prestige XC♦ Refine M♦ Refine SG Sword♦ Thumper♦	Ally♦,1 Ammo DR1 Draft CT1 Estaprop♦,1 Foxxy MR1 MPower RX♦1 Refine M♦,1 Refine SG1 Retain♦,1
Wheat (C - Group 2 tolerant wheat)	MCPA amine MCPA Na-salt Tropotox Plus♦,5	Ally♦ Ammo DR Batalium Buctril M♦ Curtail M♦ Draft CT Enforcer M♦ Engenia♦ Estaprop♦	Flurox-24♦1 Frontline 2,4-D♦ Hotshot Lorox + MCPA♦ MCPA1 (all forms) Foxxy CRX MPower RX♦ OcTTain XL♦ Pardner♦	Prestige XC♦ Refine M♦ Refine SG Signal SFU Squadron Sword♦ Thumper♦	Ally♦,1 Ammo DR1 Draft CT1 Estaprop♦,1 Foxxy MR1 MPower RX♦ Refine M♦,1 Refine SG1 Retain♦,1
Oats	MCPA amine MCPA Na-salt Tropotox Plus♦,5	Buctril M♦ Curtail M♦ Engenia♦ Hotshot	Lorox + MCPA♦ MCPA1 (all forms) MPower RX♦ Pardner♦	Prestige XC♦ Refine M♦ Refine SG Sword♦	MPower RX♦1 Refine M♦,1 Refine SG1
Fall rye (spring application)	MCPA amine MCPA Na-salt Tropotox Plus♦,5	Buctril M♦ MCPA1 (all forms) Pardner♦			
Triticale		Pardner♦			

♦ Other similar products can be found listed under this product.
1 Suppression only
2 All spring wheat except durum
3 All spring wheats (including durum when tank mixed with 2,4-D ester)
4 See page 18 for resistance information
5 Top growth control
6 Spring rosettes only
7 Pre-seed treatment
8 Refer to entry in guide for any tank-mix requirements
9 Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – cereals

Crop	Volunteer canola, wild mustard, other mustards			Wild buckwheat		
Barley	2,4-D Akito Aim♦[7] Ally♦ Altitude FX (C) Ammo DR Avenza Axial X iPak Barricade II♦ Blackhawk[7] Broadband Buctril M♦ Cirpreme Conquer[1,7] Curtail M♦ Distinct[7] Draft CT Enforcer D Enforcer M♦	Estaprop♦ Exhilarate Express FX[7] Express SG[7] Express Pro♦[,7] Flurox-24♦ Foxxy MR Frontline XL♦ Goldwing[1,7] Heat[7] Hotshot Infinity Infinity FX Intruvix[7] OcTTain XL♦ Foxxy CRX Battlestar Deathstar MPower RX♦	Paradigm (not Group 2 tolerant canola) Prestige XC♦ Priority♦[,7] Refine SG Retain♦ Rezuvant Spectrum♦ Squadron Stellar♦ Sword♦ Thumper♦ Travallas Trophy♦ Tropotox Plus♦ Tundra	2,4-D[1] Akito Ally♦[,1] Ammo DR Avenza Axial X iPak Axial Xtreme Barricade II♦ Broadband Buctril M♦ Cirpreme Conquer[1,7] Curtail M♦ Distinct[7] Draft CT Embutox♦ Enforcer D Enforcer M♦ Engenia♦ Estaprop♦ Exhilarate	Express FX[7] Express SG[7] Express Pro♦[,7] Flurox-24♦ Foxxy MR Fortress[1] Frontline XL♦ Goldwing[7] Heat[7] Hotshot Infinity Infinity FX Intruvix[7] Lontrel♦ Lorox + MCPA♦ MCPA[1] (all forms) Momentum Foxxy CRX Battlestar Deathstar MPower RX♦	MPower Extra♦[,1] OcTTain XL♦ Paradigm Pardner♦ Prestige XC♦ Priority♦[,7] Prominex Pulsar Refine M♦ Refine SG Retain♦ Rezuvant Sentrallas Spectrum♦ Stellar♦ Sword♦ Thumper♦ Travallas Trophy♦[,1] Tundra
Wheat (C - Group 2 tolerant wheat)	2,4-D Aim♦[7] Akito Ally♦ Altitude FX (C) Ammo DR Avenza Axial X iPak Barricade II♦ Batalium Blackhawk[7] Buctril M♦ Cirpreme Conquer[1,7] Curtail M♦ Denali Distinct[7] Draft CT Estaprop♦ Enforcer D Enforcer M♦ Erebus Xtreme Everest♦[,7] Exhilarate Express FX[7]	Express Pro♦[,7] Express SG[7] FMC Precision Pac[9] Flurox-24♦ Foxxy MR Frontline XL♦ Frontline 2,4-D♦ Goldwing[7,1] Heat[7] Hotshot Infinity Infinity FX Inferno Duo♦[2,7] (vol .canola) Inferno Trio♦[2,7] Intruvix[7] Luxxur MP Foxxy CRX Battlestar Deathstar MPower RX♦ Paradigm (not Group 2 tolerant canola)	Predicade Prestige XC♦ Priority♦[,7] Refine M♦ Refine SG Retain♦ Rexade Rezuvant Signal SFU Simplicity[7] Spectrum♦ Squadron Stellar♦ Tandem (C) Sword♦ Thumper♦ Travallas Traxos Two Tridem Triton K Trophy♦ Tropotox Plus♦ Tundra Varro Velocity m3	2,4-D[1] Akito Ally♦[,1] Altitude FX (C) Ammo Avenza Axial X iPak Axial Xtreme Barricade II♦ Batalium Broadband Buctril M♦ Cirpreme Conquer[1,7] Curtail M♦ Distinct[7] Draft CT Embutox♦ Enforcer D Enforcer M♦ Engenia♦ Erebus Xtreme Estaprop♦ Exhilarate Express FX[7] Express SG[7] Express Pro♦[,7]	Flurox-24♦ Fluroxypyr 180 EC FMC Precision Pac[9] Focus[1,2,7] Fortress[1] Foxxy MR Frontline XL♦ Frontline 2,4-D♦ Goldwing[7] Hotshot Heat[7] Inferno Trio♦[2,7] Infinity Infinity FX Intruvix[7] Lontrel♦ Lorox + MCPA♦ Luxxur MCPA[1] (all forms) Momentum MP Foxxy CRX Battlestar Deathstar MPower RX♦ MPower Extra♦[,1] Pardner♦	Paradigm Predicade Prestige XC♦ Priority♦[,7] Prominex Pulsar Refine M♦ Refine SG Retain♦ Rezuvant Sentrallas Signal SFU Simplicity[1] Spectrum♦ Stellar♦ Tandem[1] Sword♦ Thumper♦ Travallas TraxosTwo Tridem Triton K[1] Trophy♦[,1] Tundra Varro Velocity m3
Oats	Aim♦[7] Akito Barricade II[8] Buctril M♦ Conquer[1,7] Curtail M♦ Distinct[7] Enforcer M♦	Express SG[7] Frontline XL♦ Goldwing[7,1] Heat[7] Hotshot Intruvix[7] MPower RX♦ Prestige XC♦	Priority♦[,7] Refine M♦ Refine SG Spectrum♦ Stellar♦ Sword♦ Tropotox Plus♦	2,4-DB Akito Barricade II[8] Buctril M♦ Conquer[1,7] Curtail M♦ Distinct[7] Embutox♦ Enforcer M♦ Engenia♦	Express SG[7] Frontline XL♦ Goldwing[7] Heat[7] Hotshot Intruvix[7] Lontrel♦ Lorox + MCPA♦ MCPA[1] (all forms) MPower RX♦	Pardner♦ Prestige XC♦ Priority♦[,7] Refine M♦ Refine SG Sentrallas Spectrum♦ Stellar♦ Sword♦
Fall rye (spring application)	2,4-D Aim♦[7]	Buctril M♦ Conquer[1,7]	Goldwing[7,1] Tropotox Plus♦	2,4-D[1] Buctril M♦	Conquer[1,7] Goldwing[7]	Pardner♦ MCPA[1] (all forms)
Triticale	Aim♦[7] Conquer[1,7]	Distinct[7] Enforcer M♦	Goldwing[7,1] Infinity	Conquer[1,7] Distinct[7]	Enforcer M♦ Goldwing[7]	Infinity Pardner♦

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] All spring wheat except durum
[3] All spring wheats (including durum when tank mixed with 2,4-D ester)
[4] See page 18 for resistance information
[5] Top growth control
[6] Spring rosettes only
[7] Pre-seed treatment
[8] Refer to entry in guide for any tank-mix requirements
[9] Refer to FMC Precision Pac entry to determine which product options

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Herbicide selector chart – cereals

control/suppress this weed

Crop	Wild oats[4]		Wild radish		
Barley	Avadex BW Avenza Axial♦ Axial X iPak Axial Xtreme Broadband Cirray Express FX[7] Express Pro[7]	Express SG[7] Fortress Intruvix[7] Liquid Achieve SC♦ Puma♦ Rezuvant Trifluralin♦,[1] Tundra	2,4-D Ammo DR Avenza Express Pro♦,[7] Express SG[7] Flurox-24♦ Foxxy MR MCPA (all forms)	MPower Extra♦ Battlestar Deathstar OcTTain XL♦ Pixxaro	Rezuvant Stellar♦ Trophy♦ Tropotox Plus♦
Wheat (C - Group 2 tolerant wheat)	Altitude FX (C) Avadex BW Avenza Axial♦ Axial X iPak Axial Xtreme Batalium Broadband Cirray Denali CM Erebus Xtreme Everest♦ Express FX[7] Express Pro[7] Express SG[7] Focus[1,2,7] Fortress	FMC Precision Pac[9] Horizon♦ Inferno Duo♦[1,2,7] Inferno Trio♦[2,7] Intruvix[7] Liquid Achieve SC♦ Predicade Puma♦ Rezuvant Signal SFU Tandem Traxos Traxos Two Tridem Tundra Varro Velocity m3	2,4-D Altitude FX (C) Ammo DR Avenza Denali CM Express Pro♦,[7] Express SG[7]	Flurox-24♦ Foxxy MR Frontline 2,4-D♦ MCPA (all forms) MPower Extra♦ Battlestar Deathstar	Pixxaro Rexade Rezuvant Stellar♦ Traxos Two Trophy♦ Tropotox Plus♦
Oats	Express SG[7]	Intruvix[7]	MCPA (all forms)	Stellar♦	Tropotox Plus♦
Fall rye (spring application)	Liquid Achieve SC♦		2,4-D	MCPA (all forms)	Tropotox Plus♦,[1]
Triticale	Liquid Achieve SC♦				

♦ Other similar products can be found listed under this product.
1 Suppression only
2 All spring wheat except durum
3 All spring wheats (including durum when tank mixed with 2,4-D ester)
4 See page 18 for resistance information
5 Top growth control
6 Spring rosettes only
7 Pre-seed treatment
8 Refer to entry in guide for any tank-mix requirements
9 Refer to FMC Precision Pac entry to determine which product options control/suppress this weed

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Herbicide selector chart – oilseeds

Crop	Annual smartweed/ lady's-thumb	Annual sow thistle	Barnyard grass		Bluebur	Canada thistle
Canola	Edge[1] Muster	Clever♦,[1] Conquer[1,7]	Assure II♦ Clever♦ Edge	Poast Ultra Select♦ Trifluralin♦		Lontrel♦
Group 2 tolerant canola	Ares Edge[1] Odyssey♦ Odyssey Ultra	Clever♦,[1] Conquer[1,7]	Ares Assure II♦ Clever♦ Edge Odyssey♦	Odyssey Ultra Solo♦		Lontrel♦
Liberty link canola	Edge[1] Liberty♦	Clever♦,[1] Conquer[1,7] Liberty♦	Assure II♦ Clever♦ Edge	Liberty♦ Select		Liberty♦ Lontrel♦
Roundup ready canola	Eclipse III Edge[1] glyphosate♦	Clever♦,[1] Conquer[1,7] Eclipse III glyphosate♦	Assure II♦ Clever♦ Eclipse III	Edge glyphosate♦		Eclipse III glyphosate♦ Lontrel♦
Flax	Basagran♦ Buctril M♦ MCPA (all forms) Pardner♦	Curtail M♦ MCPA (all forms)	Assure II♦ Eptam Poast Ultra	Select♦ Trifluralin♦	Buctril M♦ MCPA (all forms) Pardner♦	Basagran♦,[1] Buctril M♦,[1] Curtail M♦ Lontrel♦ MCPA[1] (all forms)
Mustard	Ares (C) Edge[1] (yellow only) Muster (brown and oriental only)		Ares (C) Assure II♦ Clever♦ (brown and oriental only) Edge (yellow only)	Poast Ultra Select♦ Trifluralin♦		
Sunflowers	Edge[1]		Assure II Edge Eptam Poast Ultra	Select♦ Solo♦ (C) Trifluralin♦		

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] See page 18 for resistance information
[5] Spring seedlings
[6] Spring rosettes only
[7] Pre-seed treatment
(C) Group 2 tolerant sunflowers only

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Herbicide selector chart – oilseeds

Crop	Cleavers	Common chickweed	Common groundsel	Corn spurry	Cow cockle	Dandelion
Canola	Aim[7] Clever♦ Conquer[7] Command[7] Command Charge[7] Edge[1] Prospect[7]	Edge Trifluralin♦	Lontrel♦	Aim[7] Edge	Conquer[1,7] Edge Trifluralin♦	Conquer[1,7] Prospect[1,7]
Group 2 tolerant canola	Aim[7] Ares Clever♦ Command[7] Command Charge[7] Conquer[7] Edge[1] Odyssey♦ Odyssey Ultra Prospect[7] Solo♦[,1]	Edge Odyssey♦ Odyssey Ultra	Lontrel♦	Aim[7] Edge	Ares Conquer[1,7] Solo♦	Conquer[1,7] Prospect[1,7]
Liberty Link canola	Aim[7] Clever♦ Command[7] Command Charge[7] Conquer[7] Edge[1] Liberty♦ Prospect[7]	Edge[1] Liberty♦	Lontrel♦	Aim[7] Edge	Conquer[1,7] Liberty♦	Conquer[1,7] Liberty♦ Prospect[1,7]
Roundup Ready canola	Aim[7] Clever♦ Command[7] Command Charge[7] Conquer[7] Eclipse III Edge[1] glyphosate♦ Prospect[7]	Eclipse III Edge glyphosate♦		Aim[7] Eclipse III Edge glyphosate♦	Conquer[1,7] Eclipse III glyphosate♦	Conquer[1,7] Eclipse III glyphosate♦ Prospect[1,7]
Flax	Aim[7] Authority[1] Basagran♦	Basagran♦ Eptam MCPA amine MCPA Na-salt Trifluralin♦	Basagran♦ Buctril M♦ Curtail M♦ Lontrel♦ MCPA amine Pardner♦	Aim[7] Basagran♦ Eptam	Buctril M♦ Pardner♦ Trifluralin♦	Curtail M♦ MCPA[1] (all forms)
Mustard	Aim[7] Ares (C) Authority[7,1] Clever♦ (brown and oriental only) Edge[1] (yellow only)	Edge (yellow only) Trifluralin♦		Aim[7] Edge (yellow only)	Ares (C) Edge (yellow only) Trifluralin♦	
Sunflowers	Aim[7] Authority[1] Edge[1] Solo (C)♦[,1]	Edge Eptam Trifluralin♦	Authority[7]	Aim[7] Edge Eptam	Edge Solo (C)♦ Trifluralin♦	

♦ Other similar products can be found listed under this product.
1 Suppression only
2 Pre-crop emergence to weed seedlings
3 Used as a crop desiccant
4 See page 18 for resistance information
5 Spring seedlings
6 Spring rosettes only
7 Pre-seed treatment
(C) Group 2 tolerant sunflowers only

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Herbicide selector chart – oilseeds

Crop	Field bindweed	Field horsetail	Flixweed	Green foxtail[4]		Hemp-nettle
Canola	Command Charge[7]		Aim[7] Conquer[1,7] Command Charge[7] Muster[5] Prospect[7]	Assure II♦ Clever♦ Edge Fortress	Poast Ultra Select♦ Trifluralin♦	Edge[1] Muster Prospect[7]
Group 2 tolerant canola	Command Charge[7]		Aim[7] Conquer[1,7] Command Charge[7] Odyssey♦ Odyssey Ultra Prospect[7]	Ares Assure II♦ Clever♦ Odyssey♦	Odyssey Ultra Solo♦	Ares Odyssey♦ Odyssey Ultra Prospect[7]
Liberty Link canola	Command Charge[7]		Aim[7] Command Charge[7] Conquer[1,7] Liberty♦ Prospect[7]	Assure II♦ Clever♦	Liberty♦ Select	Liberty♦ Prospect[7]
Roundup Ready canola	Command Charge[7] Eclipse III glyphosate♦		Aim[7] Command Charge[7] Conquer[1,7] Eclipse III glyphosate♦ Prospect[7]	Assure II♦ Clever♦	Eclipse III glyphosate♦	Eclipse III glyphosate♦ Prospect[7]
Flax	Basagran♦,[1] MCPA[1] (all forms)	MCPA ester MCPA K-salt[1]	Aim[7] Buctril M♦ Curtail M♦ MCPA (all forms)	Assure II♦ Eptam Fortress	Poast Ultra Select♦ Trifluralin♦	MCPA (all forms)
Mustard			Aim[7] Muster[5] (brown and oriental only)	Assure II♦ Clever♦ (brown and oriental only) Edge (yellow only)	Fortress Poast Ultra Select♦ Trifluralin♦	Edge[1] (yellow only) Muster (brown and oriental only)
Sunflowers			Aim[7]	Assure II Edge Eptam Poast Ultra	Select♦ Solo (C)♦ Trifluralin♦	Edge[1]

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] See page 18 for resistance information
[5] Spring seedlings
[6] Spring rosettes only
[7] Pre-seed treatment
(C) Group 2 tolerant sunflowers only

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Herbicide selector chart – oilseeds

Crop	Knotweed	Kochia	Lady's-thumb/ annual smartweed	Lamb's-quarter	Narrow-leaved hawk's-beard
Canola	Trifluralin♦	Aim[7] Command Charge[7] Conquer[7] Edge Fortress[1] Tough 600	Edge[1]	Aim[7] Command Charge[7] Edge Fortress[1] Prospect[7] Tough 600 Trifluralin♦	Conquer[1,7]
Group 2 tolerant canola		Aim[7] Command Charge[7] Conquer[7] Odyssey♦[,1] Odyssey Ultra Solo♦[,1]	Odyssey♦ Odyssey Ultra	Aim[7] Ares Command Charge[7] Odyssey♦[,1] Odyssey Ultra Prospect[7] Solo♦	Conquer[1,7]
Liberty Link canola		Aim[7] Command Charge[7] Conquer[7]	Liberty♦	Aim[7] Command Charge[7] Liberty♦ Prospect[7]	Conquer[1,7]
Roundup Ready canola	Eclipse III glyphosate♦	Aim[7] Command Charge[7] Conquer[7] Eclipse III glyphosate♦		Aim[7] Command Charge[7] Eclipse III glyphosate♦ Prospect[7]	Conquer[1,7] Eclipse III glyphosate♦
Flax	MCPA amine Trifluralin♦	Aim[7] Authority Buctril M♦ Curtail M♦[,1] Fortress[1] MCPA amine MCPA ester MCPA K-salt MCPA Na-salt Pardner♦	Basagran♦ Buctril M♦ Pardner♦	Aim[7] Authority Basagran♦ Buctril M♦ Curtail M♦ Eptam Fortess[1] MCPA (all forms) Pardner♦ Trifluralin♦	
Mustard	Trifluralin♦	Aim[7] Authority[7] Edge (yellow only) Fortress[1]	Edge[1] (yellow only)	Aim[7] Ares (C) Authority[7] Edge (yellow only) Fortess[1] Trifluralin♦	
Sunflowers	Trifluralin♦	Aim[7] Authority Edge Solo (C)♦[,1]	Edge[1]	Aim[7] Authority Edge Eptam Solo (C)♦ Trifluralin♦	

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] See page 18 for resistance information
[5] Spring seedlings
[6] Spring rosettes only
[7] Pre-seed treatment
(C) Group 2 tolerant sunflowers only

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Herbicide selector chart – oilseeds

Crop	Night-flowering catchfly	Perennial sow thistle	Persian darnel	Prostrate pigweed	Quack grass
Canola	Conquer[7]	Clever♦,[1] Lontrel♦,[1]	Poast Ultra Select♦ Trifluralin♦	Aim[7] Command Charge[7] Edge	Assure II♦ Poast Ultra Select♦
Group 2 tolerant canola	Conquer[7]	Clever♦,[1]	Ares Odyssey♦ Odyssey Ultra	Aim[7] Command Charge[7]	Assure II♦ Odyssey Ultra[1]
Liberty Link canola	Conquer[7]	Clever♦,[1] Liberty♦	Liberty♦	Aim[7] Command Charge[7]	Assure II♦ Liberty[1,♦]
Roundup Ready canola	Conquer[7] Eclipse III	Clever♦,[1] Eclipse III glyphosate	Eclipse III glyphosate♦	Aim[7] Command Charge[7]	Assure II♦ Eclipse III glyphosate♦
Flax	Buctril M♦	Buctril M♦,[1] Curtail M♦ Lontrel♦,[1] MCPA[1] (all forms)	Poast Ultra Select♦ Trifluralin♦	Aim[7] Eptam MCPA K-salt	Assure II♦ Eptam Poast Ultra Select♦
Mustard			Ares (C) Poast Ultra Select♦ Trifluralin♦	Aim[7] Authority[7] Edge (yellow only)	Assure II♦ Poast Ultra Select♦
Sunflowers			Poast Ultra Select♦ Trifluralin♦	Aim[7] Edge Eptam	Assure II[1] Eptam Poast Ultra Select♦

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] See page 18 for resistance information
[5] Spring seedlings
[6] Spring rosettes only
[7] Pre-seed treatment
(C) Group 2 tolerant sunflowers only

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Herbicide selector chart – oilseeds

Crop	Redroot pigweed	Russian thistle[4]	Scentless chamomile	Shepherd's-purse	Stinkweed
Canola	Aim[7] Command Charge[7] Conquer[7] Edge Fortress[1] Muster Prospect[7] Tough 600	Aim[7] Command Charge[7] Edge[1] Fortress[1]	Lontrel♦	Aim[7] Command Charge[7] Prospect[7]	Aim[7] Command Charge[7] Conquer[1,7] Muster Prospect[7]
Group 2 tolerant canola	Aim[7] Ares Command Charge[7] Conquer[7] Odyssey♦ Odyssey Ultra Prospect[7] Solo♦	Aim[7] Command Charge[7] Odyssey♦ Odyssey Ultra		Aim[7] Ares Command Charge[7] Odyssey♦ Odyssey Ultra Prospect[7] Solo♦	Aim[7] Ares Command Charge[7] Conquer[1,7] Odyssey♦ Odyssey Ultra Prospect[7] Solo♦
Liberty Link canola	Aim[7] Command Charge[7] Conquer[7] Liberty♦ Prospect[7]	Aim[7] Command Charge[7] Liberty♦	Liberty♦	Aim[7] Command Charge[7] Liberty♦ Prospect[7]	Aim[7] Command Charge[7] Conquer[1,7] Liberty♦ Prospect[7]
Roundup Ready canola	Aim[7] Command Charge[7] Conquer[7] Eclipse III glyphosate♦ Prospect[7]	Aim[7] Command Charge[7] Eclipse III glyphosate♦		Aim[7] Command Charge[7] Eclipse III glyphosate♦ Prospect[7]	Aim[7] Command Charge[7] Conquer[1,7] Eclipse III glyphosate♦ Prospect[7]
Flax	Aim[7] Authority Basagran♦[,1] Buctril M♦ Curtail M♦ Eptam MCPA (all forms)	Aim[7] Basagran♦ Buctril M♦ Fortress[1] MCPA Na-salt Pardner♦	Buctril M[5,♦] Curtail M♦ Lontrel♦	Aim[7] Basagran♦ Buctril M♦ Curtail M♦ MCPA (all forms)	Aim[7] Basagran♦ Buctril M♦ Curtail M♦ MCPA (all forms) Pardner♦
Mustard	Aim[7] Ares (C) Authority[7] Edge (yellow only) Fortress[1] Muster[1] (brown and oriental only)	Aim[7] Edge[1] (yellow only) Fortess[1]		Aim[7] Ares (C)	Aim[7] Ares (C) Muster[1] (brown and oriental only)
Sunflowers	Aim[7] Authority Edge Eptam Solo (C)♦	Aim[7] Edge[1]		Aim[7] Solo (C)♦	Aim[7] Solo (C)♦

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] See page 18 for resistance information
[5] Spring seedlings
[6] Spring rosettes only
[7] Pre-seed treatment
(C) Group 2 tolerant sunflowers only

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Herbicide selector chart – oilseeds

Crop	Stork's-bill	Tartary buckwheat	Volunteer barley	Wild mustards	Volunteer oats[4]
Canola			Assure II♦ Edge[1] Poast Ultra Select♦	Conquer[1,7] Muster Tough 600	Assure II♦ Poast Ultra Select♦
Group 2 tolerant canola	Odyssey♦ Odyssey Ultra		Ares Assure II♦ Odyssey♦ Odyssey Ultra Solo♦	Ares Conquer[1,7] Odyssey♦ Odyssey Ultra Solo♦	Ares Odyssey♦ Odyssey Ultra Solo♦
Liberty Link canola	Liberty♦		Assure II♦ Liberty♦ Select	Conquer[1,7] Liberty♦	Select
Roundup Ready canola	Eclipse III glyphosate		Assure II♦ Eclipse III glyphosate♦	Conquer[1,7] Eclipse III glyphosate♦	glyphosate♦
Flax	Basagran♦	Buctril M♦ Curtail M♦ MCPA[1] (all forms) Pardner♦	Assure II♦ Eptam Poast Ultra Select♦	Basagran♦ Buctril M♦ Curtail M♦ MCPA (all forms)	Assure II♦ Eptam Poast Ultra Select♦
Mustard			Ares (C) Assure II♦ Edge[1] (yellow only) Poast Ultra Select♦	Ares (C) Muster (brown and oriental only)	Ares (C) Poast Ultra Select♦
Sunflowers			Edge[1] Eptam Poast Ultra Select♦ Solo (C)♦	Solo (C)♦	Assure II[1] Eptam Poast Ultra Select♦ Solo (C)♦

♦ Other similar products can be found listed under this product.
1 Suppression only
2 Pre-crop emergence to weed seedlings
3 Used as a crop desiccant
4 See page 18 for resistance information
5 Spring seedlings
6 Spring rosettes only
7 Pre-seed treatment
(C) Group 2 tolerant sunflowers only

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Herbicide selector chart – oilseeds

Crop	Volunteer wheat	Wild buckwheat	Wild oats[4]		Wild tomato	Witchgrass
Canola	Assure II♦ Edge Poast Ultra Select♦	Conquer[1,7] Edge Fortress[1] Lontrel♦ Prospect[1,7] Trifluralin♦	Assure II♦ Avadex BW Edge[1] Fortress	Poast Ultra Select♦ Trifluralin♦		Assure II♦ Edge Poast Ultra Select♦
Group 2 tolerant canola	Ares Assure II♦ Odyssey♦ Odyssey Ultra Solo[6,♦]	Ares Conquer[1,7] Odyssey♦ Odyssey Ultra Prospect[1,7] Solo[1,♦]	Ares Assure II♦ Odyssey Ultra Solo♦			
Liberty Link canola	Assure II♦ Liberty♦	Conquer[1,7] Liberty♦ Prospect[1,7]	Liberty♦ Select			Select♦
Roundup Ready canola	Assure II♦ Eclipse III glyphosate♦	Conquer[1,7] Eclipse III glyphosate♦ Prospect[1,7]	Assure II♦ Eclipse III glyphosate♦		Eclipse III glyphosate♦	
Flax	Assure II♦ Eptam Poast Ultra Select♦	Authority Buctril M♦ Curtail M♦ Fortress[1] Lontrel♦ MCPA Amine[1] Pardner♦ Trifluralin♦	Assure II♦ Avadex BW Eptam Fortress	Poast Ultra Select♦ Trifluralin♦	Buctril M♦	Assure II♦ Eptam Poast Ultra Select♦
Mustard	Ares (C) Assure II♦ Edge[1] (yellow only) Poast Ultra Select♦	Ares (C) Edge (yellow only) Fortress[1] Trifluralin♦	Ares (C) Assure II♦ Authority[7] Avadex BW Edge[1] (yellow only)	Fortress Poast Ultra Select♦ Trifluralin♦		Edge Poast Ultra Select♦
Sunflowers	Edge[1] Eptam Poast Ultra Select♦ Solo (C)♦,[1]	Authority Edge Solo (C)♦,[1] Trifluralin♦	Edge[1] Eptam Poast Ultra	Select♦ Solo (C)♦ Trifluralin♦		Edge Eptam Poast Ultra Select♦

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-crop emergence to weed seedlings
[3] Used as a crop desiccant
[4] See page 18 for resistance information
[5] Spring seedlings
[6] Spring rosettes only
[7] Pre-seed treatment
(C) Group 2 tolerant sunflowers only

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Herbicide selector chart – forage legumes

Crop	Crop stage	Annual smartweed	Barnyard grass		Bluebur	Canada thistle	
Alfalfa	Seedling	Basagran♦,5 Embutox♦,1 Express SG8 Odyssey♦,5 Pardner♦,5 Pursuit♦	Edge5,2 Eptam2 Liquid Achieve SC♦,7 Odyssey♦,5	Poast Ultra Select♦ Trifluralin♦,2	Pardner♦,5	Basagran♦,1,5 Embutox♦,1,2	Express SG1,8 Tropotox Plus♦,1,5
	Established	Basagran♦,5 Odyssey♦,5 Pardner♦,5 Princep♦ Reglone♦,3 Squadron	Assure II♦,5 Odyssey♦,5 Poast Ultra	Princep♦ Reglone♦,3	Pardner♦,5 Reglone♦,3	Basagran♦,1,5 Reglone♦,3	
Alsike clover	Seedling	Basagran♦,5 Embutox♦,1 Express SG8	Liquid Achieve SC♦,7 Poast Ultra	Trifluralin♦,2		Express SG1,8	
	Established		Assure II♦,5 Poast Ultra				
Cicer milkvetch	Seedling		Eptam5,2	Trifluralin♦,2			
	Established		Select♦		Tropotox Plus♦,1,5		
Red clover	Seedling	Basagran♦,5 Express SG8	Assure II♦,5 Liquid Achieve SC♦,7	Trifluralin♦,2	MCPA amine	Basagran♦,1,5 Express SG1,8	Tropotox Plus♦,1
	Established	Reglone♦,3	Assure II♦,5 Reglone♦,3		MCPA amine Reglone♦,3	Reglone♦,3	
Sweet clover	Seedling		Assure II♦,5 Eptam2,5 Liquid Achieve SC♦,7	Poast Ultra Trifluralin♦,2			
	Established	Basagran♦,5	Poast Ultra			Basagran♦,1,5	
White clover	Seedling	Embutox♦,1 Tropotox Plus♦,1	Assure II♦,5 Liquid Achieve SC♦,7	Tropotox Plus♦,1,5		Embutox♦,1	Tropotox Plus♦,1
	Established	Reglone♦,3			Reglone♦,3	Reglone♦,1,3	
Bird's-foot trefoil	Seedling	Embutox♦,1	Assure II♦,5 Eptam2	Liquid Achieve SC♦,7 Trifluralin♦,2		Embutox♦,2	
	Established	Princep♦ Reglone♦,3	Princep♦ Reglone♦,3		Reglone♦,3	Reglone♦,3	
Sainfoin	Seedling	Basagran♦,5	Assure II♦,5 Liquid Achieve SC♦,7	Poast Ultra Trifluralin♦,2		Basagran♦,1,5	
	Established		Poast Ultra				

♦ Other similar products can be found listed under this product.

1 Suppression or season long control

2 Pre-crop emergence herbicide

3 Used as crop dessicant

4 Under irrigation only

5 Seed production only

6 Forage production only

7 Underseeding only

8 To be used pre-seed, as a burnoff

Check individual herbicides for grazing or feed restrictions

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Herbicide selector chart – forage legumes

Crop	Crop stage	Chickweed	Clovers	Common groundsel	Corn spurry	Dandelion
Alfalfa	Seedling	Basagran♦,5 Edge5,2 Eptam2 Odyssey♦,5 Trifluralin♦,2		Basagran♦,5 Pardner♦,5 Pursuit♦,1	Basagran♦,5 Edge2,5 Eptam2	Embutox♦,1 Express SG8
	Established	Basagran♦,5 Odyssey♦,5 Reglone♦,3 Squadron	Princep♦ Reglone3,♦	Basagran♦,5 Pardner♦,5 Reglone♦,3 Squadron	Basagran♦,5 Reglone♦,3 Squadron	Reglone♦,3 Velpar5
Alsike clover	Seedling	Basagran♦,5 Trifluralin♦,2		Basagran♦,5	Basagran♦,5	Embutox♦,1 Express SG8
	Established					
Cicer milkvetch	Seedling	Eptam2,5 Trifluralin♦,2			Eptam2,5	
	Established					
Red clover	Seedling	Basagran♦,5 Trifluralin♦,2		Basagran♦,5	Basagran♦,5	Express SG8
	Established	Reglone♦,3	Reglone♦,3	Reglone♦,3	Reglone♦,3	Reglone♦,3
Sweet clover	Seedling	Eptam2,5 Trifluralin♦,2			Eptam1,2,5	
	Established	Basagran♦,5		Basagran♦,5	Basagran♦,5	
White clover	Seedling					Embutox♦,1
	Established	Reglone♦,3	Reglone3,♦	Reglone♦,3	Reglone♦,3	Reglone♦,1,3
Bird's-foot trefoil	Seedling	Eptam2 Trifluralin♦,2			Eptam2	Embutox♦,1
	Established	Reglone♦,3	Princep♦ Reglone♦,3	Reglone♦,3	Reglone♦,3	Reglone♦,3
Sainfoin	Seedling	Basagran♦,5 Trifluralin♦,2		Basagran♦,5	Basagran♦,5	
	Established					

♦ Other similar products can be found listed under this product.
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Check individual herbicides for grazing or feed restrictions

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Herbicide selector chart – forage legumes

Crop	Crop stage	Field bindweed		Flixweed (seedlings)	Foxtail barley	Green foxtail	
Alfalfa	Seedling	Basagran♦,1,5 Embutox♦,1	Tropotox Plus♦,1,5	Express SG8 Odyssey♦,5	Poast Ultra1	Edge2,5 Eptam2 Express SG8 Liquid Achieve SC7 Odyssey♦,5	Poast Ultra Pursuit♦,1 Select Trifluralin2
	Established	Basagran♦,1,5	Reglone3,♦	Odyssey♦,5 Reglone♦,3 Squadron	Poast Ultra1 Reglone♦,3	Assure II♦,5 Odyssey♦,5 Poast Ultra	Pursuit♦,1,5 Reglone♦,3
Alsike clover	Seedling	Basagran♦,1,5 Embutox 625♦,1	Tropotox Plus♦,1	Express SG8		Assure II♦,5 Express SG8 Liquid Achieve SC♦,7	Poast Ultra Trifluralin♦,2
	Established				Poast Ultra1	Assure II♦,5 Poast Ultra	
Cicer milk vetch	Seedling					Eptam2,5 Poast Ultra	Trifluralin♦,2
	Established				Poast Ultra1	Poast Ultra	
Red clover	Seedling	Basagran♦,1,5	Tropotox Plus♦,1	Express SG8 MCPA amine		Assure II♦,5 Express SG8 Liquid Achieve SC♦,7	Trifluralin♦,2
	Established	Reglone♦,3		MCPA amine Reglone♦,3	Reglone♦,3	Assure II♦,5	Reglone♦,3
Sweet clover	Seedling					Assure II♦,5 Eptam1,2,5 Liquid Achieve SC♦,7	Poast Ultra Trifluralin♦,2
	Established	Basagran♦,5			Poast Ultra1	Poast Ultra	
White clover	Seedling	Embutox♦,1	Tropotox Plus♦,1			Assure II♦,5 Liquid Achieve SC♦,7	
	Established		Reglone♦,3	Reglone♦,3	Reglone♦,3	Reglone♦,3	
Bird's-foot trefoil	Seedling		Embutox♦,1			Assure II♦,5 Eptam2 Liquid Achieve SC♦,7	Trifluralin♦,2
	Established		Reglone♦,3	Reglone♦,3	Reglone♦,3	Reglone♦,3	
Sainfoin	Seedling	Basagran♦,1,5			Poast Ultra1	Assure II♦,5 Liquid Achieve SC♦,7	Poast Ultra Trifluralin♦,2
	Established				Poast Ultra1	Poast Ultra	

♦ Other similar products can be found listed under this product.
1 Suppression or season long control
2 Pre-crop emergence herbicide
3 Used as crop dessicant
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6 Forage production only
7 Underseeding only
8 To be used pre-seed, as a burnoff

Check individual herbicides for grazing or feed restrictions

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Herbicide selector chart – forage legumes

Crop	Crop stage	Kochia	Lamb's-quarter		Leafy spurge	Mustards	
Alfalfa	Seedling	Edge[2,5] Express SG[8] Odyssey♦[,1] Pardner♦[,5]	Basagran♦[,5] Edge[2,5] Embutox♦ Eptam[2] Express SG[8]	Odyssey♦[,1,5] Pardner♦[,5] Pursuit♦[,1] Trifluralin♦[,2] Tropotox Plus♦[,5]		Basagran♦[,5] Embutox♦ Express SG[8] Odyssey♦[,5]	Pardner♦[,5] Pursuit♦ Tropotox Plus♦[,5]
	Established	Odyssey♦[,1,5] Pardner♦[,5] Reglone♦[,3]	Basagran♦[,5] Odyssey♦[,1,5] Pardner♦[,5]	Princep♦ Reglone♦[,3] Squadron	Reglone♦[,3]	Basagran♦[,5] Odyssey♦[,5] Pardner♦[,5]	Pursuit♦[,5] Reglone♦[,3] Squadron
Alsike clover	Seedling	Express SG[8]	Basagran♦[,5] Embutox♦ Express SG[8]	Trifluralin♦[,2] Tropotox Plus♦		Basagran♦[,5] Embutox♦	Express SG[8] Tropotox Plus♦
	Established						
Cicer milk vetch	Seedling		Eptam[2,5]	Trifluralin♦[,2]			
	Established						
Red clover	Seedling	Express SG[8] MCPA amine	Basagran♦[,5] Express SG[8] MCPA amine	Trifluralin♦[,2] Tropotox Plus♦	Express SG[8]	Basagran♦[,5] Express SG[8] MCPA amine	Tropotox Plus♦
	Established	MCPA amine Reglone♦[,3]	MCPA amine	Reglone♦[,3]	Reglone♦[,3]	MCPA amine	Reglone♦[,3]
Sweet clover	Seedling		Eptam[1,2,5]	Trifluralin♦[,2]			
	Established		Basagran♦[,5]			Basagran♦[,5]	
White clover	Seedling		Embutox♦	Tropotox Plus♦		Embutox♦	Tropotox Plus♦
	Established	Reglone♦[,3]	Reglone♦[,3]		Reglone♦[,3]	Reglone♦[,3]	
Bird's-foot trefoil	Seedling		Embutox♦ Eptam[2]	Trifluralin♦[,2]		Embutox♦	
	Established	Reglone♦[,3]	Princep♦	Reglone♦[,3]	Reglone♦[,3]	Reglone♦[,3]	
Sainfoin	Seedling		Basagran♦[,5]	Trifluralin♦[,2]		Basagran♦[,5]	
	Established						

♦ Other similar products can be found listed under this product.
1 Suppression or season long control
2 Pre-crop emergence herbicide
3 Used as crop dessicant
4 Under irrigation only
5 Seed production only
6 Forage production only
7 Underseeding only
8 To be used pre-seed, as a burnoff

Check individual herbicides for grazing or feed restrictions

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Herbicide selector chart – forage legumes

Crop	Crop stage	Narrow-leaved hawk's-beard	Night-flowering catchfly	Perennial sow thistle		Quack grass	
Alfalfa	Seedling	Embutox 625♦ Express SG[8]	Pardner♦,[5]	Embutox♦,[1]	Tropotox Plus[1,5,♦]	Eptam[1,2] Poast Ultra[1]	Select♦
	Established	Reglone♦,[3] Velpar[5]	Pardner♦,[5] Reglone♦,[3] Squadron	Reglone♦,[3]	Tropotox Plus♦,[1] Velpar[5]	Assure II♦,[5] Poast Ultra[1]	Reglone♦,[3] Velpar[5]
Alsike clover	Seedling	Embutox♦,[1] Express SG[8]		Embutox[1,♦]	Tropotox Plus♦,[1]	Assure II♦,[5]	Poast Ultra[1]
	Established					Assure II♦,[5]	Poast Ultra[1]
Cicer milk vetch	Seedling					Poast Ultra[1]	
	Established					Poast Ultra[1]	
Red clover	Seedling	Express SG[8]			Tropotox Plus♦,[1]	Assure II♦,[5]	
	Established	Reglone♦,[3]	Reglone♦,[3]		Reglone♦,[3]	Assure II♦,[5]	Reglone♦,[3]
Sweet clover	Seedling					Assure II♦,[5] Eptam[1,2]	Poast Ultra[1]
	Established					Poast Ultra[1]	
White clover	Seedling	Embutox♦		Embutox♦,[1]	Tropotox Plus♦,[1]	Assure II♦,[5]	
	Established	Reglone♦,[3]	Reglone♦,[3]		Reglone♦,[3]	Reglone♦,[3]	
Bird's-foot trefoil	Seedling	Embutox♦		Embutox♦,[1]		Assure II♦,[5]	Eptam[1,2]
	Established	Reglone♦,[3]	Reglone♦,[3]		Reglone♦,[3]	Reglone♦,[3]	
Sainfoin	Seedling					Assure II♦,[5]	Poast Ultra[1]
	Established					Poast Ultra[1]	

♦ Other similar products can be found listed under this product.
1 Suppression or season long control
2 Pre-crop emergence herbicide
3 Used as crop dessicant
4 Under irrigation only
5 Seed production only
6 Forage production only
7 Underseeding only
8 To be used pre-seed, as a burnoff

Check individual herbicides for grazing or feed restrictions

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Herbicide selector chart – forage legumes

Crop	Crop stage	Redroot pigweed		Scentless chamomile (seedlings)	Shepherd's-purse (seedlings)		Stinkweed (seedlings)	
Alfalfa	Seedling	Basagran♦,1,5 Edge2,5 Embutox♦ Eptam2 Express SG8	Odyssey♦,5 Pardner♦,5 Pursuit♦ Trifluralin♦,2 Tropotox Plus♦,5	Express SG8	Basagran♦,5 Embutox♦ Odyssey♦,5	Plus♦,5 Pursuit♦,1 Tropotox	Basagran♦,5 Embutox♦ Express SG8 Odyssey♦,5	Pardner♦,5 Pursuit♦ Tropotox Plus♦,5
	Established	Basagran♦,1,5 Odyssey♦,5 Pardner♦,5	Pursuit♦,5 Reglone♦,3 Squadron	Reglone♦,3 Velpar5	Basagran♦,5 Odyssey♦,5	Reglone♦,3 Squadron	Basagran♦,5 Odyssey♦,5 Pardner♦,5	Pursuit♦,5 Reglone♦,3 Squadron
Alsike clover	Seedling	Basagran♦,1,5 Embutox♦ Express SG8	Trifluralin♦,2 Tropotox Plus♦	Express SG8	Basagran♦,5 Embutox♦	Tropotox Plus♦	Basagran♦,5 Embutox♦	Express SG8 Tropotox Plus♦
	Established							
Cicer milk vetch	Seedling	Eptam2,5	Trifluralin♦,2					
	Established							
Red clover	Seedling	Basagran♦,1,5 Express SG8 MCPA amine	Trifluralin♦,2 Tropotox Plus♦	Express SG8	Basagran♦,5 MCPA amine	Tropotox Plus♦	Basagran♦,5 Express SG8 MCPA amine	Tropotox Plus♦
	Established	MCPA amine	Reglone♦,3	Reglone♦,3	MCPA amine	Reglone♦,3	MCPA amine	Reglone♦,3
Sweet clover	Seedling	Eptam2,5	Trifluralin♦,2					
	Established	Basagran♦,1,5			Basagran♦,5		Basagran♦,5	
White clover	Seedling	Embutox♦	Tropotox Plus♦		Embutox♦	Tropotox Plus♦	Embutox♦	Tropotox Plus♦
	Established	Reglone♦,3		Reglone♦,3	Reglone♦,3		Reglone♦,3	
Bird's-foot trefoil	Seedling	Embutox♦ Eptam2	Trifluralin♦,2		Embutox♦		Embutox♦	
	Established	Reglone♦,3		Reglone♦,3	Reglone♦,3		Reglone♦,3	
Sainfoin	Seedling	Basagran♦,1,5	Trifluralin♦,2		Basagran♦,5		Basagran♦,5	
	Established							

♦ Other similar products can be found listed under this product.
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Check individual herbicides for grazing or feed restrictions

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Herbicide selector chart – forage legumes

Crop	Crop stage	Tall buttercup	Toadflax	Wild buckwheat		Wild oats	
Alfalfa	Seedling	Basagran♦ Tropotox Plus♦,1,5		Edge2,5 Embutox♦ Express SG8	Odyssey♦,5 Pardner♦,5 Trifluralin♦,2	Avadex BW2,7 Edge1,2,5 Eptam2 Express SG8 Liquid Achieve SC♦,7 MicroActiv2,7	Odyssey♦,5 Poast Ultra Select♦ Trifluralin♦,2
	Established	Basagran♦	Reglone♦,3	Odyssey♦,5 Pardner♦,5	Princep♦ Reglone♦,3	Assure II♦,5 Odyssey♦,5 Poast Ultra	Princep♦ Reglone♦,3
Alsike clover	Seedling	Tropotox Plus♦,1,5		Embutox♦ Express SG8	Trifluralin♦,2	Assure II♦,5 Avadex BW2,7 Express SG8 Liquid Achieve SC♦,7	MicroActiv2,7 Poast Ultra Trifluralin♦,2
	Established					Assure II♦,5	Poast Ultra
Cicer milk vetch	Seedling			Trifluralin♦,2		Eptam2,5 Poast Ultra	Trifluralin♦,2
	Established					Poast Ultra	
Red clover	Seedling	MCPA amine Tropotox Plus♦,1,5		Express SG8 Trifluralin♦,2		Assure II♦,5 Avadex BW2,7 Express SG8	Liquid Achieve SC♦,7 MicroActiv2,7 Trifluralin♦,2
	Established	MCPA amine	Reglone♦	Reglone♦,3		Assure II♦,5	Reglone♦,3
Sweet clover	Seedling			Trifluralin♦,2		Assure II♦,5 Avadex BW2,7 Eptam2,5 Liquid Achieve SC♦,7	MicroActiv2,7 Poast Ultra Trifluralin♦,2
	Established					Poast Ultra	
White Clover	Seedling	Tropotox Plus♦,1,5		Embutox♦		Assure II♦,5 Avadex BW7	Liquid Achieve SC♦,7 MicroActiv2,7
	Established		Reglone♦,3	Reglone♦,3		Reglone♦,3	
Bird's-foot trefoil	Seedling			Embutox♦	Trifluralin♦,2	Assure II♦,5 Avadex BW2,7 Eptam2	Liquid Achieve SC♦,7 MicroActiv2,7 Trifluralin♦,2
	Established		Reglone♦,3	Princep♦	Reglone♦,3	Princep♦	Reglone♦,3
Sainfoin	Seedling			Trifluralin♦,2		Assure II♦,5 Liquid Achieve SC♦,7	Poast Ultra Trifluralin♦,2
	Established					Poast Ultra	

♦ Other similar products can be found listed under this product.
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Herbicide selector chart – forage grasses

Crop	Crop stage	Annual smartweed					Barnyard grass
Meadow bromegrass	Seedling	Express SG[2] Flurox-24♦[5]	MCPA Prestige XC♦[,5]	MPower RX Refine SG	Spectrum♦[,5]		
	Established	Flurox-24♦[5] MPower RX	Prestige XC♦[,5] Infinity MCPA[1]	Refine SG Spectrum♦[,5]	Sword♦[,7]		
Smooth bromegrass	Seedling	2,4-D Basagran♦[,5] Buctril M♦[,5]	Deploy♦ Engenia♦ Express SG[2]	Flurox-24[5] MCPA[1] MPower RX	Pardner♦[,5] Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦[,7]	
	Established	2,4-D Flurox-24♦[5]	MPower RX MCPA[1]	Refine SG Spectrum♦[,5]	Sword♦[,7]		
Crested wheatgrass	Seedling	2,4-D Basagran♦[,5] Buctril M♦[,5]	Engenia♦ Flurox-24♦[5] MCPA[1]	MPower RX Pardner♦[,5] Prestige XC♦[,5]	Refine SG Spectrum♦[,5] Sword♦[,7]		
	Established	2,4-D Ally♦	Flurox-24♦[5] MCPA[1]	MPower RX Prestige XC♦[,5]	Refine SG Spectrum♦[,5]	Sword♦[,7]	
Intermediate wheatgrass	Seedling	2,4-D Buctril M[5] Engenia♦	Flurox-24♦[5] MCPA[1]	MPower RX Pardner♦[,5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦[,7]	
	Established	2,4-D Ally♦	Flurox-24♦[5] MCPA[1]	MPower RX Refine SG	Prestige XC♦[,5] Spectrum♦[,5]	Sword♦[,7]	
Creeping red fescue	Seedling	2,4-D Basagran♦[,5] Buctril M♦[,5]	Engenia♦ Express SG[2] Flurox-24♦[5]	MCPA[1] MPower RX Pardner♦[,5]	Refine SG Spectrum♦[,7]	Sword♦[,7]	Assure II♦[,5] Poast Ultra[5]
	Established	2,4-D Ally♦ Engenia♦	Flurox-24♦[5] Infinity	MCPA[1] MPower RX	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword[,7]	Assure II♦[,5] Poast Ultra[5]
Tall fescue	Seedling	2,4-D Buctril M[5]	Engenia♦ Infinity	MCPA[1] MPower RX	Refine SG	Spectrum♦[,5]	
	Established	2,4-D MCPA[1]	MPower RX Prestige XC♦[,5]	Refine SG	Spectrum♦[,5]	Sword♦[,7]	
Orchard grass	Seedling	2,4-D Basagran♦[,5]	Buctril M♦[,5] Engenia♦	MCPA[1] MPower RX	Pardner♦[,5] Refine SG	Sword♦[,7]	
	Established	2,4-D Ally♦	MCPA[1] MPower RX	Refine SG	Sword♦[,7]		
Timothy	Seedling	2,4-D Basagran♦[,5] Buctril M♦[,5]	Curtail M♦ Engenia♦ Express SG[2]	Flurox-24♦[5] Frontline XL♦ MCPA[1]	Pardner♦[,5] Prestige XC♦[,5] Spectrum♦[,5]	Sword♦[,7]	
	Established	2,4-D Ally♦	Buctril M♦ Curtail M♦	Flurox-24♦[5] MCPA[1]	Prestige XC♦[,5] Spectrum♦[,5]	Sword♦[,7]	
Hay and grazing	With Legumes	Embutox♦[,5,1]					
	No Legumes	2,4-D	Embutox♦[,1]	MCPA[1]			

♦ Other similar products can be found listed under this product.
1 Suppression only
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6 Underseeding only
7 Forage production only
8 Fall application only

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Herbicide selector chart – forage grasses

Crop	Crop stage	Bluebur			Burdock
Meadow bromegrass	Seedling	MCPA	Flurox-24♦[5]	OcTTain[5]	Flurox-24♦[5] OcTTain[5]
	Established	Flurox-24♦[5]			Flurox-24♦[5] OcTTain[5]
Smooth bromegrass	Seedling	2,4-D Buctril M♦[,5]	Flurox-24♦[5] MCPA	Pardner♦[,5]	Flurox-24♦[5] MCPA OcTTain[5]
	Established	2,4-D	Flurox-24♦[5]	MCPA	Flurox-24♦[5] MCPA OcTTain[5]
Crested wheatgrass	Seedling	2,4-D Buctril M♦[,5]	Flurox-24♦[5] MCPA	OcTTain[5] Pardner♦[,5]	Flurox-24♦[5] MCPA OcTTain[5]
	Established	2,4-D Ally♦	Flurox-24♦[5] MCPA	OcTTain[5]	Flurox-24♦[5] MCPA OcTTain[5]
Intermediate wheatgrass	Seedling	2,4-D Buctril M♦[,5]	Flurox-24♦[5] MCPA	OcTTain[5] Pardner♦[,5]	Flurox-24♦[5] MCPA OcTTain[5]
	Established	2,4-D Ally♦	Flurox-24♦[5] MCPA	OcTTain[5]	Flurox-24♦[5] MCPA OcTTain[5]
Creeping red fescue	Seedling	2,4-D Buctril M♦[,5]	Flurox-24♦[5] MCPA	OcTTain[5] Pardner♦[,5]	Flurox-24♦[5] MCPA OcTTain[5]
	Established	2,4-D Ally♦	Flurox-24♦[5] MCPA	OcTTain[5]	Flurox-24♦[5] MCPA OcTTain[5]
Tall fescue	Seedling	2,4-D Buctril M♦[,5]	Flurox-24♦[5] MCPA	OcTTain[5] Pardner♦[,5]	Flurox-24♦[5] OcTTain[5]
	Established	2,4-D Ally♦	Flurox-24♦[5] MCPA	OcTTain[5]	Flurox-24♦[5] OcTTain[5]
Orchard grass	Seedling	2,4-D Buctril M♦[,5]	Flurox-24♦[5] MCPA	Pardner♦[,5]	
	Established	2,4-D	Pardner♦[,5]	MCPA	
Timothy	Seedling	Buctril M♦[,5] MCPA	Flurox-24♦[5] OcTTain[5]	Pardner♦[,5]	Flurox-24♦[5] MCPA OcTTain[5]
	Established	2,4-D Ally♦	Buctril M♦ Flurox-24♦[5]	MCPA OcTTain[5]	Flurox-24♦[5] MCPA OcTTain[5]
Hay and grazing	With Legumes				
	No Legumes	2,4-D	MCPA		Grazon MCPA

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-plant, incorporate treatment, or pre-seed, as a burnoff
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[4] Under irrigation only
[5] Seed production only
[6] Underseeding only
[7] Forage production only
[8] Fall application only

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Herbicide selector chart – forage grasses

Crop	Crop stage	Canada thistle				
Meadow bromegrass	Seedling	Express SG[1,2] Flurox-24♦[5]	Prestige XC♦[,5] MPower RX[1]	OcTTain[5,1]	Refine SG[1]	Spectrum♦[,5]
	Established	Flurox-24♦[1,5] Infinity[1]	MPower RX[1] OcTTain[5,1]	Prestige XC♦[,5] Refine SG[1]	Spectrum♦[,5]	Sword♦[,7]
Smooth bromegrass	Seedling	2,4-D[1] Basagran♦[,1,5] Buctril M♦[,1,5]	Engenia♦[,1] Express SG[1,2] Flurox-24♦[1,5]	Lontrel♦ MCPA[1] MPower RX[1]	OcTTain[5,1] Prestige XC♦[,5] Refine SG[1]	Spectrum♦[,5] Sword♦[,1,7]
	Established	2,4-D[1] Flurox-24♦[1,5] Infinity[1]	Lontrel♦ MCPA[1] MPower RX[1]	OcTTain[5,1] Prestige XC♦[,5]	Refine SG[1] Spectrum♦[,5]	Sword♦[,1,7]
Crested wheatgrass	Seedling	2,4-D[1] Basagran♦[,1,5] Buctril M♦[,1,5]	Engenia♦[,1,5] Flurox-24♦[1,5] Lontrel♦	MCPA[1] MPower RX[1] OcTTain[5,1]	Prestige XC♦[,5] Refine SG[1]	Spectrum♦[,5] Sword♦[,1,7]
	Established	2,4-D[1] Ally♦[,1] Flurox-24♦[1,5]	Lontrel♦ MCPA[1] MPower RX[1]	OcTTain[5,1] Prestige XC♦[,5]	Refine SG[1] Spectrum♦[,5]	Sword♦[,1,7]
Intermediate wheatgrass	Seedling	2,4-D[1] Buctril M♦[,1,5] Engenia♦[,1]	Flurox-24♦[1,5] Lontrel♦ MCPA[1]	MPower RX[1] OcTTain[5,1]	Prestige XC♦[,5] Refine SG[1]	Spectrum♦[,5] Sword♦[,1,7]
	Established	2,4-D[1] Ally♦[,1] Flurox-24♦[1,5]	Lontrel♦ MCPA[1] MPower RX[1]	OcTTain[5,1] Prestige XC♦[,5]	Refine SG[1] Spectrum♦[,5]	Sword♦[,1,7]
Creeping red fescue	Seedling	2,4-D[1] Basagran♦[,1,5] Buctril M♦[,1,5]	Engenia♦[,1] Express SG[1,2] Flurox-24♦[1,5]	Lontrel♦ MCPA[1] MPower RX[1]	OcTTain[5,1] Prestige XC♦[,5] Refine SG[1]	Spectrum♦[,5] Sword♦[,1,7]
	Established	2,4-D[1] Ally♦[,1] Engenia♦[,1]	Flurox-24♦[1,5] Lontrel♦ MCPA[1]	MPower RX[1] OcTTain[5,1]	Prestige XC♦[,5] Refine SG[1]	Spectrum♦[,5] Sword♦[,1,7]
Tall fescue	Seedling	2,4-D[1] Buctril M♦[,1,5]	Engenia♦[,1] Lontrel♦	MPower RX[1] OcTTain[5,1]	Refine SG[1]	Spectrum♦[,5]
	Established	2,4-D[1] Lontrel♦	MPower RX[1] OcTTain[5,1]	Prestige XC♦[,5] Refine SG[1]	Spectrum♦[,5]	Sword♦[,1,7]
Orchard grass	Seedling	2,4-D[1] Basagran♦[,1,5]	Buctril M♦[,1,5] Engenia♦[,1]	Lontrel♦ MPower RX[1]	Refine SG[1]	Sword♦[,1,7]
	Established	2,4-D[1] Ally♦[,1]	Lontrel♦	MPower RX[1]	Refine SG[1]	Sword♦[,1,7]
Timothy	Seedling	2,4-D[1] Basagran♦[,1,5] Buctril M♦[,1,5]	Curtail M♦ Engenia♦[,1] Express SG[1,2]	Flurox-24♦[1,5] Infinity[4,5] Lontrel♦	MCPA[1] OcTTain[5,1] Prestige XC♦[,5]	Spectrum♦[,5] Sword♦[,1,7]
	Established	2,4-D[1] Ally♦[,1] Buctril M♦[,1]	Curtail M♦ Flurox-24♦[1,5]	Lontrel♦ MCPA[1]	OcTTain[5,1] Prestige XC♦[,5]	Spectrum♦[,5] Sword♦[,1,7]
Hay and grazing	With Legumes	Embutox♦[,1]	Tropotox Plus♦[,1]			
	No Legumes	2,4-D Escort[1]	Embutox♦[,1] Grazon	Lontrel♦ MCPA[1]	Tordon 22K	Tropotox Plus♦[,1]

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Herbicide selector chart – forage grasses

Crop	Crop stage	Cleavers			Clovers	Common chickweed	
Meadow bromegrass	Seedling	Flurox-24♦[5] Ikwin[5] MPower RX[1]	OcTTain[5] Prestige XC♦[,5]	Refine SG[1] Spectrum♦[,5]	Lontrel♦	OcTTain[5] Flurox-24♦[5] Ikwin[5] MPower RX	Prestige XC♦[,1,5] Refine SG Spectrum♦[,5]
	Established	Infinity[1] Flurox-24♦[5] Ikwin[5]	MPower RX[1] OcTTain[5] Prestige XC♦[,5]	Refine SG[1] Spectrum♦[,5] Sword♦[,7]	Lontrel♦	Flurox-24♦[5] Ikwin[5] Infinity MPower RX	OcTTain[5] Prestige XC♦[,1,5] Refine SG Spectrum♦[,5]
Smooth bromegrass	Seedling	Basagran♦[,5] Engenia♦ Flurox-24♦[5]	Ikwin[5] MPower RX[1] Prestige XC♦[,5]	Refine SG[1] Spectrum♦[,5] Sword♦[,7]	Lontrel♦	Basagran♦[,5] Flurox-24♦[5] Ikwin[5] MPower RX	Prestige XC♦[,1,5] Refine SG Spectrum♦[,5]
	Established	Flurox-24♦[5] Ikwin[5] Infinity[1]	MPower RX[1] OcTTain[5] Prestige XC♦[,5]	Refine SG[1] Spectrum♦[,5] Sword♦[,7]	Lontrel♦	Flurox-24♦[5] Ikwin[5] Infinity MPower RX	OcTTain[5] Prestige XC♦[,1,5] Refine SG Spectrum♦[,5]
Crested wheatgrass	Seedling	Basagran♦[,5] Engenia♦ Flurox-24♦[5] Ikwin[5]	MPower RX[1] OcTTain[5] Prestige XC♦[,5]	Refine SG[1] Spectrum♦[,5] Sword♦[,7]	Lontrel♦	Basagran♦[,5] Flurox-24♦[5] Ikwin[5] MPower RX	OcTTain[5] Prestige XC♦[,1,5] Refine SG Spectrum♦[,5]
	Established	Flurox-24♦[5] Ikwin[5] MPower RX[1]	OcTTain[5] Prestige XC♦[,5] Refine SG[1]	Spectrum♦[,5] Sword♦[,7]	Lontrel♦	Ally♦ Flurox-24♦[5] Ikwin[5] MPower RX[1]	OcTTain[5] Prestige XC♦[,1,5] Refine SG Spectrum♦[,5]
Intermediate wheatgrass	Seedling	Engenia♦ Flurox-24♦[5] Ikwin[5]	MPower RX[1] OcTTain[5] Prestige XC[5,♦]	Refine SG[1] Spectrum♦[,5] Sword♦[,7]	Lontrel♦	Flurox-24♦[5] Ikwin[5] MPower RX[1] OcTTain[5]	Prestige XC♦[,1,5] Refine SG Spectrum♦[,5]
	Established	Flurox-24♦[5] Ikwin[5] MPower RX[1]	OcTTain[5] Prestige XC[5,♦] Refine SG[1]	Spectrum[5,♦] Sword♦[,7]	Lontrel♦	Ally♦ Flurox-24♦[5] Ikwin[5] MPower RX[1]	OcTTain[5] Prestige XC♦[,1,5] Refine SG Spectrum♦[,5]
Creeping red fescue	Seedling	Basagran♦[,5] Engenia♦[,5] Flurox-24♦[5] Ikwin[5]	MPower RX[1] OcTTain[5] Prestige XC♦[,5]	Refine SG[1] Spectrum♦[,5] Sword♦[,7]	Engenia♦ Lontrel♦	Basagran♦[,5] Flurox-24♦[5] Ikwin[5] MPower RX[1]	OcTTain[5] Prestige XC♦[,1,5] Refine SG Spectrum♦[,5]
	Established	Flurox-24♦[5] Ikwin[5] Infinity	MPower RX[1] OcTTain[5] Prestige XC♦[,5]	Refine SG[1] Spectrum♦[,5] Sword♦[,7]	Engenia♦ Lontrel♦	Ally♦ Flurox-24♦[5] Ikwin[5] Infinity MPower RX[1]	OcTTain[5] Prestige XC♦[,1,5] Refine SG Spectrum♦[,5]
Tall fescue	Seedling	MPower RX[1] OcTTain[5]	Refine SG[1]	Spectrum♦[,5]	Lontrel♦	MPower RX OcTTain[5]	Refine SG Spectrum♦[,5]
	Established	MPower RX[1] OcTTain[5]	Prestige XC♦[,5] Refine SG[1]	Spectrum♦[,5] Sword♦[,7]	Lontrel♦	MPower RX OcTTain[5] Prestige XC♦[,1,5]	Refine SG Spectrum♦[,5]
Orchard grass	Seedling	Basagran♦[,5] Engenia♦	MPower RX[1] Refine SG[1]	Sword♦[,7]	Lontrel♦	Basagran♦[,5] MPower RX	Refine SG
	Established	MPower RX[1]	Refine Extra[1]	Sword♦[,7]	Lontrel♦	Ally♦ MPower RX	Refine SG
Timothy	Seedling	Basagran♦[,5] Engenia♦ Flurox-24♦[5]	Ikwin[5] Infinity[5] OcTTain[5]	Prestige XC♦[,5] Spectrum♦[,5] Sword♦[,7]	Lontrel♦ (Alsike only)	Basagran♦[,5] Flurox-24♦[5] Ikwin[5] Infinity[5]	OcTTain[5] Prestige XC♦[,1,5] Spectrum♦[,5]
	Established	Flurox-24♦[5] Ikwin[5]	Prestige XC♦[,5] Spectrum♦[,5]	Sword♦[,7]	Lontrel♦(Alsike only)	Flurox-24♦[5] Ikwin[5]	Prestige XC♦[,1,5] Spectrum♦[,5]
Hay and grazing	With Legumes						
	No Legumes				Grazon		

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Herbicide selector chart – forage grasses

Crop	Crop stage	Common groundsel			Common ragweed		
Meadow bromegrass	Seedling	MPower RX	Prestige XC♦,5	Refine SG	Express SG2 Flurox-24♦5	MCPA	OcTTain5
	Established	MPower RX	Prestige XC♦,5	Refine SG	Flurox-24♦5 Infinity	MCPA OcTTain5	Sword♦,7
Smooth bromegrass	Seedling	Basagran♦,5 Buctril M♦,5 Lontrel♦	MPower RX Pardner♦,5	Prestige XC♦,5 Refine SG	Buctril M5 Express SG2	Flurox-24♦5 MCPA	Sword♦,7
	Established	Lontrel♦ MPower RX	Prestige XC♦,5	Refine SG	Flurox-24♦5 Infinity	MCPA OcTTain5	Sword♦,7
Crested wheatgrass	Seedling	Basagran♦,5 Buctril M♦,5 Lontrel♦	MPower RX Pardner♦,5	Prestige XC♦,5 Refine SG	Buctril M♦,5 Flurox-24♦5	MCPA OcTTain5	Sword♦,7
	Established	Ally♦ Lontrel♦	MPower RX Prestige XC♦,5	Refine SG	Flurox-24♦5 MCPA	OcTTain5	Sword♦,7
Intermediate wheatgrass	Seedling	Buctril M♦,5 Deploy♦	Lontrel♦ MPower RX	Prestige XC♦,5 Refine SG	Buctril M5 Flurox-24♦5	OcTTain5	Sword♦,7
	Established	Ally♦ Lontrel♦	MPower RX Prestige XC♦,5	Refine SG	Flurox-24♦5 MCPA	OcTTain5	Sword♦,7
Creeping red fescue	Seedling	Basagran♦,5 Buctril M♦,5 Lontrel♦	MPower RX Pardner♦,5	Prestige XC♦,5 Refine SG	Buctril M♦,5 Express SG2	Flurox-24♦5 MCPA	OcTTain5 Sword♦,7
	Established	Ally♦ Basagran♦,5 Deploy♦	Lontrel♦ MPower RX	Prestige XC♦,5 Refine SG	Flurox-24♦5 MCPA	OcTTain5	Sword♦,7
Tall Fescue	Seedling	Buctril M♦,5 Lontrel♦	MPower RX	Refine SG	Buctril M♦,5	MCPA OcTTain5	
	Established	Lontrel♦ MPower RX	Prestige XC♦,5	Refine SG	MCPA	OcTTain5	Sword♦,7
Orchard grass	Seedling	Basagran♦,5 Buctril M♦,5 Deploy♦	Lontrel♦ MPower RX	Pardner♦,5 Refine SG	Buctril M♦,5	MCPA	Sword♦,7
	Established	Ally♦ Basagran♦,5	Deploy♦ Lontrel♦	MPower RX Refine SG	MCPA	Sword7,♦	
Timothy	Seedling	Basagran♦,5 Buctril M♦,5	Lontrel♦ Curtail M♦	Pardner♦,5 Prestige XC♦,5	Buctril M♦,5 Express SG2 Flurox-24♦5	Infinity5 MCPA	OcTTain5 Sword♦,7
	Established	Ally♦ Basagran♦,5	Buctril M♦ Curtail M♦	Lontrel♦ Prestige XC♦,5	Buctril M♦ Flurox-24♦5	Infinity5 OcTTain5	MCPA Sword♦,7
Hay and grazing	With Legumes				Tropotox Plus♦		
	No Legumes	Lontrel♦			Grazon	MCPA	Tropotox Plus♦

♦ Other similar products can be found listed under this product.
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6 Underseeding only
7 Forage production only
8 Fall application only

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Herbicide selector chart – forage grasses

Crop	Crop stage	Corn spurry		Cow cockle			
Meadow bromegrass	Seedling	MPower RX	Refine SG	Express SG[2]	MPower RX	Refine SG	
	Established	MPower RX Refine SG	Sword♦,[7]	Refine SG	Sword♦,[7]		
Smooth bromegrass	Seedling	Engenia♦ Basagran♦,[5] MPower RX	Refine SG Sword♦,[7]	Engenia♦ Buctril M♦,[5]	Express SG[2] MPower RX	Pardner♦,[5] Refine SG	Sword♦,[7]
	Established	Deploy♦ MPower RX	Refine SG Sword♦,[7]	Deploy♦	MPower RX	Refine SG	Sword♦,[7]
Crested wheatgrass	Seedling	Engenia♦ Basagran♦,[5] MPower RX[1]	Refine SG Sword♦,[7]	Engenia♦ Buctril M♦,[5]	MPower RX Pardner♦,[5]	Refine SG	Sword♦,[7]
	Established	Ally♦ MPower RX	Refine SG Sword♦,[7]	Ally♦	MPower RX	Refine SG	Sword♦,[7]
Intermediate wheatgrass	Seedling	Engenia♦ MPower RX	Refine SG Sword♦,[7]	Buctril M♦,[5] Engenia♦	MPower RX Pardner♦,[5]	Refine SG	Sword♦,[7]
	Established	Ally♦ MPower RX	Refine SG Sword♦,[7]	Ally♦	MPower RX	Refine SG	Sword♦,[7]
Creeping red fescue	Seedling	Basagran♦,[5] Engenia♦ MPower RX	Refine SG Sword♦,[7]	Buctril M♦,[5] Engenia♦,[5]	Express SG[2] MPower RX	Pardner♦,[5] Refine SG	Sword♦,[7]
	Established	Ally♦ Engenia♦ MPower RX	Refine SG Sword♦,[7]	Ally♦ Engenia♦	MPower RX	Refine SG	Sword♦,[7]
Tall fescue	Seedling	Engenia♦ MPower RX	Refine SG	Buctril M♦,[5]	Engenia♦	MPower RX	Refine SG
	Established	Refine SG MPower RX	Sword♦,[7]	Deploy♦	Refine SG	Sword♦,[7]	
Orchard grass	Seedling	Basagran♦,[5] Engenia♦ MPower RX	Refine SG Sword♦,[7]	Buctril M♦,[5] Engenia♦	MPower RX Pardner♦,[5]	Refine SG	Sword♦,[7]
	Established	Ally♦ MPower RX	Refine SG Sword♦,[7]	Ally♦	MPower RX	Refine SG	Sword♦,[7]
Timothy	Seedling	Basagran♦,[5] Engenia♦	Sword♦,[7]	Buctril M♦,[5] Engenia♦	Express SG[2]	Pardner♦,[5]	Sword♦,[7]
	Established	Ally♦	Sword♦,[7]	Ally♦			Sword♦,[7]
Hay and grazing	With Legumes						
	No Legumes	Engenia♦		Engenia♦			

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Herbicide selector chart – forage grasses

Crop	Crop stage	Dandelion			Field bindweed		
Meadow bromegrass	Seedling	Express SG[2] Flurox-24♦[5]	MCPA[1] OcTTain[5]	Prestige XC♦[,5] Spectrum♦[,5]	Attain XC♦[,5]	Flurox-24♦[5]	OcTTain[5]
	Established	Flurox-24[5] Infinity[1] OcTTain[5]	MCPA[1] OcTTain[5]	Prestige XC♦[,5] Spectrum♦[,5]	Attain XC♦[,5] Flurox-24♦[5]	OcTTain[5]	Sword♦[,1,7]
Smooth bromegrass	Seedling	2,4-D[1] Flurox-24♦[5] Express SG[2]	MCPA[1] OcTTain[5]	Prestige XC♦[,5] Spectrum♦[,5]	2,4-D[1] Attain XC♦[,5] Basagran♦[,1,5]	Flurox-24♦[5] MCPA[1] OcTTain[5]	Sword♦[,1,7]
	Established	2,4-D[1] Flurox-24♦[5] Infinity[1]	MCPA[1] OcTTain[5]	Prestige XC♦[,5] Spectrum♦[,5]	2,4-D[1] Flurox-24♦[5]	MCPA[1] OcTTain[5]	
Crested wheatgrass	Seedling	2,4-D[1] Flurox-24♦[5]	MCPA[1] OcTTain[5]	Prestige XC♦[,5] Spectrum♦[,5]	2,4-D[1] Basagran♦[,1,5]	Flurox-24♦[5] MCPA[1]	OcTTain[5] Sword♦[,1,7]
	Established	2,4-D[1] Flurox-24♦[5]	MCPA[1] Prestige XC♦[,5]	Spectrum♦[,5]	2,4-D[1] Flurox-24♦[5]	MCPA[1]	OcTTain[5]
Intermediate wheatgrass	Seedling	2,4-D[1] Flurox-24♦[5]	MCPA[1] OcTTain[5]	Prestige XC♦[,5] Spectrum♦[,5]	2,4-D[1] Flurox-24♦[5]	MCPA[1]	OcTTain[5]
	Established	2,4-D[1] Flurox-24♦[5]	MCPA[1] OcTTain[5]	Prestige XC♦[,5] Spectrum♦[,5]	2,4-D[1] Flurox-24♦[5]	MCPA[1] OcTTain[5]	Sword♦[,1,7]
Creeping red fescue	Seedling	2,4-D[1] Express SG[2] Flurox-24♦[5]	MCPA[1] OcTTain[5]	Prestige XC♦[,5] Spectrum♦[,5]	2,4-D[1] Basagran♦[,1,5]	Flurox-24♦[5] MCPA[1]	OcTTain[5] Sword♦[,1,7]
	Established	2,4-D[1] Flurox-24♦[5]	MCPA[1] OcTTain[5]	Spectrum♦[,5]	2,4-D[1] Flurox-24♦[5]	MCPA[1]	OcTTain[5]
Tall fescue	Seedling	2,4-D[1] Flurox-24♦[5]	MCPA[1] OcTTain[5]	Spectrum♦[,5]	2,4-D[1] Flurox-24♦[5]	MCPA[1]	OcTTain[5]
	Established	2,4-D[1] Flurox-24♦[5]	MCPA[1] OcTTain[5]	Prestige XC♦[,5] Spectrum♦[,5]	2,4-D[1] Flurox-24♦[5]	MCPA[1] OcTTain[5]	Sword♦[,1,7]
Orchard grass	Seedling	2,4-D[1]	MCPA[1]		2,4-D[1] Basagran♦[,1,5]	MCPA[1]	Sword♦[,1,7]
	Established	2,4-D[1]	MCPA[1]		2,4-D[1]	MCPA[1]	Sword♦[,1,7]
Timothy	Seedling	2,4-D[1] Attain XC♦[,5] Curtail M♦	Flurox-24♦[5] Express SG[2] MCPA[1]	OcTTain[5] Prestige XC♦[,5] Spectrum♦[,5]	2,4-D[1] Basagran♦[,1,5]	Flurox-24♦[5] MCPA[1]	OcTTain[5] Sword♦[,1,7]
	Established	2,4-D[1] Ally[8] Attain XC♦[,5]	Curtail M♦ Flurox-24♦[5] MCPA[1]	OcTTain[5] Prestige XC♦[,5] Spectrum♦[,5]	2,4-D[1] Flurox-24♦[5]	MCPA[1]	OcTTain[5]
Hay and grazing	With Legumes		Embutox♦[,1]		Tropotox Plus♦[,1]		
	No Legumes	2,4-D[1] Embutox♦[,1]	Escort Grazon	MCPA[1]	2,4-D[1] Engenia♦	Embutox♦[,1] MCPA[1]	Tordon 22K Tropotox Plus♦[,1]

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Herbicide selector chart – forage grasses

Crop	Crop stage	Flixweed (seedlings)				Green foxtail
Meadow bromegrass	Seedling	Attain XC♦,5 Express SG2 Flurox-24♦5	MCPA MPower RX	OcTTain5 Prestige XC♦,5	Refine SG Spectrum♦,5	Express SG2
	Established	Attain XC♦,5 Flurox-24♦5 Infinity	MCPA MPower RX	Prestige XC♦,5 Refine SG	Spectrum♦,5 Sword♦,7	
Smooth bromegrass	Seedling	2,4-D Attain XC♦,5 Buctril M♦,5	Express SG2 Flurox-24♦5 MCPA	MPower RX OcTTain5 Prestige XC♦,5	Refine SG Spectrum♦,5 Sword♦,7	Express SG2
	Established	2,4-D Attain XC♦,5 Flurox-24♦5	Infinity MCPA MPower RX	OcTTain5 Prestige XC♦,5 Refine SG	Spectrum♦,5 Sword♦,7	Liquid Achieve SC♦,5
Crested wheatgrass	Seedling	2,4-D Attain XC♦,5 Buctril M♦,5	Flurox-24♦5 MCPA MPower RX	OcTTain5 Prestige XC♦,5 Refine SG	Spectrum♦,5 Sword♦,7	
	Established	2,4-D Ally♦ Attain XC♦,5	Flurox-24♦5 MCPA MPower RX	OcTTain5 Prestige XC♦,5 Refine SG	Spectrum♦,5 Sword♦,7	Liquid Achieve SC♦
Intermediate wheatgrass	Seedling	2,4-D Attain XC♦,5 Buctril M♦,5	Flurox-24♦5 MCPA MPower RX	Prestige XC♦,5 Refine SG	Spectrum♦,5 Sword♦,7	
	Established	2,4-D Ally♦ Attain XC♦,5	Flurox-24♦5 MCPA MPower RX	OcTTain5 Prestige XC♦,5 Refine SG	Spectrum♦,5 Sword♦,7	
Creeping red fescue	Seedling	2,4-D Attain XC♦,5 Buctril M♦,5	Express SG2 Flurox-24♦5 MCPA	MPower RX OcTTain5 Prestige XC♦,5	Refine SG Spectrum♦,5 Sword♦,7	Assure II♦,5 Express SG2 Poast Ultra5
	Established	2,4-D Ally♦ Attain XC♦,5	Flurox-24♦5 MCPA MPower RX	OcTTain5 Prestige XC♦,5	Refine SG Spectrum♦,5 Sword♦,7	Assure II♦,5 Poast Ultra5
Tall fescue	Seedling	2,4-D Attain XC♦,5 Buctril M♦,5	Flurox-245 MCPA MPower RX	OcTTain5 Refine SG	Spectrum♦,5	
	Established	2,4-D Attain XC♦,5 MCPA	Flurox-245 MPower RX OcTTain5	Prestige XC♦,5 Refine SG Spectrum♦,5	Sword♦,7 XC♦,5	
Orchard grass	Seedling	2,4-D Buctril M♦,5	MCPA MPower RX	Refine SG	Sword♦,7	
	Established	2,4-D Ally♦	MCPA MPower RX	Refine SG	Sword♦,7	
Timothy	Seedling	2,4-D Buctril M♦,5 Curtail M♦	Express SG2 Flurox-24♦5 Infinity5	MCPA OcTTain5 Prestige XC♦,5	Spectrum♦,5 Sword♦,7	Express SG2
	Established	2,4-D Ally♦,8 Buctril M♦	Curtail M♦ Flurox-24♦5 MCPA	OcTTain5 Prestige XC♦,5 Spectrum♦,5	Sword♦,7	
Hay and grazing	With Legumes					
	No Legumes	2,4-D	MCPA			

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Herbicide selector chart – forage grasses

Crop	Crop stage	Hemp-nettle			Kochia			
Meadow bromegrass	Seedling	Express SG[2] Flurox-24[♦1,5] Ikwin[5]	MCPA[1] MPower RX OcTTain[5]	Prestige XC[♦,1,5] Refine SG Spectrum[♦,5]	Flurox-24[♦1,5] Ikwin[5]	Express SG[2,†] MCPA	MPower RX OcTTain[5]	Prestige XC[♦,5] Refine SG[†]
	Established	Infinity Flurox-24[1,5] Ikwin[5] MCPA[1]	MPower RX OcTTain[5] Prestige XC[♦,1,5]	Refine SG Spectrum[♦,5] Sword[♦,7]	Flurox-24[♦1,5] Ikwin[5] Infinity	MCPA MPower RX	OcTTain[5] Prestige XC[♦,5]	Refine SG[†] Sword[♦,7]
Smooth bromegrass	Seedling	Express SG[2] Flurox-24[♦1,5] Ikwin[5] MCPA[1]	MPower RX OcTTain[5] Prestige XC[♦,1,5]	Refine SG Spectrum[♦,5] Sword[♦,7]	2,4-D Buctril M[♦,5] Express SG[2,†]	Flurox-24[♦1,5] Ikwin[5] MCPA	MPower RX OcTTain[5] Pardner[♦,5]	Prestige XC[♦,5] Refine SG[†] Sword[♦,7]
	Established	Flurox-24[♦1,5] Ikwin[5] Infinity MCPA[1]	MPower RX OcTTain[5] Prestige XC[♦,1,5]	Refine SG Spectrum[♦,5] Sword[♦,7]	2,4-D Flurox-24[♦1,5] Ikwin[5]	MCPA MPower RX	OcTTain[5] Prestige XC[♦,5]	Refine SG[†] Sword[♦,7]
Crested wheatgrass	Seedling	Flurox-24[♦1,5] Ikwin[5] MCPA[1]	MPower RX OcTTain[5] Prestige XC[♦,1,5]	Refine SG Spectrum[♦,5] Sword[♦,7]	2,4-D Buctril M[♦,5] Flurox-24[♦1,5]	Ikwin[5] MCPA MPower RX	OcTTain[5] Pardner[♦,5] Prestige XC[♦,5]	Refine SG[†] Sword[♦,7]
	Established	Ally[♦] Flurox-24[♦1,5] Ikwin[5] MCPA[1]	MPower RX OcTTain[5] Prestige XC[♦,1,5]	Refine SG Spectrum[♦,5] Sword[♦,7]	2,4-D Ally[♦,†] Flurox-24[♦1,5]	Ikwin[5] MCPA MPower RX	OcTTain[5] Prestige XC[♦,5]	Refine SG[†] Sword[♦,7]
Intermediate wheatgrass	Seedling	Flurox-24[♦1,5] Ikwin[5] MCPA[1]	MPower RX OcTTain[5] Prestige XC[♦,1,5]	Refine SG Spectrum[♦,5] Sword[♦,7]	2,4-D Buctril M[♦,5] Flurox-24[♦1,5]	Ikwin[5] MCPA MPower RX	OcTTain[5] Pardner[♦,5] Prestige XC[♦,5]	Refine SG[†] Sword[♦,7]
	Established	Ally[♦] Flurox-24[♦1,5] Ikwin[5] MCPA[1]	MPower RX OcTTain[5] Prestige XC[♦,1,5]	Refine SG Spectrum[♦,5] Sword[♦,7]	2,4-D Ally[♦,†] Flurox-24[♦1,5]	Ikwin[5] MCPA MPower RX	OcTTain[5] Prestige XC[♦,5]	Refine SG[†] Sword[♦,7]
Creeping red fescue	Seedling	Express SG[2] Flurox-24[♦1,5] Ikwin[5] MCPA[1]	MPower RX OcTTain[5] Prestige XC[♦,1,5]	Refine SG Spectrum[♦,5] Sword[♦,7]	2,4-D Buctril M[♦,5] Express SG[2,†]	Flurox-24[♦1,5] Ikwin[5] MCPA	MPower RX OcTTain[5] Pardner[♦,5]	Prestige XC[♦,5] Refine SG[†] Sword[♦,7]
	Established	Ally[♦] Flurox-24[♦1,5] Ikwin[5] MCPA[1]	MPower RX OcTTain[5] Prestige XC[♦,1,5]	Refine SG Spectrum[♦,5] Sword[♦,7]	2,4-D Ally[♦,†] Flurox-24[♦1,5]	Ikwin[5] Infinity MCPA	MPower RX OcTTain[5] Prestige XC[♦,5]	Refine SG[†] Sword[♦,7]
Tall fescue	Seedling	Flurox-24[1,5] Ikwin[5] MCPA[1]	MPower RX OcTTain[5]	Refine SG Spectrum[♦,5]	2,4-D Buctril M[♦,5]	Flurox-24[1,5] Ikwin[5]	MCPA MPower RX	OcTTain[5] Refine SG[†]
	Established	Flurox-24[1,5] Ikwin[5] MPower RX	MCPA[1] OcTTain[5] Prestige XC[♦,1,5]	Refine SG Spectrum[♦,5] Sword[♦,7]	2,4-D Flurox-24[1,5] Ikwin[5]	MCPA MPower RX	OcTTain[5] Prestige XC[♦,5]	Refine SG[†] Sword[♦,7]
Orchard grass	Seedling	MPower RX MCPA[1]	Refine SG	Sword[♦,7]	2,4-D Buctril M[♦,5]	MCPA MPower RX	Pardner[♦,5] Refine SG[†]	Sword[♦,7]
	Established	Ally[♦] MCPA[1]	MPower RX Refine SG	Sword[♦,7]	2,4-D Ally[♦,†]	MCPA MPower RX	Refine SG[†]	Sword[♦,7]
Timothy	Seedling	Express SG[2] Flurox-24[♦1,5] Ikwin[5]	Infinity[5] MCPA[1] OcTTain[5]	Prestige XC[♦,1,5] Spectrum[♦,5] Sword[♦,7]	2,4-D Buctril M[♦,5] Curtail M[♦,1]	Express SG[2,†] Flurox-24[♦1,5] Ikwin[5]	Infinity[5] OcTTain[5]	Prestige XC[♦,5] Sword[♦,7]
	Established	Ally[♦] Flurox-24[♦1,5] Ikwin[5]	MCPA[1] Prestige XC[♦,1,5]	Spectrum[♦,5] Sword[♦,7]	2,4-D Ally[♦] Buctril M[♦]	Curtail M[♦,1] Flurox-24[♦1,5] Ikwin[5]	MCPA OcTTain[5]	Prestige XC[♦,5] Sword[♦,7]
Hay and grazing	With Legumes	Tropotox Plus[♦,1]						
	No Legumes	MCPA[1]	Tropotox Plus[♦,1]		2,4-D	Escort	MCPA	

[†] 90% of kochia-surveyed fields have resistance to Group 2 herbicides such as these products. Use herbicides from another herbicde group to control kochia.

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Herbicide selector chart – forage grasses

Crop	Crop stage	Lamb's-quarter				
Meadow bromegrass	Seedling	Express SG[2] Flurox-24♦[5]	MCPA MPower RX	Prestige XC♦[,5]	Refine SG	Spectrum♦[,5]
	Established	Flurox-24♦[5] Infinity	MCPA MPower RX	OcTTain[5] Prestige XC♦[,5]	Refine SG Spectrum♦[,5]	Sword♦[,7]
Smooth bromegrass	Seedling	2,4-D Basagran♦[,5] Buctril M♦[,5]	Express SG[2] Flurox-24♦[5] MCPA	MPower RX OcTTain[5] Pardner♦[,5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦[,7]
	Established	2,4-D Flurox-24[5]	Infinity MCPA	OcTTain[5] Prestige XC♦[,5]	Refine SG Spectrum♦[,5]	Sword♦[,7]
Crested wheatgrass	Seedling	2,4-D Basagran♦[,5] Buctril M♦[,5] MCPA	Flurox-24♦[5] MPower RX	OcTTain[5] Pardner♦[,5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦[,7]
	Established	2,4-D Ally♦[,1]	Flurox-24♦[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦[,7]
Intermediate wheatgrass	Seedling	2,4-D Buctril M♦[,5] Flurox-24♦[5]	OcTTain[5] MCPA	MPower RX Pardner♦[,5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦[,7]
	Established	2,4-D Ally♦[,1]	Flurox-24♦[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦[,7]
Creeping red fescue	Seedling	2,4-D Basagran♦[,5] Buctril M♦[,5]	Express SG[2] Flurox-24♦[5] MCPA	MPower RX OcTTain[5] Pardner♦[,5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦[,7]
	Established	2,4-D Ally♦[1]	Flurox-24♦[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦[,7]
Tall fescue	Seedling	2,4-D Buctril M♦[,5]	Flurox-24 [5] MCPA	MPower RX OcTTain[5]	Refine SG	Spectrum♦[,5]
	Established	2,4-D Flurox-24 [5]	MCPA MPower RX	OcTTain[5] Prestige XC♦[,5]	Refine SG Spectrum♦[,5]	Sword♦[,7]
Orchard grass	Seedling	2,4-D Basagran♦[,5]	Buctril M♦[,5] MCPA	MPower RX Pardner♦[,5]	Refine SG	Sword♦[,7]
	Established	2,4-D Ally♦[,1]	MCPA	MPower RX	Refine SG	Sword♦[,7]
Timothy	Seedling	2,4-D Basagran♦[,5] Buctril M♦[,5]	Curtail M♦ Express SG[2] Flurox-24[5]	Infinity[5] MCPA OcTTain[5]	Pardner♦[,5] Prestige XC♦[,5]	Spectrum♦[,5] Sword♦[,7]
	Established	2,4-D Ally♦	Buctril M♦[,5] Curtail M♦	Flurox-24[5] MCPA	OcTTain[5] Prestige XC♦[,5]	Spectrum♦[,5] Sword♦[,7]
Hay and grazing	With Legumes	Embutox ♦	Tropotox Plus♦			
	No Legumes	2,4-D	Embutox ♦	MCPA	Tropotox Plus♦	

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Herbicide selector chart – forage grasses

Crop	Crop stage	Leafy spurge		Mustards			
Meadow bromegrass	Seedling	Flurox-24[1,5] MCPA[1]	OcTTain[5,1]	Express SG[2] Flurox-24[5]	MCPA MPower RX	OcTTain[5]	Spectrum♦[,5]
	Established	Flurox-24[1,5] MCPA[1]	OcTTain[5,1]	Flurox-24[5] MCPA	MPower RX	OcTTain[5]	Spectrum♦[,5]
Smooth bromegrass	Seedling	2,4-D[1] Flurox-24[1,5]	MCPA[1] OcTTain[5,1]	2,4-D Basagran♦[,5] Buctril M♦[,5]	Express SG[2] Flurox-24[5] MCPA	MPower RX Pardner♦[,5]	Spectrum♦[,5] Sword♦[,7]
	Established	2,4-D[1] MCPA[1]	OcTTain[5,1]	2,4-D Flurox-24[5]	MCPA MPower RX	OcTTain[5,1] Spectrum♦[,5]	Sword♦[,7]
Crested wheatgrass	Seedling	2,4-D[1] Flurox-24[1,5]	MCPA[1] OcTTain[5,1]	2,4-D Basagran♦[,5] Buctril M♦[,5]	Flurox-24[5] MCPA MPower RX	OcTTain[5] Pardner♦[,5]	Spectrum♦[,5] Sword♦[,7]
	Established	2,4-D[1] MCPA[1]	OcTTain[5,1]	2,4-D Ally♦	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Spectrum♦[,5] Sword♦[,7]
Intermediate wheatgrass	Seedling	2,4-D[1] Flurox-24[1,5]	MCPA[1] OcTTain[5,1]	2,4-D Buctril M♦[,5] Flurox-24[5]	MCPA MPower RX	OcTTain[5] Pardner♦[,5]	Spectrum♦[,5] Sword♦[,7]
	Established	2,4-D[1] Flurox-24[1,5]	MCPA[1] OcTTain[5,1]	Ally♦ Flurox-24[5]	MCPA MPower RX	OcTTain[5] Spectrum♦[,5]	Sword♦[,7]
Creeping red fescue	Seedling	2,4-D[1] Flurox-24[1,5]	MCPA[1] OcTTain[5,1]	2,4-D Basagran♦[,5] Buctril M♦[,5]	Express SG[2] Flurox-24[5] MCPA	MPower RX OcTTain[5] Pardner♦[,5]	Spectrum♦[,5] Sword♦[,7]
	Established	2,4-D[1] Flurox-24[1,5]	MCPA[1] OcTTain[5,1]	2,4-D Ally♦	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Spectrum♦[,5] Sword♦[,7]
Tall fescue	Seedling	2,4-D[1] Flurox-24[1,5]	MCPA[1] OcTTain[5,1]	2,4-D Buctril M♦[,5]	Flurox-24♦[5] MCPA	MPower RX OcTTain[5]	Spectrum♦[,5]
	Established	2,4-D[1] Flurox-24[1,5]	MCPA[1] OcTTain[5,1]	2,4-D Flurox-24♦[5]	MCPA MPower RX	OcTTain[5] Spectrum♦[,5]	Sword♦[,7]
Orchard grass	Seedling	2,4-D[1]	MCPA[1]	2,4-D Basagran♦[,5]	Buctril M♦[,5] MCPA	MPower RX Pardner♦[,5]	Sword♦[,7]
	Established	2,4-D[1]	MCPA[1]	2,4-D Ally♦	MCPA	MPower RX	Sword♦[,7]
Timothy	Seedling	2,4-D[1] Flurox-24[1,5]	MCPA[1] OcTTain[5,1]	2,4-D Basagran♦[,5] Buctril M♦[,5]	Curtail M♦ Express SG[2] Flurox-24[5]	Infinity[5] MCPA OcTTain[5]	Pardner♦[,5] Spectrum♦[,5] Sword♦[,7]
	Established	2,4-D[1] Flurox-24[1,5]	MCPA[1] OcTTain[5,1]	2,4-D Buctril M♦	Curtail M♦ Flurox-24[5]	MCPA Spectrum♦[,5]	Sword♦[,7]
Hay and grazing	With Legumes			Embutox ♦	Tropotox Plus♦		
	No Legumes	2,4-D[1] MCPA[1]	Tordon 22K	2,4-D	Embutox ♦	MCPA	Tropotox Plus♦

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Herbicide selector chart – forage grasses

Crop	Crop stage	Narrow-leaved Hawk's-beard		Night-flowering catchfly		
Meadow bromegrass	Seedling	MPower RX Express SG[2]	Refine SG			
	Established	MPower RX	Refine SG	Sword♦		
Smooth bromegrass	Seedling	2,4-D[1] Express SG[2]	MPower RX Refine SG	Buctril M♦,[5]	Pardner♦,[5]	Sword♦
	Established	2,4-D[1] Infinity	MPower RX Refine SG	Sword♦,[7]		
Crested wheatgrass	Seedling	2,4-D[1] MPower RX	Refine SG	Buctril M♦,[5]	Pardner♦	Sword♦
	Established	2,4-D[1] Ally♦	MPower RX Refine SG	Sword♦		
Intermediate Wheatgrass	Seedling	2,4-D[1] MPower RX	Refine SG	Buctril M♦,[5]	Pardner♦,[5]	Sword♦
	Established	2,4-D[1] Ally♦	MPower RX Refine SG	Sword♦		
Creeping red fescue	Seedling	2,4-D[1] Express SG[2]	MPower RX Refine SG	Buctril M♦,[5]	Pardner♦,[5]	Sword♦
	Established	2,4-D[1] Ally♦ Infinity	MPower RX Refine SG	Sword♦		
Tall fescue	Seedling	2,4-D[1] MPower RX	Refine SG	Buctril M♦,[5]		
	Established	2,4-D[1] MPower RX	Refine SG	Sword♦		
Orchard grass	Seedling	2,4-D[1] MPower RX	Refine SG	Buctril M♦,[5]	Pardner♦,[5]	Sword♦
	Established	2,4-D[1] Ally♦	MPower RX Refine SG	Sword♦		
Timothy	Seedling	2,4-D[1] Express SG[2]	Infinity[5]	Buctril M♦,[5]	Pardner♦,[5]	Sword♦
	Established	2,4-D[1] Ally♦,[7]	Infinity[5]	Buctril M[5]	Sword♦	
Hay and grazing	With Legumes	Embutox♦ (all fall applied)				
	No Legumes	2,4-D[1]	Embutox♦ (all fall applied)			

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Herbicide selector chart – forage grasses

Crop	Crop stage	Perennial sow thistle				Plantain	Prickly lettuce
Meadow bromegrass	Seedling	Flurox-24[1,5]	OcTTain[1,5]	Prestige XC♦[,5]	Spectrum♦[,1,5]		MCPA
	Established	Flurox-24[1,5] Infinity[1]	OcTTain[1,5] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦[,1,7]			MCPA
Smooth bromegrass	Seedling	2,4-D[1] Buctril M♦[,1,5] Engenia♦[,1]	Flurox-24[1,5] Lontrel♦	OcTTain[1,5] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦		MCPA
	Established	2,4-D[1] Flurox-24[1,5] Lontrel♦	Infinity[1] MCPA[1]	OcTTain[1,5] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦		MCPA
Crested wheatgrass	Seedling	2,4-D[1] Buctril M♦[,1,5] Engenia♦[,1]	Flurox-24[1,5] Lontrel♦	OcTTain[1,5] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦		MCPA
	Established	2,4-D[1] Ally♦[,1]	Flurox-24[1,5] Lontrel♦	MCPA[1] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦		MCPA
Intermediate wheatgrass	Seedling	2,4-D[1] Buctril M♦[,1,5] Engenia♦[,1]	Flurox-24[1,5] Lontrel♦	OcTTain[1,5] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦		MCPA
	Established	2,4-D[1] Ally♦[,1] Flurox-24[1,5]	Lontrel♦ MCPA[1]	OcTTain[1,5] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦		MCPA
Creeping red fescue	Seedling	2,4-D[1] Buctril M♦[,1,5] Engenia♦[,1]	Flurox-24[1,5] Lontrel♦	OcTTain[1,5] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦		MCPA
	Established	2,4-D[1] Ally♦[,1] Engenia♦[,1]	Flurox-24[1,5] Infinity[1] Lontrel♦	MCPA[1] OcTTain[1,5] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦		MCPA
Tall fescue	Seedling	2,4-D[1] Flurox-24[1,5]	Buctril M♦[,1,5] Engenia♦[,1]	Lontrel♦ OcTTain[1,5]	Spectrum♦[,1,5]		MCPA
	Established	2,4-D[1] Flurox-24[1,5]	Lontrel♦ OcTTain[1,5]	Prestige XC♦[,5] Spectrum♦[,1,5]	Sword♦		MCPA
Orchard grass	Seedling	2,4-D[1] Buctril M♦[,1,5]	Engenia♦[,1]	Lontrel♦	Sword♦		MCPA
	Established	2,4-D[1]	Ally♦[,1]	Lontrel♦	Sword♦		MCPA
Timothy	Seedling	2,4-D[1] Buctril M♦[,1,5] Curtail M♦	Engenia♦[,1] Flurox-24[1,5] Infinity[1,5]	Lontrel♦ OcTTain[1,5] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦		MCPA
	Established	2,4-D[1] Ally♦[,1] Buctril M♦[,1]	Curtail M♦ Flurox-24[1,5] Lontrel♦	MCPA[1] OcTTain[1,5] Prestige XC♦[,5]	Spectrum♦[,1,5] Sword♦		MCPA
Hay and grazing	With Legumes	Embutox♦[,1]	Tropotox Plus♦[,1]			Tropotox Plus♦[,1]	
	No Legumes	2,4-D[1] Embutox♦[,1]	Escort[1] Lontrel♦	MCPA[1] Tropotox Plus♦[,1]	Tordon 22K	Grazon Tropotox Plus♦[,1]	Grazon MCPA

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Herbicide selector chart – forage grasses

Crop	Crop stage	Quack grass	Redroot pigweed				
Meadow bromegrass	Seedling		Express SG[2] Flurox-24[5]	MPower RX OcTTain[5]	Prestige XC♦[,5]	Refine SG	Spectrum♦[,5]
	Established		Flurox-24[5] Infinity	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5]	Sword♦
Smooth bromegrass	Seedling		2,4-D Basagran♦[,5] Buctril M♦[,5]	Express SG[2] Flurox-24[5] MPower RX	OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦
	Established		2,4-D Flurox-24[5]	Infinity MCPA[1]	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦
Crested wheatgrass	Seedling		2,4-D Basagran♦[,1,5]	Buctril M♦[,5] Flurox-24[5]	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦
	Established		2,4-D Ally♦	Flurox-24[5] MCPA[1]	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦
Intermediate wheatgrass	Seedling		2,4-D Buctril M♦[,5]	Flurox-24[5] MPower RX	OcTTain[5] Prestige XC♦[,5]	Refine SG Spectrum♦[,5]	Sword♦
	Established		2,4-D Ally♦	Flurox-24[5] MPower RX	MCPA[1] OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦
Creeping red fescue	Seedling	Assure II♦[,5] Poast Ultra[5]	2,4-D Basagran♦[,1,5] Buctril M[5]	Express SG[2] Flurox-24[5]	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦
	Established	Assure II♦[,5] Poast Ultra[5]	2,4-D Ally♦ Basagran♦[,1,5]	Flurox-24[5] Infinity MCPA[1]	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦
Tall fescue	Seedling		2,4-D Buctril M♦[,5]	Flurox-24[5] MPower RX	OcTTain[5]	Refine SG	Spectrum♦[,5]
	Established		2,4-D Flurox-24[5]	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5]	Sword♦
Orchard grass	Seedling		2,4-D Basagran♦[,5]	Buctril M♦[,5]	MPower RX	Refine SG	Sword♦
	Established		2,4-D	Ally♦	MPower RX	Refine SG	Sword♦
Timothy	Seedling		2,4-D Basagran♦[,5] Buctril M♦[,5]	Curtail M♦ Express SG[2] Flurox-24[5]	Infinity[5] OcTTain[5]	Pardner♦[,5] Prestige XC♦[,5]	Spectrum♦[,5] Sword♦
	Established		2,4-D Ally♦ Basagran♦[,1,5]	Buctril M♦[,5] Curtail M♦	Flurox-24[5] MCPA[1]	OcTTain[5] Prestige XC♦[,5]	Spectrum♦[,5] Sword♦
Hay and grazing	With Legumes		Embutox♦	Tropotox Plus♦			
	No Legumes		2,4-D	Embutox♦	MCPA	Tropotox Plus♦	

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Herbicide selector chart – forage grasses

Crop	Crop stage	Russian thistle				Scentless chamomile (seedlings)		
Meadow bromegrass	Seedling	Express SG[2] Flurox-24[5]	MPower RX	OcTTain[5]	Refine SG	Express SG[2]	MPower RX[1]	Prestige XC[♦,5]
	Established	Infinity[7] Flurox-24[5]	MPower RX	Refine SG	Sword[♦]	MPower RX[1]	Prestige XC[♦,5]	
Smooth bromegrass	Seedling	2,4-D Basagran[♦,5] Buctril M[♦,5]	Express SG[2] Flurox-24[5] MPower RX	OcTTain[5] Pardner[♦,5]	Refine SG Sword[♦]	Buctril M[♦,5] Express SG[2]	Lontrel[♦] MPower RX[1]	Pardner[♦,5] Prestige XC[♦,5]
	Established	2,4-D Flurox-24[5]	Infinity MPower RX	OcTTain[5] Refine SG	Sword[♦]	Lontrel[♦]	MPower RX[1]	Prestige XC[♦,5]
Crested wheatgrass	Seedling	2,4-D Basagran[♦,5] Buctril M[♦,5]	Flurox-24[5] MPower RX	OcTTain[5] Pardner[♦,5]	Refine SG Sword[♦]	Buctril M[♦,5] Lontrel[♦]	MPower RX[1] OcTTain[5]	Pardner[♦,5] Prestige XC[♦,5]
	Established	2,4-D Ally[♦,1]	Flurox-24[5] MPower RX	OcTTain[5] Refine SG	Sword[♦]	Ally[♦] Lontrel[♦]	MPower RX[1]	Prestige XC[♦,5]
Intermediate wheatgrass	Seedling	2,4-D Buctril M[♦,5]	Flurox-24[5] MPower RX	OcTTain[5] Pardner[♦,5]	Refine SG Sword[♦]	Buctril M[♦,5] Lontrel[♦]	MPower RX[1] Pardner[5]	Prestige XC[♦,5]
	Established	2,4-D Ally[♦,1]	Flurox-24[5] MPower RX	OcTTain[5] Refine SG	Sword[♦]	Ally[♦] Lontrel[♦]	MPower RX[1]	Prestige XC[♦,5]
Creeping red fescue	Seedling	2,4-D Basagran[♦,5] Buctril M[♦,5]	Express SG[2] Flurox-24[5] MPower RX	OcTTain[5] Pardner[♦,5]	Refine SG Sword[♦]	Buctril M[♦,5] Express SG[2]	Lontrel[♦] MPower RX[1]	Pardner[♦,5] Prestige XC[♦,5]
	Established	2,4-D Ally[♦,1]	Flurox-24[5] Infinity[7]	MPower RX OcTTain[5]	Refine SG Sword[♦]	Ally[♦] Lontrel[♦]	MPower RX[1]	Prestige XC[♦,5]
Tall fescue	Seedling	2,4-D Buctril M[♦,5]	Flurox-24[5] MPower RX	OcTTain[5]	Refine SG	Buctril M[♦,5]	Lontrel[♦]	MPower RX[1]
	Established	2,4-D Flurox-24[5]	MPower RX OcTTain[5]	Refine SG	Sword[♦]	Lontrel[♦]	MPower RX[1]	Prestige XC[♦,5]
Orchard grass	Seedling	2,4-D Basagran[♦,5]	Buctril M[♦,5] MPower RX	Pardner[♦,5] Refine SG	Sword[♦]	Buctril M[♦,5] Lontrel[♦]	MPower RX[1]	Pardner[♦,5]
	Established	2,4-D Ally[♦]	MPower RX	Refine SG	Sword[♦]	Ally[♦]	Lontrel[♦]	MPower RX[1]
Timothy	Seedling	2,4-D Basagran[♦,5] Buctril M[♦,5]	Express SG[2] Flurox-24[5]	Infinity[5] OcTTain[5]	Pardner[♦,5] Sword[♦]	Buctril M[♦,5] Curtail M[♦]	Express SG[2] Lontrel[♦]	Pardner[♦,5] Prestige XC[♦,5]
	Established	2,4-D	Buctril M[♦,5]	Flurox-24[5]	Sword[♦]	Ally[♦,7] Buctril M[♦]	Curtail M[♦] Lontrel[♦]	Prestige XC[♦,5]
Hay and grazing	With Legumes							
	No Legumes	2,4-D	Escort	Sword[♦]		Escort	Lontrel[♦]	Tordon 22K

♦ Other similar products can be found listed under this product.
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4 Under irrigation only
5 Seed production only
6 Underseeding only
7 Forage production only
8 Fall application only

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Herbicide selector chart – forage grasses

Crop	Crop stage	Shepherd's-purse (seedlings)				
Meadow bromegrass	Seedling	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5]	Refine SG	Spectrum♦,[5]
	Established	Attain XC♦,[5] Flurox-24[5]	Infinity MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦
Smooth bromegrass	Seedling	2,4-D Basagran♦,[5] Buctril M♦,[5]	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦
	Established	2,4-D Flurox-24[5] Infinity	Flurox-24[5] MCPA[5]	MPower RX OcTTain[5]	Prestige XC♦ Refine SG	Spectrum♦,[5] Sword♦
Crested wheatgrass	Seedling	2,4-D Basagran♦,[5]	Buctril M♦,[5] Flurox-24[5]	MCPA OcTTain[5] MPower RX	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦
	Established	2,4-D Ally♦ Attain XC♦,[5]	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦
Intermediate wheatgrass	Seedling	2,4-D Buctril M♦,[5]	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦
	Established	2,4-D Ally♦	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦
Creeping red fescue	Seedling	2,4-D Basagran♦,[5] Buctril M♦,[5]	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦
	Established	2,4-D Ally♦ Flurox-24[5]	Infinity MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦
Tall fescue	Seedling	2,4-D Buctril M♦,[5]	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Refine SG	Spectrum♦,[5]
	Established	2,4-D Flurox-24[5]	MCPA MPower RX	OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦
Orchard grass	Seedling	2,4-D Basagran♦,[5]	Buctril M♦,[5] MCPA	MPower RX	Refine SG	Sword♦
	Established	2,4-D Ally♦	MCPA	MPower RX	Refine SG	Sword♦
Timothy	Seedling	2,4-D Basagran♦,[5] Buctril M♦,[5]	Curtail M♦ Flurox-24[5]	Infinity[5] MCPA	OcTTain[5] Prestige XC♦,[5]	Spectrum♦,[5] Sword♦
	Established	2,4-D Ally♦ Attain XC♦,[5]	Buctril M♦ Curtail M♦	Flurox-24[5] MCPA	OcTTain[5] Prestige XC♦,[5]	Spectrum♦,[5] Sword♦
Hay and grazing	With Legumes	Embutox♦	Tropotox Plus♦			
	No Legumes	2,4-D	Embutox♦	MCPA	Tropotox Plus♦	

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Herbicide selector chart – forage grasses

Crop	Crop stage	Stinkweed (seedlings)					Tansy	Toadflax	
Meadow bromegrass	Seedling	Express SG[2] Flurox-24[5]	MCPA MPower RX	OcTTain[5] Prestige XC♦,[5]	Refine SG	Spectrum♦,[5]		MPower RX[1]	Refine SG[1]
	Established	Attain XC♦,[5] Deploy♦ Flurox-24[5]	Infinity MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦		MPower RX[1]	Refine SG[1]
Smooth bromegrass	Seedling	2,4-D Basagran♦,[5] Buctril M♦,[5]	Express SG[2] Flurox-24[5] MCPA	MPower RX Pardner♦,[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦		MPower RX[1]	Refine SG[1]
	Established	2,4-D Flurox-24[5]	MCPA MPower RX	Prestige XC♦,[5] Refine SG	Spectrum♦,[5]	Sword♦		MPower RX[1]	Refine SG[1]
Crested wheatgrass	Seedling	2,4-D Basagran♦,[5] Buctril M♦,[5]	Flurox-24[5] MCPA MPower RX	OcTTain[5] Pardner♦,[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦		MPower RX[1]	Refine SG[1]
	Established	2,4-D Ally♦	Flurox-24[5] MPower RX	MCPA OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦		Ally♦,[1] MPower RX[1]	Refine SG[1]
Intermediate wheatgrass	Seedling	2,4-D Buctril M♦,[5] Flurox-24[5]	MCPA MPower RX	OcTTain[5] Pardner♦,[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦		MPower RX[1]	Refine SG[1]
	Established	2,4-D Ally♦	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦		Ally♦,[1] MPower RX	Refine SG[1]
Creeping red fescue	Seedling	2,4-D Basagran♦,[5] Buctril M♦,[5]	Express SG[2] Flurox-24[5] MCPA	MPower RX OcTTain[5] Pardner♦,[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦		MPower RX[1]	Refine SG[1]
	Established	2,4-D Ally♦	Flurox-24[5] MCPA	MPower RX OcTTain[5]	Prestige XC♦,[5] Refine SG	Spectrum♦,[5] Sword♦		Ally♦,[1] MPower RX[1]	Refine SG[1]
Tall fescue	Seedling	2,4-D Buctril M♦,[5]	Flurox-24[5] MPower RX	MCPA OcTTain[5]	Refine SG	Spectrum♦,[5]		MPower RX[1]	Refine SG[1]
	Established	2,4-D Flurox-24[5]	MCPA MPower RX	OcTTain[5] Prestige XC♦,[5]	Refine SG Spectrum♦,[5]	Sword♦		MPower RX[1]	Refine SG[1]
Orchard grass	Seedling	2,4-D Basagran♦,[5]	Buctril M♦,[5] MCPA	MPower RX Pardner♦,[5]	Refine SG	Sword♦		MPower RX[1]	Refine SG[1]
	Established	2,4-D Ally♦	MCPA	MPower RX	Refine SG	Sword♦		Ally♦,[1] MPower RX[1]	Refine SG[1]
Timothy	Seedling	2,4-D Basagran♦,[5] Buctril M♦,[5]	Curtail M♦ Express SG[2] Flurox-24[5]	Infinity[5] MCPA OcTTain[5]	Pardner♦,[5] Prestige XC♦,[5]	Spectrum♦,[5] Sword♦			
	Established	2,4-D Ally♦	Buctril M♦ Curtail M♦	Flurox-24[5] MCPA	OcTTain[5] Prestige XC♦,[5]	Spectrum♦,[5] Sword♦		Ally♦,[1]	
Hay and grazing	With Legumes	Embutox♦	Tropotox Plus♦						
	No Legumes	2,4-D	Embutox	MCPA	Tropotox Plus♦		Escort	Tordon 22K	

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Herbicide selector chart – forage grasses

Crop	Crop stage	Wild buckwheat					Wild oats
Meadow bromegrass	Seedling	2,4-D[1] Express SG[2]	Flurox-24[5] Ikwin[5]	MCPA[1] MPower RX	Prestige XC♦[,5] Refine SG	Spectrum♦[,5]	Express SG[2]
	Established	2,4-D[1] Flurox-24[5] Ikwin	Infinity MCPA[1]	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦	
Smooth bromegrass	Seedling	2,4-D[1,5] Buctril M♦[,5] Engenia♦	Express SG[2] Flurox-24[5] Ikwin[5]	Lontrel♦ MCPA MPower RX	OcTTain[5] Pardner[5] Prestige XC♦[,5]	Refine SG Spectrum♦[,5] Sword♦	Express SG[2]
	Established	2,4-D[1] Flurox-24[5] Ikwin[5]	Infinity Lontrel♦ MCPA[1]	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦	
Crested wheatgrass	Seedling	2,4-D[1] Buctril M♦[,5] Engenia♦	Flurox-24[5] Ikwin[5] Lontrel♦	MCPA[1] MPower RX OcTTain[5]	Pardner♦[,5] Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦	
	Established	2,4-D[1] Ally♦[,1] Flurox-24[5]	Ikwin[5] Lontrel♦ MCPA[1]	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦	
Intermediate wheatgrass	Seedling	2,4-D[1] Attain XC[5] Buctril M♦[,5]	Engenia♦ Flurox-24[5] Ikwin[5]	Lontrel♦ MCPA[1] MPower RX	OcTTain[5] Pardner♦[,5] Prestige XC♦[,5]	Refine SG Spectrum♦[,5] Sword♦	
	Established	2,4-D[1] Ally♦[,1] Attain XC♦[,5]	Flurox-24[5] Ikwin[5] Lontrel♦	MCPA[1] MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦	
Creeping red fescue	Seedling	2,4-D[1] Buctril M♦[,5] Engenia♦	Express SG[2] Flurox-24[5] Ikwin[5]	Lontrel♦ OcTTain[5] MCPA[1]	MPower RX Pardner♦[,5] Prestige XC♦[,5]	Refine SG Spectrum♦[,5] Sword♦	Assure II♦[,5] Express SG[2] Poast Ultra[5]
	Established	2,4-D[1] Ally♦[,1] Engenia♦	Flurox-24[5] Ikwin[5] Infinity	Lontrel♦ MCPA[1] MPower RX	OcTTain[5] Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦	Assure II♦[,5] Poast Ultra[5]
Tall fescue	Seedling	2,4-D[1] Buctril M♦[,5] Engenia♦	Flurox-24[5] Ikwin[5]	Lontrel♦ MCPA[1]	MPower RX OcTTain[5]	Refine SG Spectrum♦[,5]	
	Established	2,4-D[1] Flurox-24[5] Ikwin[5]	Lontrel♦ MCPA[1]	MPower RX OcTTain[5]	Prestige XC♦[,5] Refine SG	Spectrum♦[,5] Sword♦	
Orchard grass	Seedling	2,4-D[1] Buctril M♦[,5]	Engenia♦ Lontrel♦	MCPA[1]	Pardner♦[,5]	Refine SG Sword♦	
	Established	2,4-D[1] Ally♦[,1]	Lontrel♦ MCPA[1]	MPower RX	Refine SG	Sword♦	
Timothy	Seedling	2,4-D[1] Buctril M♦[,5] Curtail M♦	Engenia♦ Express SG[2] Flurox-24[5]	Ikwin[5] Infinity[5] Lontrel♦	MCPA[1] Pardner♦[,5] Prestige XC♦[,5]	Spectrum♦[,5] Sword♦	Express SG[2]
	Established	2,4-D[1] Ally♦[,1] Buctril M♦	Curtail M♦ Flurox-24[5] Ikwin[5]	Lontrel♦ OcTTain[5]	MCPA[1] Prestige XC♦[,5]	Spectrum♦[,5] Sword♦	
Hay and grazing	With Legumes	Embutox♦					
	No Legumes	2,4-D[1]	Engenia♦	Embutox♦	Lontrel♦	MCPA[1]	

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Herbicide selector chart – other crops

Crop	American nightshade	Annual smartweed/lady's-thumb			Annual sow-thistle	
Beans Check label	Dual II Magnum♦	Basagran♦ Express SG[6]	MP Boa IQ Permit	Quasar	Goldwing[1,6]	
Canary seed	Buctril M♦ Pardner♦	Buctril M♦ Engenia♦ Express SG[6]	Pardner♦ Sword♦ Trophy♦		Clever♦,[1] Conquer[1,6] Curtail M♦	Goldwing[1,2] Prestige XC♦ Sword♦
Chickpeas		Express SG[6]	Squadron		Goldwing[1,6]	
Field corn	Buctril M♦ Dual II Magnum♦ Pardner♦ Primextra II Magnum	2,4-D Aatrex Liquid 480 Armezon♦ Basagran♦ Buctril M♦ Complete[6]	Distinct Embutox♦ Engenia♦ Heat Complete[6] MCPA Amine[1] MCPA K-salt	MCPA Na-salt Pardner♦ Permit Primextra II Magnum Princep Nine-T♦	2,4-D Conquer[1,6] Goldwing[1,2] MCPA Amine[1]	MCPA K-salt MCPA Na-salt Tropotox Plus♦
Liberty link corn		Heat Complete[6] Liberty♦			Conquer[1,6] Goldwing[1,2]	
Roundup ready corn	glyphosate	Armezon♦	glyphosate	Heat Complete[6]	Conquer[1,6] glyphosate	Goldwing[1,2]
Sweet corn	Buctril M♦ Dual II Magnum♦ Pardner♦	Aatrex Liquid 480 Armezon♦	Basagran♦ Buctril M♦	Heat Complete[6] Pardner♦	Goldwing[1,2]	
Faba beans		Basagran♦	Express SG[6]	MP Boa IQ	Goldwing[1,6]	
Lentils		Ares[4] Express SG[6]	Heat Complete[6] Odyssey♦,[4]	Squadron	Goldwing[1,6]	
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Dual II Magnum♦	Basagran♦ Express SG[6] Heat Complete[6] MCPA Amine[1] MCPA Na-salt	MP Boa IQ MP Ninja Master MPower Anaconda Odyssey♦ Pursuit♦	Quasar Solo♦ Squadron Viper♦	Goldwing[1,2] MCPA Amine[1]	MCPA Na-salt[1] Tropotox Plus♦,[1]
Potatoes irrigated (irr)	Dual II Magnum♦	Squadron	Titus Pro			

♦ Other similar products can be found listed under this product.
1 Suppression only
2 Pre-emergence to crop, post-emergent to weeds
3 Used as crop desiccant
4 Group 2 tolerant lentils only
5 Non-Group 2 tolerant varieties
6 To be used pre-seed as a burnoff.

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Herbicide selector chart – other crops

Crop	Barnyard grass		Canada thistle		Cleavers	
Beans Check label	Assure II♦ Dual II Magnum♦ Edge Eptam MP Boa IQ	Poast Ultra Quasar[1] Select♦ Solo♦ Trifluralin♦	Basagran♦ Express SG[1,6]		Aim[6] Basagran♦ Edge[1] Goldwing[6]	Heat[6] MP Boa IQ Solo♦,[1]
Canary seed	Clever♦		Buctril M♦,[1] Curtail M♦ Engenia♦,[1]	Express SG[1,6] Prestige XC♦	Clever♦ Conquer[6] Engenia♦ Goldwing[2]	Heat[6] Prestige XC♦ Sword♦ Trophy♦
Chickpeas	Assure II♦ Authority Supreme[6]	Poast Ultra Select♦	Express SG[1,6]		Aim[6] Authority[1,6] Authority Supreme[6]	Goldwing[6] Heat[6]
Field corn	Accent♦ Dual II Magnum♦ Focus[6]	Primextra II Magnum Princep Nine-T♦ Shieldex	Basagran♦ Buctril M♦,[1] Distinct[1] Embutox♦,[1] Engenia♦,[1]	MCPA Amine[1] MCPA K-salt[1] MCPA Na-salt[1] Tropotox Plus♦,[1]	Aim[6] Basagran♦ Conquer[6] Engenia♦	Focus[6] Goldwing[2] Heat[6] Heat Complete[1,6]
Liberty link corn	Liberty♦		Liberty♦		Aim[6] Conquer[6]	Goldwing[2] Heat Complete[1,6]
Roundup Ready corn	glyphosate		glyphosate		Aim[6] Conquer[6] glyphosate	Goldwing[2] Heat Complete[1,6]
Sweet corn	Accent♦	Dual II Magnum♦ Shieldex	Basagran♦,[1] Buctril M♦,[1]		Aim[6] Basagran♦	Goldwing[2] Heat Complete[1,6]
Faba beans	Assure II Edge MP Boa IQ	Poast Ultra Trifluralin♦	Basagran♦	Express SG[1,6]	Aim[6] Authority[1,6] Basagran♦	Edge[1] Goldwing[6] MP Boa IQ
Lentils	Ares[4] Assure II♦ Edge Focus[6] Odyssey♦,[4]	Poast Ultra Select♦ Solo♦,[4] Trifluralin♦	Express SG[1,6]		Aim[6] Ares[4] Edge[1] Focus[6] Goldwing[6]	Heat[6] Heat Complete[1,6] Odyssey♦,[4] Solo♦,[1,4]
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Assure II♦ Authority Supreme[6] Dual II Magnum♦ Edge MP Boa IQ MPower Anaconda MPower Samurai Master	Odyssey♦ Poast Ultra Quasar[1] Select♦ Solo♦ Trifluralin♦ Viper♦	Amine[1] Basagran♦,[1] Express SG[1,6]	MCPA MCPA Na-salt[1] Tropotox Plus♦,[1]	Aim[6] Authority[1,6] Authority Supreme[6] Basagran♦ Edge[1] Goldwing[2] Heat[6] Heat Complete[1,6] MP Boa IQ	MP Ninja Master[1] MPower Anaconda[1] MPower Samurai Master Odyssey♦ Pursuit♦ Solo♦,[1] Viper♦,[1]
Potatoes irrigated (irr)	Dual II Magnum♦ Eptam Poast Ultra	Prism (irr) Select♦ Titus Pro			Aim[6]	

♦ Other similar products can be found listed under this product.
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3 Used as crop desiccant
4 Group 2 tolerant lentils only
5 Non-Group 2 tolerant varieties
6 To be used pre-seed as a burnoff.

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Herbicide selector chart – other crops

Crop	Cocklebur		Common chickweed		Common groundsel		Corn spurry
Beans Check label	Aim[6] Basagran♦	MP Boa IQ Permit	Basagran♦ Edge Eptam MP Boa IQ	Permit Quasar Trifluralin♦	Basagran♦ MP Boa IQ Permit		Aim[6] Basagran♦ Edge Eptam MP Boa IQ Permit
Canary seed	Buctril M♦ Pardner♦	Trophy♦	Prestige XC♦		Buctril M♦ Curtail M♦	Pardner♦	Engenia♦ Sword♦
Chickpeas	Aim[6]		Squadron		Authority[6] Authority Supreme[6]		Aim[6] Squadron
Field corn	2,4-D Aim[6] Basagran♦ Buctril M♦ Distinct MCPA amine	MCPA K-salt MCPA Na-salt Pardner♦ Permit Shieldex	2,4-D Armezon♦	Basagran♦ Permit	2,4-D Basagran♦ Buctril M♦	Pardner♦ Permit	Aim[6] Engenia♦ Basagran♦ Permit
Liberty Link corn	Aim[6]	Liberty♦	Liberty♦				Aim[6]
Roundup Ready corn	Aim[6] glyphosate	Primextra II Magnum Princep Nine-T♦	Armezon♦ glyphosate	Primextra II Magnum Princep Nine-T♦			Aim[6] glyphosate
Sweet corn	Aim[6] Basagran♦ Buctril M♦	Pardner♦ Shieldex	Armezon♦ Basagran♦		Basagran♦ Buctril M♦	Pardner♦	Aim[6] Basagran♦
Faba beans	Aim[6] Basagran♦	MP Boa IQ	Basagran♦ Edge	MP Boa IQ Trifluralin♦	Authority [6] Basagran♦	MP Boa IQ	Aim[6] Basagran♦ Edge MP Boa IQ
Lentils	Aim[6]		Edge Odyssey♦[,4]	Squadron Trifluralin♦			Aim[6] Edge Squadron
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Aim[6] Basagran♦ MCPA amine	MCPA Na-salt MP Boa IQ	Basagran♦ Edge MP Boa IQ MP Ninja Master[1]	Odyssey♦ Pursuit♦ Squadron Trifluralin[1,♦]	Authority[6] Authority Supreme[6] Basagran♦ MP Boa IQ		Aim[6] Basagran♦ Edge MP Boa IQ Squadron
Potatoes irrigated (irr)	Aim[6]		Eptam Squadron	Titus Pro			Aim[6] Eptam Squadron Titus Pro

♦ Other similar products can be found listed under this product.
1 Suppression only
2 Pre-emergence to crop, post-emergent to weeds
3 Used as crop desiccant
4 Group 2 tolerant lentils only
5 Non-Group 2 tolerant varieties
6 To be used pre-seed as a burnoff.

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Herbicide selector chart – other crops

Crop	Cow cockle		Green foxtail		Hairy nightshade	Hemp-nettle
Beans Check label	Edge Express SG[6] Goldwing[1,6]	Solo♦ Trifluralin♦	Assure II♦ Dual II Magnum♦ Edge Eptam Express SG[6] MP Boa IQ	Poast Ultra Quasar Select♦ Solo♦ Trifluralin♦,[1]	Aim[6] Basagran♦ Eptam Pursuit♦	Edge[1] Eptam Express SG[6]
Canary seed	Buctril M♦ Conquer[1,6] Engenia♦ Express SG[6]	Goldwing[1,6] Pardner♦ Sword♦	Clever♦ Express SG[6]			Express SG[6] Prestige XC♦,[1] Sword♦ Trophy♦
Chickpeas	Authority Supreme[6] Express SG[6]	Goldwing[1,6]	Assure II♦ Authority Supreme[6]	Express SG[6] Poast Ultra Select♦	Aim[6]	Express SG[6] Squadron
Field corn	Buctril M♦ Conquer[1,6] Engenia♦	Goldwing[2] Pardner♦	Accent♦ Dual II Magnum♦ Focus[2,6] Heat Complete[1,6]	Primextra II Magnum Shieldex Steadfast IS	Aim[6] Basagran♦	MCPA Amine[1] MCPA K-salt[1] MCPA Na-salt[1] Tropotox Plus♦,[1]
Liberty Link corn	Conquer[1,6]	Goldwing[2]	Heat Complete[1,6]	Liberty♦		
Roundup Ready corn	Conquer[1,6] glyphosate Goldwing[2]	Primextra II Magnum Princep Nine-T♦	glyphosate Heat Complete[1,6]	Primextra II Magnum Princep Nine-T♦	Aim[6] glyphosate	glyphosate
Sweet corn	Buctril M♦	Goldwing[2] Pardner♦	Accent♦ Dual II Magnum♦	Heat Complete[1,6] Shieldex	Aim[6] Basagran♦	
Faba beans	Edge Express SG[6]	Goldwing[1,6] Trifluralin♦	Assure II Edge Express SG[6] MP Boa IQ	Poast Ultra Select♦ Trifluralin♦	Aim[6] Basagran♦	Edge Express SG[6]
Lentils	Edge Express SG[6] Goldwing[1,6]	Solo♦,[4] Trifluralin♦	Assure II♦ Express SG[6] Focus[6] Heat Complete[1,6] Odyssey♦,[4]	Poast Ultra Select♦ Solo♦,[4] Trifluralin♦	Aim[6]	Ares[4] Edge Express SG[6] Odyssey♦,[4] Squadron
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Authority Supreme[6] Edge Express SG[6] Goldwing[2] MPower Anaconda MPower Samurai	Master Solo♦ Trifluralin♦ Viper♦	Assure II♦ Authority Supreme[6] Chateau♦,[1,6] Edge Express SG[6] Heat Complete[1,6] MP Boa IQ MP Ninja Master MPower Anaconda MPower Samurai	Master Odyssey♦ Poast Ultra Pursuit♦ Quasar Select♦ Solo♦ Trifluralin♦ Viper♦	Aim[6] Basagran♦ Chateau♦,[6]	Edge[1] Express SG[6] MCPA Amine[1] MCPA Na-salt[1] MP Ninja Master[1] Odyssey♦,[1] Pursuit♦ Squadron Tropotox Plus♦,[1]
Potatoes irrigated (irr)			Chateau♦,[1,6] Dual II Magnum♦ Eptam Poast Ultra	Prism (irr) Select♦ Titus Pro	Aim[6] Chateau♦,[6] Eptam	Squadron Titus Pro

♦ Other similar products can be found listed under this product.
[1] Suppression only
[2] Pre-emergence to crop, post-emergent to weeds
[3] Used as crop desiccant
[4] Group 2 tolerant lentils only
[5] Non-Group 2 tolerant varieties
[6] To be used pre-seed as a burnoff.

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Herbicide selector chart – other crops

Crop	Knotweed	Kochia		Lamb's-quarter		
Beans Check label	Trifluralin♦	Aim[6] Edge	Express SG[6] Goldwing[6]	Aim[6] Basagran♦ Edge Eptam	Express SG[6] Goldwing[6] MP Boa IQ Permit	Quasar Solo♦ Trifluralin♦
Canary seed	Sword♦	Buctril M♦ Conquer[6] Express SG[6] Goldwing[2] Heat[6]	Pardner♦ Prestige XC♦ Sword♦ Trophy♦	Buctril M♦ Conquer[6] Curtail M♦ Express SG[6]	Goldwing[2] Heat[6] Pardner♦ Prestige XC♦	Sword♦ Trophy♦
Chickpeas		Aim[6] Authority♦,[6] Authority Supreme[6]	Goldwing[6] Heat[6] Tough 600	Aim[6] Authority♦,[6]	Authority Supreme[6] Express SG[6] Goldwing[6]	Heat[6] Squadron Tough 600
Field corn	2,4-D	2,4-D Aim[6] Buctril M♦ Conquer[6] Distinct Focus[1,6] Goldwing[2]	Heat[6] Heat Complete[1,6] MCPA amine MCPA K-salt Pardner♦ Tough 600	2,4-D Aatrex Liquid 480 Aim[6] Armezon♦ Basagran♦ Buctril M♦ Conquer[6] Distinct Embutox♦	Focus[1,6] Goldwing[2] Heat[6] Heat Complete[1,6] MCPA amine MCPA K-salt MCPA Na-salt Pardner♦	Permit Primextra II Magnum Princep Nine-T♦ Shieldex Steadfast IS Tropotox Plus♦ Tough 600
Liberty Link corn		Aim[6] Conquer[6]	Goldwing[2] Heat Complete[1,6]	Aim[6] Conquer[6]	Goldwing[2] Heat Complete[1,6]	
Roundup Ready corn		Aim[6] Conquer[6] glyphosate	Goldwing[2] Heat Complete[1,6]	Aim[6] Armezon♦	Conquer[6] glyphosate	Goldwing[2] Heat Complete[1,6]
Sweet corn		Aim[6] Buctril M♦ Goldwing[2]	Heat Complete[1,6] Pardner♦ Tough 600	Aatrex Liquid 480 Aim[6] Armezon♦ Basagran♦	Buctril M♦ Goldwing[2] Heat Complete[1,6]	Pardner♦ Shieldex Tough 600
Faba beans	Trifluralin♦	Aim[6] Authority[6] Express SG[6]	Edge Goldwing[6]	Aim[6] Authority[6] Basagran♦	Edge Express SG[6] Goldwing[6]	MP Boa IQ Trifluralin♦
Lentils	Trifluralin♦	Aim[6] Edge Focus[1,6] Goldwing[6] Heat[6]	Heat Complete[1,6] Odyssey♦,[1,4] Solo♦,[1,4] Tough 600	Ares[4] Aim[6] Express SG[6] Focus[6,1]	Goldwing[6] Heat[6] Heat Complete[1,6] Odyssey♦,[1,4]	Squadron Solo[4,♦] Tough 600 Trifluralin♦
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Trifluralin♦	Aim[6] Authority♦,[6] Authority Supreme[6] Chateau♦,[6] Edge Express SG[6] Goldwing[2] Heat[6]	Heat Complete[1,6] MCPA amine MP Ninja Master[1] MPower Samurai Master Odyssey♦,[1] Solo♦,[1] Tough 600 Viper♦,[1]	Aim[6] Authority♦,[6] Authority Supreme[6] Basagran♦ Chateau♦,[6] Edge Express SG[6] Goldwing[2] Heat[6]	Heat Complete[1,6] MCPA amine MCPA Na-salt MP Boa IQ MP Ninja Master[1] MPower Anaconda MPower Samurai Master	Odyssey♦,[1] Quasar Solo♦ Squadron Tough 600 Trifluralin♦ Tropotox Plus♦ Viper♦
Potatoes irrigated (irr)		Aim[6]	Chateau♦,[6]	Aim[6] Chateau♦,[6]	Eptam Prism[1] (irr)	Squadron

♦ Other similar products can be found listed under this product.

1 Suppression only

2 Pre-emergence to crop, post-emergent to weeds

3 Used as crop desiccant

4 Group 2 tolerant lentils only

5 Non-Group 2 tolerant varieties

6 To be used pre-seed as a burnoff.

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Herbicide selector chart – other crops

Crop	Mustards			Night-flowering catchfly	Perennial sow thistle	
Beans Check label	Aim[6] Basagran♦ Express SG[6]	Goldwing[6] MP Boa IQ Permit	Quasar Solo♦	Goldwing[6]		
Canary seed	Buctril M♦ Conquer[6] Engenia♦	Express SG[6] Goldwing[2] Pardner♦	Sword♦ Trophy♦	Buctril M♦ Conquer[6] Goldwing[2] Sword♦	Buctril M♦,[1] Curtail M♦,[1] Engenia♦,[1]	Prestige XC♦ Sword♦[1]
Chickpeas	Aim[6] Authority Supreme[1,6]	Express SG[6] Goldwing[6]	Squadron Tough 600	Goldwing[6]		
Field corn	2,4-D Aim[6] Aatrex Liquid 480 Armezon♦ Basagran♦ Buctril M♦ Conquer[6]	Embutox♦ Engenia♦ Focus[1,6] Goldwing[2] Heat Complete[1,6] MCPA amine MCPA K-salt	MCPA Na-salt Pardner♦ Permit Primextra II Magnum Tough 600 Tropotox Plus♦	Buctril M♦ Conquer[6] Goldwing[2]	Buctril M♦,[1] Embutox♦ Engenia♦,[1] Heat Complete[1,6] MCPA Amine[1]	MCPA K-salt[1] MCPA Na-salt[1] Princep Nine-T♦ Tropotox Plus♦,[1]
Liberty Link corn	Aim[6] Conquer[6]	Goldwing[2] Heat Complete[1,6]	Liberty♦	Conquer[6] Goldwing[2]	Heat Complete[1,6] Liberty♦	
Roundup Ready corn	Aim[6] Armezon♦ Conquer[6]	glyphosate Goldwing[2] Heat Complete[1,6]		Conquer[6] glyphosate Goldwing[2]	glyphosate Heat Complete[1,6]	
Sweet corn	Aatrex Liquid 480 Aim[6] Armezon♦	Basagran♦ Buctril M♦ Goldwing[2]	Heat Complete[1,6] Pardner♦ Tough 600	Buctril M♦ Goldwing[2]	Buctril M♦,[1] Heat Complete[1,6]	
Faba beans	Aim[6] Basagran♦	Goldwing[6] Express SG[6]	MP Boa IQ	Goldwing[6]		
Lentils	Ares[4] Aim[6] Express SG[6]	Focus[1,6] Goldwing[6] Heat Complete[1,6]	Odyssey♦,[4] Squadron Tough 600	Goldwing[6]	Heat Complete[1,6]	
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Aim[6] Authority Supreme[1,6] Basagran♦ Express SG[6] Goldwing[2] Heat Complete[1,6]	MCPA amine MCPA Na-salt MP Boa IQ Odyssey♦ Pursuit♦ Quasar	Squadron Solo♦ Tough 600 Tropotox Plus♦ Viper♦	Goldwing[2]	Heat Complete[1,6] MCPA Amine[1] MCPA Na-salt[1]	Tropotox Plus♦,[1]
Potatoes irrigated (irr)	Aim[6]	Squadron	Titus Pro			

♦ Other similar products can be found listed under this product.
1 Suppression only
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Herbicide selector chart – other crops

Crop	Persian darnel		Prostrate pigweed	Purslane		Quack grass	
Beans Check label	Express SG[6] Poast Ultra	Select♦ Trifluralin♦	Aim[6] Edge Eptam	Aim[6] Edge Eptam	MP Boa IQ Permit Trifluralin♦	Assure II♦ Eptam	MP Boa IQ Poast Ultra Select♦
Canary seed	Express SG[6]		Sword♦				
Chickpeas	Express SG[6] Poast Ultra	Select♦	Aim[6]	Aim[6] Authority[6]	Authority Supreme[6]	Assure II♦	Select♦
Field corn Check label to ensure chosen chemical or mix is registered for use on the crop			2,4-D Aim[6] MCPA K-salt Primextra II Magnum	2,4-D Aatrex Liquid 480 Aim[6] Basagran♦ MCPA amine MCPA K-salt	MCPA Na-salt Permit Primextra II Magnum Princep Nine-T♦ Shieldex	Accent♦	
Liberty Link corn			Aim[6]	Aim[6]		Liberty♦	
Roundup Ready corn			Aim[6]	Aim[6]		glyphosate	
Sweet corn			Aim[6]	Aatrex Nine-0 Aim[6]	Basagran♦ Shieldex	Accent♦	
Faba beans	Edge Express SG[6] Poast Ultra	Select♦ Trifluralin♦	Aim[6] Edge	Aim[6] Authority[6] Basagran♦	Edge MP Boa IQ Trifluralin♦	Assure II MP Boa IQ	
Lentils	Ares[4] Express SG[6] Odyssey♦,[4] Poast Ultra	Select♦ Solo♦,[4] Trifluralin♦	Aim[6] Edge	Aim[6] Edge	Trifluralin♦	Assure II♦ MP Boa IQ MP Ninja Master[1]	Poast Ultra Select♦
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Express SG[6] MP Ninja Master Odyssey♦ Poast Ultra	Select♦ Trifluralin♦ Viper♦	Aim[6] Edge	Aim[6] Authority[6] Authority Supreme[6] Basagran♦	Edge MCPA amine MCPA Na-salt MP Boa IQ Trifluralin♦	Assure II♦ MP Boa IQ MP Ninja Master[1] Poast Ultras	Select♦
Potatoes irrigated (irr)	Poast Ultra	Select♦	Aim[6] Eptam	Aim[6]	Eptam	Eptam Poast Ultra Prism (irr)	Select♦ Titus Pro

♦ Other similar products can be found listed under this product.

1 Suppression only

2 Pre-emergence to crop, post-emergent to weeds

3 Used as crop desiccant

4 Group 2 tolerant lentils only

5 Non-Group 2 tolerant varieties

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Herbicide selector chart – other crops

Crop	Redroot pigweed			Russian thistle	Shepherd's purse	
Beans Check label	Aim[6] Basagran♦[,1] Dual II Magnum♦ Edge	Eptam Express SG[6] Goldwing[6] Permit	Quasar Solo♦ Trifluralin♦	Aim[6] Basagran♦[,1] Edge[1] Express SG[6] MP Boa IQ	Aim[6] Basagran♦ MP Boa IQ	Permit Solo♦
Canary seed	Basagran♦[,1] Buctril M♦ Conquer[6] Curtail M♦	Express SG[6] Goldwing[2] Heat[6]	Prestige XC♦ Sword♦ Trophy♦	Buctril M♦ Express SG[6] Pardner♦ Sword♦	Buctril M♦ Curtail M♦ Prestige XC♦	Sword♦ Trophy♦
Chickpeas	Aim[6] Authority♦[,6] Authority Supreme[6]	Tough 600 Goldwing[6]	Heat[6] Express SG[6]	Aim[6] Express SG[6]	Aim[6]	
Field corn	2,4-D Aatrex Liquid 480 Aim[6] Armezon♦ Basagran♦[,1] Buctril M♦ Conquer[6] Distinct	Dual II Magnum♦[1] Embutox♦ Focus[6] Goldwing[2] Heat[6] Heat Complete[6] MCPA amine MCPA K-salt	MCPA Na-salt Permit Primextra II Magnum Shieldex Tough 600 Tropotox Plus♦	2,4-D Aim[6] Basagran♦[,1] Buctril M♦ Pardner♦	2,4-D Aim[6] Basagran♦ Buctril M♦ Embutox♦ Heat Complete[6]	MCPA amine MCPA K-salts MCPA Na-salt Permit Shieldex Tropotox Plus♦
Liberty Link corn	Aim[6] Conquer[6]	Goldwing[2] Heat Complete[6]	Liberty♦	Aim[6]	Aim[6] Heat Complete[6]	Liberty♦
Roundup Ready corn	Aim[6] Armezon♦	Conquer[6] glyphosate	Goldwing[2] Heat Complete[6]	Aim[6] glyphosate	Aim[6] Heat Complete[6]	
Sweet corn	Aatrex Liquid 480 Aim[6] Armezon♦ Basagran♦[,1]	Buctril M♦ Dual II Magnum♦[1,2] Goldwing[2]	Heat Complete[6] Shieldex Tough 600	Aim[6] Basagran♦[,1] Buctril M♦ Pardner♦	Aim[6] Basagran♦ Buctril M♦	Heat Complete[6] Shieldex
Faba beans	Aim[6] Authority[6]	Basagran♦[,1] Edge	Express SG[6] Goldwing[6]	Aim[6] Basagran♦[,1] Edge Express SG[6] MP Boa IQ	Aim[6] Basagran♦ MP Boa IQ	
Lentils	Ares[4] Aim[6] Edge Express SG[6]	Focus[6] Goldwing[6] Heat[6] Heat Complete[6]	Odyssey♦[,4] Solo♦[,4] Tough 600	Aim[6] Ares[4] Express SG[6] Odyssey♦[,4] Squadron	Aim[6] Ares[4] Heat Complete[6] Odyssey[4]	Solo♦[,4]
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Aim[6] Authority♦[,6] Authority Supreme[6] Basagran♦[,1] Chateau♦[,6] Edge Express SG[6]	Goldwing[2] Heat[6] Heat Complete[6] MCPA amine MCPA Na-salt MP Ninja Master MPower Anaconda MPower Samurai	Master Odyssey♦ Pursuit♦ Quasar Solo♦ Tough 600 Tropotox Plus♦ Viper♦	Aim[6] Basagran♦[,1] Edge[1] Express SG[6] MP Boa IQ MPower Anaconda MPower Samurai Master Odyssey♦ Viper♦	Aim[6] Basagran♦ Heat Complete[6] MCPA amine MCPA Na-salt MP Boa IQ MP Ninja Master[1] MPower Anaconda	MPower Samurai Master Odyssey♦ Pursuit♦ Solo♦ Tropotox Plus♦ Viper♦
Potatoes irrigated (irr)	Aim[6] Chateau♦[,6] Dual II Magnum♦	Eptam Prism (irr)	Squadron Titus Pro	Aim[6]	Aim[6] Squadron Titus Pro	

♦ Other similar products can be found listed under this product.
[1] Suppression only
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[4] Group 2 tolerant lentils only
[5] Non-Group 2 tolerant varieties
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Herbicide selector chart – other crops

Crop	Stinkweed		Tartary buckwheat		Volunteer cereals		Volunteer oats	
Beans Check label	Aim[6] Basagran♦ Express SG[6] Goldwing[6]	MP Boa IQ Quasar Solo♦			Assure II♦ Edge[1] Eptam Express SG[6]	Poast Ultra Quasar[1] Select♦ Solo♦	Assure II♦ Eptam Express SG[6] Poast Ultra	Quasar Select♦ Solo♦
Canary seed	Buctril M♦ Conquer[1,6] Curtail M♦ Express SG[6] Goldwing[2] Heat[6]	Pardner♦ Prestige XC♦ Sword♦ Trophy♦	Buctril M♦ Curtail M♦ Engenia♦	Pardner♦ Prestige XC♦ Sword♦	Express SG[6]		Express SG[6]	
Chickpeas	Aim[6] Authority Supreme[6] Express SG[6]	Goldwing[6] Heat[6] Squadron	Squadron		Assure II♦ Express SG[6] Poast Ultra	Select♦	Assure II♦ Express SG[6] Poast Ultra	Select♦
Field corn	2,4-D Aim[6] Basagran♦ Buctril M♦ Conquer[1,6] Embutox♦ Focus[1,6] Goldwing[2]	Heat[6] Heat Complete[6] MCPA amine MCPA K-salt MCPA Na-salt Pardner♦ Tropotox Plus♦	Buctril M♦ Engenia♦ MCPA Amine[1]	MCPA K-salt[1] MCPA Na-salt[1] Pardner♦	Steadfast IS			
Liberty Link corn	Aim[6] Conquer[1,6] Goldwing[2]	Heat Complete[6] Liberty♦						
Roundup Ready corn	Aim[6] Conquer[1,6] glyphosate	Goldwing[2] Heat Complete[6]			glyphosate		glyphosate	
Sweet corn	Aim[6] Basagran♦ Buctril M♦ Conquer[1,6]	Goldwing[2] Heat Complete[6] Pardner♦	Buctril M♦ Pardner♦					
Faba beans	Aim[6] Basagran♦ Express SG[6]	Goldwing[6] MP Boa IQ			Assure II Edge	Express SG[6] Poast Ultra	Assure II Express SG[6] Poast Ultra	Select♦
Lentils	Ares[4] Aim[6] Express SG[6] Focus[6,1] Goldwing[6]	Heat[6] Heat Complete[6] Odyssey♦,[4] Squadron Solo♦,[4]	Squadron		Ares[4] Assure II♦ Edge Express SG[6]	Odyssey♦,[4] Poast Ultra Select♦ Solo♦,[4]	Ares[4] Assure II♦ Express SG[6] Odyssey♦,[4]	Poast Ultra Select♦ Solo♦,[4]
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Aim[6] Basagran♦ Express SG[6] Goldwing[2] Heat[6] Heat Complete[6] MCPA amine MCPA Na-salt MP Boa IQ MP Ninja Master[1]	MPower Anaconda MPower Samurai Master Odyssey♦ Pursuit♦ Quasar Squadron Solo♦ Tropotox Plus♦ Viper♦	MCPA Amine[1] MCPA Na-salt[1] Squadron		Assure II♦ Edge[1] Express SG[6] MP Ninja Master[1] MPower Samurai Master	Odyssey♦,[5] Poast Ultra Pursuit♦,[1] Quasar[1] Select♦ Solo♦ Viper♦,[5]	Assure II♦ Express SG[6] MP Ninja Master Odyssey♦ Poast Ultra Quasar	Select♦ Solo♦ Viper♦
Potatoes irrigated (irr)	Aim[6] Squadron	Titus Pro	Squadron Titus Pro		Eptam Poast Ultra	Select♦	Eptam Poast Ultra	Select♦

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Herbicide selector chart – other crops

Crop	Volunteer canola		Wild buckwheat		Wild oats		Wild radish
Beans Check label	Aim[6] Basagran♦ Express SG[6] Goldwing[6]	MP Boa IQ Quasar[1] Solo♦	Edge Express SG[6] Goldwing[6]	Quasar[1] Solo♦ Trifluralin♦	Assure II♦ Edge Eptam Express SG[6] MP Boa IQ	Poast Ultra Quasar Select♦ Solo♦ Trifluralin♦	Basagran♦ MP Boa IQ Permit
Canary seed	Buctril M♦ Conquer[6] Curtail M♦ Express SG[6] Goldwing[2]	Heat[6] Prestige XC♦ Sword♦ Trophy♦	Buctril M♦ Conquer[1,6] Curtail M♦ Engenia♦ Express SG[6] Goldwing[2]	Heat[6] Pardner♦ Prestige XC♦ Sword♦ Trophy♦	Express SG[6]		Trophy♦
Chickpeas	Aim[6] Express SG[6] Goldwing[6]	Heat[6] Squadron	Authority♦[,6] Authority Supreme[6]	Express SG[6] Goldwing[6] Heat[6]	Assure II♦ Authority Supreme[1,6]	Express SG[6] Poast Ultra Select♦	
Field corn	2,4-D Aim[6] Armezon♦ Basagran♦ Buctril M♦ Conquer[6]	Distinct Goldwing[2] Heat[6] Steadfast IS Tropotox Plus♦	2,4-D Aatrex Liquid 480 Buctril M♦ Conquer[1,6] Distinct Embutox♦ Engenia♦ Focus[1,6]	Goldwing[2] Heat[6] Heat Complete[6] MCPA Amine[1] MCPA K-salt[1] MCPA Na-salt[1] Pardner♦ Princep Nine-T♦	Aatrex Liquid 480 Accent♦ Focus[1,6]	Heat Complete[6] Princep Nine-T♦ Steadfast IS	2,4-D Basagran♦ MCPA amine MCPA K-salt MCPA Na-salt Permit Tropotox Plus♦
Liberty Link corn	Aim[6] Conquer[6]	Goldwing[2]	Conquer[1,6] Liberty♦	Goldwing[2] Heat Complete[6]	Heat Complete[6] Liberty♦		
Roundup Ready corn	Aim[6] Armezon♦ Conquer[6]	glyphosate Goldwing[2]	Conquer[1,6] glyphosate	Goldwing[2] Heat Complete[6]	glyphosate Heat Complete[6]		
Sweet corn	Aim[6] Armezon♦ Basagran♦	Buctril M♦ Goldwing[2]	Aatrex Liquid 480 Buctril M♦	Goldwing[2] Heat Complete[6] Pardner♦	Aatrex Liquid 480 Heat Complete[6]		Basagran♦
Faba beans	Aim[6] Basagran♦ Express SG[6]	Goldwing[6] MP Boa IQ	Authority[6] Edge Express SG[6]	Goldwing[6] Trifluralin♦	Assure II Edge Express SG[6] MP Boa IQ	Poast Ultra Select♦ Trifluralin♦	Basagran♦ MP Boa IQ
Lentils	Ares[4] Aim[6] Express SG[6] Goldwing[6]	Heat[6] Odyssey♦[,4] Squadron Solo♦[,4,5]	Ares[4] Edge Express SG[6] Focus[6,1] Goldwing[6]	Heat[6] Heat Complete[6] Odyssey♦[,4] Solo♦[,1,4] Trifluralin♦	Ares[4] Assure II♦ Edge Express SG[6] Focus[6,1] Heat Complete[6]	Odyssey♦[,4] Poast Ultra Select♦ Solo♦[,4] Trifluralin♦	
Peas Check label to ensure chosen chemical or mix is registered for use on the crop	Aim[6] Basagran♦ Express SG[6] Goldwing[2] Heat[6] MP Boa IQ MP Ninja Master[1] MPower Anaconda	MPower Samurai Master Odyssey♦[,5] Pursuit♦[,5] Quasar[1] Squadron Solo♦[,5] Tropotox Plus Viper♦	Authority♦[,6] Authority Supreme[6] Edge Express SG[6] Goldwing[2] Heat[6] Heat Complete[6] MCPA Amine[1] MCPA Na-salt[1] MP Ninja Master[1]	MPower Anaconda[1] MPower Samurai Master Odyssey♦[,1] Pursuit♦[,1] Quasar[1] Solo♦[,1] Trifluralin♦ Viper♦[,1]	Assure II♦ Authority Supreme[6] Avadex BW Edge Express SG[6] Heat Complete[6] MP Boa IQ MP Ninja Master MPower Anaconda	MPower Samurai Master Odyssey♦ Poast Ultra Pursuit Quasar Select♦ Solo♦ Trifluralin♦ Viper♦	Basagran♦ MCPA amine MCPA Na-salt MP Boa IQ Tropotox Plus♦
Potatoes irrigated (irr)	Aim[6] Squadron	Titus Pro			Eptam Poast Ultra	Select♦	

♦ Other similar products can be found listed under this product.
1 Suppression only
2 Pre-emergence to crop, post-emergent to weeds
3 Used as crop desiccant
4 Group 2 tolerant lentils only
5 Non-Group 2 tolerant varieties
6 To be used pre-seed as a burnoff.

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Insecticide index

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Chemical insect control in Alberta

The degree of infestation and severity of insect damage varies drastically from area to area and season to season. Most pests, such as grasshoppers, cutworms and Bertha armyworms, require control during periods of abundance that may last from 1 to several years. Other pests, like flea beetles, require control annually in some parts of Alberta.

Insect pest monitoring

The Alberta Insect Pest Monitoring Network can provide more information on insect pests of Alberta. See the web page at *agriculture.alberta.ca/bugs-pest*

Chemical control

A number of factors should be considered once the decision to apply an insecticide has been made. Insecticides will kill the pest insect if applied properly at a stage when the pest is susceptible. An application made too early or too late in the life cycle may not provide adequate control. Other factors to consider include: ability of the insecticide to penetrate through the plant foliage, weather conditions, age and size of the insect, wait period to grazing or harvest and dosage required. If insects are moving into crops or emerging over an extended period, several applications in the same season may be necessary since most insecticides have limited residual properties when applied to foliage.

Safety

In general, insecticides are more toxic to humans, wildlife, fish, bees and other non-target organisms than herbicides or fungicides. Follow label directions for safety precautions associated with application of each insecticide. Refer to the introductory section of this book for general information on safety precautions associated with pesticide use.

Bee safety

The insecticides used to protect crops from damaging outbreaks of insect pests can also kill beneficial insects. The objective of the insecticide application is to remove the problem insects from the crop with the least possible impact to beneficial insects such as honeybees and leafcutter bees. Because bees play a critical role in pollinating certain crops, it is important to ensure that an insecticide application has a minimum impact on population numbers. Although it may not be possible to totally eliminate the effect of insecticides on beneficial insects, the impact can be greatly reduced when the farmer, pesticide applicator and beekeeper work together.

Beekeepers should

- Talk with the landowners near their bee yards before spray season and provide the farmers with their phone number.
- Ask farmers if spraying to control insects is likely this year.
- Ask the farmer to provide them with notification 48 hours in advance of applying an insecticide.

Farmers and applicators should

- Check for potential insect infestations in field crops early and frequently and determine the economic thresholds for problem insects so that a spray program can be planned should it be required.
- Notify beekeepers of intentions to spray 48 hours in advance of spraying.
- Avoid application of insecticides to crops in bloom or to fields containing blooming weeds, which are attractive to foraging bees. Where feasible, use a preventative program early in the season when insecticides may be as effective and crops are not blooming.
- Spray late in the day or early in the morning when the temperature is below ideal foraging temperatures to reduce direct exposure to bees. Honeybees are most active when the temperature is above 18°C, usually in the heat of the day. As a general rule, evening applications are less hazardous than morning applications.
- Where there is a risk to bees, use an insecticide that has short residual activity to reduce the impact on the bees and to reduce possibilities of residues occurring in honey and pollen.
- Learn about pollination requirements of the different crops grown and about honeybees and leafcutter bees.

Caution

Unusually low temperatures during and immediately following applications cause insecticides to remain toxic to bees for a much longer period than normal. High temperatures will extend the foraging period, and application time must be adjusted accordingly. Prevent insecticides from drifting into adjacent blooming crops, roadsides and pastures with weeds

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in bloom, water used by bees, leafcutter shelters or apiaries by maintaining a reasonable distance from field boundaries and allowing for the potential movement of insecticides by wind. For more information, contact the Alberta Ag-Info Centre at 310-FARM (3276).

Rights and good practice

By law, persons, provided they do not contravene any land use by-laws, regulations or generally accepted practices, may operate an agricultural operation (including the application of pesticides). It's important to follow label directions and good practices regarding protection of pollinator species from insecticide applications.

Laws generally allow persons to obtain a benefit on their property, provided that the benefit is not achieved at the expense of adjacent landowners. Ensure that pesticides are used in a manner where drift does not occur.

Notification ensures that hazards are identified prior to spraying so that farmers or their custom applicators can adjust application practices to prevent problems and beekeepers can adjust practices to accommodate spraying. Notification does not mean seeking permission to spray. Farmers have the legal right to apply pesticides on their property.

Toxicity of insecticides to honeybees

Highly toxic		Moderately toxic	Relatively non-toxic
Severe losses may be expected if the following materials are used when bees are present at treatment time or within a few days thereafter		These can be used around bees if dosage, timing and method of application are correct, but do not apply them directly on bees, in the field or at the colonies	
Aceta 70 WP	Lorsban NT	Lannate	Beleaf
Actara	Mako	Movento 240 SC	Coragen
Admire	Malathion 25W	Oberon	Coragen MaX
Agri-Mek SC	Matador 120EC		Eco-Bran
Alias 240 SC	Minecto Duo 40WG		Sefina
Ambush 500 EC	Minecto Pro		
Assail	Nufos 4E		
Cimegra	Orthene		
Citadel 480EC	Perm-UP		
Closer	Poleci 2.5 EC		
Clutch	Poncho 600 FS		
Concept	Pounce		
Cormoran	Pyrifos 15G		
Cygon 480	Pyrinex 480EC		
Decis 100 EC	Rimon 10 EC		
Dibrom	Sefina		
Decis 5EC	Sevin XLR		
Delegate	Ship 250 EC		
FBN Deltamethrin 5 EC	Sharphos		
	Silencer 120EC		
Harvanta 50SL	Titan		
Imidan 70 WP	Verimark		
IPCO Syncro	Voliam Xpress		
Labamba	vayego 200 SC		
Lagon 480	Warhawk 480 EC		

Notification is a two-way street. Both the beekeeper and farmer have to make efforts to protect pollinators.

Note: In many cases, beekeepers cannot move or cover their bees, especially during honey flow, so timing and accuracy of an insecticide application, plus selection of the safest insecticide where there is risk to bees, are the only ways to safeguard bees.

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Livestock and residues

The number of days between the application of an insecticide and harvesting, feeding to livestock or grazing is given on the label. These restrictions must be followed to prevent illegal residues in crops and livestock and to eliminate hazards to consumers.

The guide

This guide only includes the major insecticides registered for use on field crops in Alberta. Not all insects controlled are listed for each insecticide.

Economic threshold

Before making a decision to apply an insecticide, farmers need to know if the application would be economically justified. In addition to the expected dollar value of the crop, the farmer needs to determine whether the insects present will cause a yield loss greater in value than the cost of control. The economic thresholds listed below will assist in making this decision.

Thresholds are given as the number of insects/unit of measure (such as #/plant or #/m^2) or, for insects that are difficult to sample, the amount of damage evident. Chemical controls are generally only warranted when numbers meet or exceed the threshold level. Remember to sample throughout the field (minimum of 10 samples per 160 acres) to obtain an average infestation level.

Economic thresholds for insect pests of forage and special crops

Insect	Economic threshold	Comments
Alfalfa weevil	Alfalfa hay crops: Thresholds are based on plant height and number of larvae: < 30 cm - 1 larva per stem; < 40 cm - 2 larvae per stem. 3 larvae per stem requires control regardless of plant height. Alfalfa seed crops: 20 - 30 larvae per 90° sweep or when 35 - 50% of foliage tips show damage.	Alfalfa hay crops: If feeding damage detected, cutting hay early can be an effective control strategy.
Grasshoppers	Alfalfa: See Cereals table.	
Lygus bugs	For adults and nymph stages 4 and 5: 2 - 3 lygus per 90° sweep.	Nymph stages 1, 2 and 3 do not cause economic damage.
Pea aphid	Alfalfa: 75 - 100 aphids per plant. Field pea: 2 - 3 aphids per 20 cm stem tip when 50% of plants have developed some young pods.	
Plant bugs	Alfalfa for seed: 5 nymphs per sweep (any or all species of plant bugs) when alfalfa is in bud or bloom.	
Sweetclover weevil	Seedling crop (cotyledon stage): 1 weevil per 5 seedlings under slow growing conditions or 1 weevil per 3 seedlings under normal growing conditions. Newly emerged 2nd-year stand: 9 - 12 weevils per plant.	

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Economic thresholds for insect pests of cereals		
Insect	**Economic threshold**	**Comments**
Aphids Birdcherry-oat Corn leaf English grain Greenbug Russian wheat	 Seedling: 20: Boot: 30 (aphids per stem) Seedling: 20: Boot: 30 (aphids per stem) Seedling: 30: Boot: 50 (aphids per stem) Seedling: 5 - 15: Boot: 10 - 25 (aphids per stem) **Spring cereals** – Seedling: 10 - 15%; Boot: 15 - 20% (% plants infested) **Winter cereals** – Seedling: 15 - 20% after October 1	Do not treat for aphids in cereals after the soft dough stage. Aphid populations decrease rapidly as heads mature.
Armyworm	11/m^2	
Barley thrips	Treat when the number of thrips are > the number calculated below. Threshold (thrips/stem) = (cost of control/expected crop value per bushel)/ 0.4.	Infestations of 1 thrip per stem have caused losses of 0.4 - 1.25 bu/ac. Insecticde applications are only effective when applied before heading is complete.
Cutworms Pale western Red-backed	 3 - 4/m^2 5 - 6/m^2	Well-established crops with good moisture can tolerate higher numbers.
Grasshoppers	13/m^2 in fields or 25/m^2 in roadsides.	
Wheat midge	For yield only: 1 adult for every 4 - 5 heads of wheat To maintain grade: 1 adult for every 8 - 10 heads of wheat.	1 adult for every 4 - 5 heads of wheat can reduce yield by approximately 15%.

Economic thresholds for insect pests of oilseed crops		
Insect	**Economic threshold**	**Comments**
Army cutworm	Seedling mustard: less than 5/m^2.	
Bertha armyworm	Economic threshold varies with insecticide cost, application cost and value of the crop. Tables showing economic thresholds can be found at *www.agric.gov.ab.ca*.	
Cabbage seedpod weevil	3 - 4 adult weevils per sweep	Optimum time to spray is at 10 - 20% flower.
Cutworms	3 - 4 cutworms/m^2	Evening application of insecticides will provide the best control.
Diamondback moth	Pod ripening: 200 - 300 larvae/m^2 Early flowering (if bud feeding): 100 - 150 larvae/m^2.	
Flea beetles	An average of 25% defoliation on seedling leaves and flea beetles are present.	Damage is usually most severe along field margins and frequently only field margins require treatment.
Lygus bug	Economic threshold varies with insecticide cost, application cost and value of the crop. Tables showing economic thresholds can be found at *www.agric.gov.ab.ca*	Control should not be required within 10 days of swathing.

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Insecticide group classification by mode of action					
Chemical family	**Active ingredients**	**Found in**			
Group 1A, 1B	**Acetylcholinesterase inhibitors These chemicals inhibit an enzyme, interrupting the transmission of nerve impulses**				
Carbamates *(Group 1A)*	carbaryl	ECO Bran	Sevin XLR		
Organophosphates *(Group 1B)*	methomyl	Lannate			
	acephate	Orthene 75%			
	chlorpyrifos	Citadel 480 EC Lorsban NT	Nufos 4E Pyrifos 15G	Pyrinex 480 EC Sharphos	Warhawk 480EC
	dimethoate	Cygon 480	Cygon 480 EC	Lagon 480E	
	malathion	Malathion Malathion 85 E	Malathion 95 ULV Malathion 500 EC	Malathion Grain Protector Dust	
	naled	Dibrom			
	phorate	Thimet			
	phosmet	Imidan 70 WP Instapak			
Group 3	**These chemicals act as an axonic poison by interfering with the nervous system, leading to paralysis**				
Synthetic pyrethroids	lambda-cyhalothrin	Labamba	Matador 120EC	Silencer 120EC	Voliam Xpress
	cypermethrin	Mako	Ship 250 EC		
	deltamethrin	Concept Decis 5 EC Decis 100 EC	FBN Deltamethrin 5 EC	Poleci 25 EC	
	permethrin	Ambush 500EC	IPCO Syncro	Perm-UP	Pounce
Group 4	**These chemicals bind to nicotinic acetylcholine receptor, disrupting nerve transmission**				
Chloronicotines	clothianidin	Clutch Nipsit SUITE Cereals OF Seed Protectant*	Nipsit INSIDE 600 Insecticide* Poncho 600 FS*	Prosper Evergol* Titan	Titan ST* Vercoras*
	imidacloprid	Admire 240 Alias 240 SC Concept Gaucho 480 FL*	Gaucho CS FL* Raxil Pro Shield seed treatment*	Raxil WW seed treatment*	Sombrero 600 FS* Stress Shield* Trilex Evergol SHIELD*
	thiamethoxam	Actara Cruiser 5FS* Cruiser Maxx Potato Extreme*	Cruiser Maxx Vibrance Beans* Cruiser Maxx Vibrance Cereals*	Cruiser Maxx Vibrance Pulses* Helix Vibrance*	Cruiser Maxx Vibrance Quattro* Minecto Duo 40WG Visivio*
	acetamiprid	Aceta 70 WP	Assail	Cormoran	
Group 4C					
Sulfoximine	sulfoxaflor	Closer	Visivio*		
Group 4D					
Butenolides	flupyradifurone	Sivanto Prime	Buteo Start*		

(continued)

* These products are Seed Treatments and may also contain a fungicide.
Information on fungicide mode of action can be found in the Seed Treatment section.

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Insecticide group classification by mode of action				
Chemical family	**Active ingredients**	**Found in**		
Group 5	**Nicotinic acetylcholine receptor (nAChR) allosteric activators**			
Spinosyns	spinetoram	Delegate		
Group 6	**Chloride channel activators**			
Avermectins	abamectin	Agri-Mek SC	Minecto Pro	
Group 8B	**Unknown or non-specific mode of action (fumigants)**			
	aluminum phosphide	Phostoxin		
Group 9C	**Unknown or non-specific mode of action (selective feeding blockers)**			
	flonicamid	Beleaf		
Group 9D				
	Afidopyropen	Sefina		
Group 15	**Inhibitors of chitin biosynthesis**			
	Novafluron	Cormoran	Rimon	
Group 23	**Lipid biosynthesis inhibitor**			
Tetramic acid	spirotetramat	Movento		
	spiromesifen	Oberon		
Group 28	**Acts on the ryanodine receptor of the insect muscle cell, leading to muscle paralysis**			
Diamide	chlorantraniliprole	Coragen Coragen MaX	Lumivia CPL*	Voliam Xpress
	cyantraniliprole	Fortenza* Lumiderm*	Minecto Duo 40WG	Minecto Pro Verimark
	cycaniliprole	Harvanta 50SL		
	tetraniliprole	vayego 200 SC		
Group 30	**GABA antagonist: GABA-gated chloride channel allosteric modulators**			
Meta-diamides	broflanilide	Cimegra	Teraxxa F4*	

* These products are seed treatments and may also contain a fungicide. Information on fungicide mode of action can be found in the seed treatment section.

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Actara

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Actara 240 SC (PCP# 28407)	Syngenta	Thiamethoxam: 240 g/L	Soluble concentrate	2.04 L
Actara 25 WG (PCP# 28408)		Thiamethoxam: 25%	Water dispersible granules	850 g

Crops, insects controlled and rates

Product	Crop	Insects controlled	Application method/rate	Specific comments
Actara 240SC	**Potato**	Colorado potato beetle, aphids (including green peach, potato, buckthorn and foxglove aphid), potato leafhopper	Soil application: 3.4 - 4.4 mL/100 m row. For 90 cm row spacing, apply 151 - 196 mL/acre	Apply as an in-furrow spray at planting. Use the higher rate for extended residual control. Apply in sufficient water to ensure good coverage.
	Potato	Colorado potato beetle, aphids (including green peach, potato, buckthorn and foxglove aphid), potato leafhopper	Foliar application: 44 mL/acre	Apply before pests reach damaging levels. Scout fields and treat again 7 - 10 days later if populations rebuild to potentially damaging levels. Potato leafhopper: Control may require the use of 2 applications made at a 7 - 10 day interval.
Actara 25WG	**Potato**	Colorado potato beetle, aphids (including green peach, potato, buckthorn and foxglove aphid), potato leafhopper	Foliar application: 43 g/acre	Apply before pests reach damaging levels. Scout fields and treat again 7 - 10 days later if populations rebuild to potentially damaging levels. Potato leafhopper: Control may require the use of 2 applications made at a 7 - 10 day interval.

Registered Tank Mixes

Pest	Product/rate	Specific comments
Colorado potato beetle, potato leafhopper, aphids (including green peach, potato, buckthorn and foxglove aphid), rhizoctonia stem and stolon canker, black scurf and suppression of pink rot	Actara 240 SC at 3.4 - 4.4 L/100 m. row + Quadris Flowable at 4 - 6 mL/100 m. row + Ridomil Gold 480 at 4 mL/100 m. row	Use the higher rate for extended residual control of insects. Use the higher rate of Quadris. Flowable when risk of disease is high.

Application Information

Actara 240 SC – Soil application
How to apply: Ground application only. Do not apply by air. **Water volume:** Ground – 40 L/acre minimum.

Actara 25 WG
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum.
Aerial – 8 L/acre minimum.

Application tips

Actara 25 WG: Do not exceed a total of 85 g of Actara per acre during each growing season. Allow at least 7 days between applications. Avoid making aerial applications under conditions where uniform coverage cannot be obtained or where excessive spray drift may occur. Avoid spray overlap. Do not apply Actara after pre-bloom (early pink growth stage) or before post-bloom (petal fall growth stage).

Potato seed piece treatment: Choose the appropriate rate for Actara 240 SC from the chart on the label, based upon the seeding rate. Use high rate for extended residual control. Do not apply more than 24.4 mL product/100 kg seed pieces or 79.7 mL product per acre. Apply only in areas with adequate ventilation or in areas equipped to remove spray mist or dust. Apply Actara 240SC as a water-based slurry utilizing standard slurry seed treatment equipment which provides uniform seed coverage.

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How it works
Actara is a systemic neonicotinoid insecticide. It controls the sucking and chewing insects through contact and ingestion.

Restrictions
Rainfall: Avoid application of Actara when heavy rain is forecast. **Pre-harvest intervals:** 7 days. **Re-entry interval:** 12 hours. **Re-cropping:** Treated areas may be replanted immediately following harvest or as soon as practical following the last application with any crop listed on this label or to sorghum, wheat, barley and canola. Any cover crop planted for erosion control or soil improvement may be planted as soon as practical following the last application. However, the cover crop may not be grazed or harvested for food or feed. For all other crops, a 120-day plant-back interval must be observed.

Environmental precautions
Actara is highly toxic to certain aquatic organisms. Do not contaminate water with the product or its container. Observe buffer zones specified on the Actara label. **Runoff:** Do not apply Actara directly to freshwater habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Leaching:** Thiamethoxam is moderate to very persistent in soil and is highly mobile. The use of Actara may result in contamination of groundwater particularly in areas where soils are permeable (e.g., sandy soil) and/or where the depth to the water table is shallow.

Toxicity
Oral LD_{50} (rats) >5,000 mg/kg. Dermal LD_{50} (rabbits) = >2,000 mg/kg. Toxic to bees.

Storage
Store in cool, dry place and prevent cross contamination with other pesticides, fertilizers, food and feed.

Admire® 240 Flowable Systemic Insecticide

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Admire 240 Flowable (PCP# 24094)	Bayer	Imidacloprid: 240 g/L	Flowable	1 L, 3.785 L

Crops, insects controlled and rates

Crop	Insects controlled	Application rate	Specific comments
Soil application			
Potato	Colorado potato beetle, aphids (including green peach, buckthorn, foxglove and potato aphid), potato leafhopper, potato flea beetle	7.5 - 12 mL/100 m row or 345 - 525 mL/acre (based on 90 cm row spacing)	The higher rate is recommended when extended length of control is needed. Do not apply more than once per season as a soil application. Do not follow a soil application with a foliar application.
Foliar application			
Potato	Colorado potato beetle, aphids (including green peach, buckthorn, foxglove and potato aphid)	81.0 mL/acre	For optimal control, good coverage of the foliage is needed. A maximum of 2 foliar applications may be made per crop per season. Aphid control: 2 applications at least 7 days apart may be required to achieve control.

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Admire 240 Flowable (cont'd)

Crop	Insects controlled	Application rate	Specific comments
Potato seed piece treatment			
Potato	Colorado potato beetle, aphids (including green peach, buckthorn, foxglove and potato aphid), potato leafhopper, potato flea beetle	26 - 39 mL per 100 kg seed pieces	Apply only in areas with adequate ventilation or in areas that are equipped to remove spray mist or dust. Do not apply any subsequent application of imidacloprid or other Group 4 insecticide following a Group 4 potato seed piece treatment.

Registered tank mixes

Admire 240 can be tank mixed with Ridomil Gold 480 for suppression of pink rot (*Phytophthora erythroseptica*). Please refer to Ridomil Gold 480 label for use instructions and precautions.

Application information

How to apply: Ground application only. Do not apply by air.

Water volume: Water volume should be adequate to provide sufficient coverage.

Application tips

Soil application: Apply Admire 240 as a narrow band in-furrow. For best results, direct spray on the seed pieces or seed potato in the furrow. **Foliar application**: Apply product as pest numbers begin to increase but before a damaging population becomes established. Scout fields and repeat if needed. Do not make a foliar application of imidacloprid following a soil or seed piece treatment application of product in the same crop. **Potato seed piece treatment:** Do not dilute with any more than 3 parts water to 1 part insecticide. Agitate or stir spray solution as needed. The higher rate is recommended when extended length of control is needed. Do not apply more than 0.47 L/acre per year. Check the label to select an effective treatment rate based upon seeding rate and desired duration of control.

How it works

Imidacloprid is a systemic chloronicotinyl insecticide.

Restrictions

Rainfall: Do not apply product or plant treated seed pieces when heavy rainfall is forecast for the next 48 hours. **Grazing**: Do not use treated seed pieces for food, feed or fodder. **Re-entry interval:** 24 hours. **Pre-harvest interval:** 7 days after a foliar application. **Re-cropping:** Plant-back interval for cereal grains (wheat, barley, oats) – minimum of 30 days; pea and bean – minimum of 9 months. Other food and feed crops – 12 months. Green manure and other cover crops not intended for human or animal consumption can be grown without plant-back interval. Do not graze or harvest cover crops for food or feed.

Environmental precautions

Imidacloprid is toxic to aquatic invertebrates and birds. Keep out of lakes, streams, ponds or other aquatic systems. Imidacloprid is toxic to bees.

Runoff: Do not apply to terrain where there is a potential for surface runoff to enter aquatic systems. **Leaching:** Imidacloprid demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of Admire 240 in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Toxicity

Oral LD_{50} (rats) = 4,143 - 4,870 mg/kg. Dermal LD_{50} (rabbits) = 2,000 mg/kg. Toxic to bees.

Storage

Store in cool, dry place and avoid cross contamination with other pesticides, fertilizers, food and feed.

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Agri-Mek SC

Group 6

Formulation

Product	Company	Active ingredient	Formulation	Container size
Agri-Mek SC (PCP# 31607)	Syngenta	Abamectin: 84 g/L	Emulsifiable concentrate	2 L

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Potato psyllid, spider mite	91 mL	Do not make more than 2 applications per year. Allow 7 days between applications.

Registered tank mixes

None registered.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 75 L/acre.

Application tips

Apply when pests first appear.

How it works

Abamectin attacks the nervous system, causing paralysis within a few hours. Affected insect stops eating and dies after a few days.

Restrictions

Pre-harvest interval: 14 days. **Grazing:** Do not graze treated crop. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms, fish and wildlife. Do not apply this product directly to freshwater habitats, estuaries or marine habitats by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (rats) = 300 mg/kg. Dermal LD_{50} (rabbit) = > 1,800 mg/kg. Toxic to bees.

Storage

Heated storage not required. Store in cool, dry place.

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Assail 70 WP/Aceta 70 WP

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Assail 70 WP (PCP# 27128)	Nippon Soda Company Ltd.	Acetamiprid: 70%	Wettable powder	0.34 - 1.2 kg
Aceta 70 WP (PCP# 33298)	Sharda CropChem Ltd.	Acetamiprid: 70%	Wettable powder	0.34 - 5 kg

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Aphids	22 - 34 g	Begin applications when treatment thresholds have been reached. Use the higher application rates when (1) heavy pest pressure occurs (2) the majority of the Colorado potato beetle population is present as adults. Do not make more than 2 applications per year. Do not apply more than once every 7 days.
	Colorado potato beetle	16 - 32 g	
Seed alfalfa	Tarnished plant bug Alfalfa plant bug	35 - 69 g	Apply prior to bloom up to the time when 50% of seed pods are ripe. Spray when adults and/or 4 - 5th instar nymphs have economic threshold levels. Maximum 3 applications per season.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 80 L/acre minimum.

Application tips

Thorough coverage is required to obtain optimal control. Do not exceed 69 g product per acre per season.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Re-entry interval:** 12 hours. **Pre-harvest interval:** 7 days.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones as specified on the label.

Toxicity

Oral LD_{50} (rats) = 1,064 mg/kg. Dermal LD_{50} (rabbit) = > 2,000 mg/kg. Toxic to bees.

Storage

Store unused product in a cool, dry and well ventilated area.

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Beleaf 50SG

Group 29

Formulation

Product	Company	Active ingredient	Formulation	Container size
Beleaf 50SG (PCP# 29796)	ISK Biosciences Corporation: distributed by FMC of Canada Limited	Flonicamid: 50%	Water soluble granule	0.68 kg

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Aphids	49 - 65 g	Use higher rate under extreme pest populations and/or dense plant foliage.
	Psyllid suppression	81 g	
Alfalfa (seed production) **Non-grass animal feeds: clover (*Trifolium* spp., *Melilotus* spp.), alfalfa, lupin, sainfoin, trefoil, vetch (crown, milk), lespodeza***	Aphids	49 - 65 g	Apply before populations reach economic thresholds or as populations begin to increase, but before damaging populations become established. Use higher rate under extreme pest populations and/or dense foilage. Do not use seed for human or animal consumption.
	Tarnished plant bug (lygus)	81 g (3 applications) or 121 g (2 applications)	
Faba bean, dry shelled bean	Aphids	49 - 65 g	Use higher rate under extreme pest populations and/or dense plant foliage.
	Reduces the numbers of lygus bugs including tarnished plant bug.	81 g	Apply when lygus bugs are first detected in the field and before populations reach high levels.

* Please see label for complete list of registered crops.

Registered tank mixes

None registered.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** Ground: 38 L/acre minimum.

Application tips

Allow a minimum of 7 days between applications. Do not make more than 3 applications per year. Do not apply more than 242 g/acre of Beleaf 50SG per season.

How it works

Flonicamid insecticide is a member of the pyridinecarboxamide class of chemistry. It specifically targets piercing and sucking pests. Both immature and adult stages begin to stop feeding within 30 minutes of application. The chemical works by contact or ingestion and disrupts the insect's nervous system, which leads to an inability to feed.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Pre-harvest intervals:** Potato, alfalfa, non-grass animal feeds, faba bean, dry shelled bean – 7 days. **Re-entry interval:** 12 hours.

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Beleaf 50SG (cont'd)

Re-cropping: There are no plant-back restrictions for crops listed on the label. All other crops may be planted 30 days after the last application.

Environmental precautions

Flonicamid is toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland.

Toxicity

Oral LD_{50} (rats) > 2,000 mg/kg. Dermal LD_{50} (rats) > 2,000 mg/kg. Toxic to certain beneficial insects.

Storage

Keep containers in a dry, cool and well-ventilated place. Store in original container only.

Cimegra

Group 30

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cimegra (PCP# 33666)	BASF Canada	Broflanilide: 100 g/L	Suspension concentrate	3 L

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Staging and specific comments
Potato	Wireworms	101 mL	See label for mL/100 m of row
Corn (field, pop, sweet, seed)	Wireworms, corn rootworm		

Registered tank mixes

Do not mix with liquid fertilizers. To determine compatibility with all other crop protection products, mix all components of the finished spray in proportionate quantities in a small jar. Always follow the most restrictive label regarding any precautions when tank mixing.

Application information

Apply in-furrow or as a T-band at planting. Apply as a dilute concentrate in sufficient water to get good coverage of the seed furrow. Do not apply Cimegra to the soil surface.

Instructions for in-furrow use in potatoes

Use 101 mL/acre of Cimegra insecticide in-furrow. Apply at planting as a dilute spray in water. Dilute Cimegra insecticide product in a minimum of 20 L of water per acre. Apply the in-furrow spray to uniformly cover the seed pieces and surrounding soil. The spray pattern should be a 10 - 20 cm (4 - 8 inches) band that is applied to the open seed piece furrow prior to being covered with soil. Do not apply Cimegra insecticide to the soil surface of a closed furrow.

Instructions for in-furrow use in corn

Use 101 mL/acre of Cimegra insecticide in furrow to control wireworm and corn rootworm (*Diabrotica virgifera* and *Diabrotica barberi*). Dilute Cimegra insecticide in 20 L of water per acre and apply at planting as an in-furrow or T-band spray by directing spray pattern to uniformly cover seed and surrounding soil.

• **In-furrow:** Apply through spray nozzles or microtubes into the open seed furrow, between the planter furrow openers and press wheels.

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• **T-band:** Apply in a 10 - 20 cm (4 - 8 inch) band over the top of the open seed furrow, between planter furrow openers and press wheels. Do not T-band over the top of a closed furrow.

How it works

Cimegra insecticide is a suspension concentrate (SC) that may be applied in-furrow or as a T band to control certain below ground chewing insect pests. Broflanilide is a Group 30 insecticide that controls wireworm through contact and ingestion.

Restrictions

Re-entry: No restricted-entry interval. **Re-cropping:** Immediate plant-back is permitted for all labelled crops. A plant-back interval of 30 days is required for all crops not on the label.

Environmental precautions

Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Toxic to bees. However, this product is not systemic and when used according to label directions, minimal exposure or risk is expected. Toxic to aquatic organisms. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil or clay. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative filter strip between the treated area and the edge of the water body. Avoid application when heavy rain is forecast.

Toxicity

Oral LD_{50} (rats) = >2,000 mg/kg. Dermal LD_{50} (rats) = >5,000 mg/kg.

Storage

Prevent from freezing; however, in the instance that the product freezes, allow to thaw at room temperature for 24 hours and agitate well prior to use. Store in original tightly closed container in a cool, dry, well-ventilated area without floor drain. To prevent contamination, store this product away from food and feed.

Closer

Group 4C

Formulation

Product	Company	Active ingredient	Formulation	Container size
Closer (PCP# 30826)	Corteva Agriscience	Sulfoxaflor: 240 g/L	Suspension concentrate	1 L

Crops, insects controlled and rates

Crop*	Insects controlled	Rate per acre	Specific comments
Potato, sugar beet	Aphid	20 - 60 mL	Do not make more than 2 applications per growing season. For aphid: do not apply more than 120 mL/acre per growing season. For Leafhoppers and Tarnished plant bug: Do not apply more than 240 mL/acre per growing season. Minimum of 7 days between applications.
	Leafhopper, tarnished plant bug	120 mL	
Corn, sorghum	Aphid	30 - 60 mL	Do not make more than 2 applications per growing season. For aphid, do not apply more than 120 mL/acre per growing season.

* If Closer is used on a commodity that may be exported, information on acceptable US residue levels can be found on CropLife Canada's web site at *www.croplife.ca*

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre. Aerial – 12 L/acre.

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Closer (cont'd)

Application tips
Use proper application techniques to help ensure thorough spray coverage and correct dosage for optimum insect control. Do not apply during periods of dead calm. Avoid application of this product when winds are gusty.

How it works
Closer interacts with certain receptors in the insect's central nervous system. Target insects cease feeding within a few minutes of application.

Restrictions
Grazing: No restrictions. **Pre-harvest intervals:** Do not apply within 7 days of harvest. **Plant-back interval:** 30 day interval between the treatment of primary crops and the planting of secondary crops not on the label. **Re-entry interval:** 12 hours.

Environmental precautions
Toxic to bees exposed to direct treatment, drift or residues on flowering crops or weeds. Toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland. Apply early in the morning or late in the evening when bees are not active.

Runoff: The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in a cool, dry place. Keep from freezing. Store this product away from food or feed.

Clutch

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Clutch (PCP# 29382)	Valent Canada Inc distributed by Nufarm Agriculture	Clothianidin: 50%	Water dispersible granules	680 g

Crops, insects controlled and rates

Crop	Insects controlled	Rate	Specific comments
Potato	Colorado potato beetle	2.38 - 4.0 g/100 m row based on 90 cm row spacing	In-furrow application. Do not make more than 1 application per season. Do not follow a soil application with a foliar application of a Group 4 or 4A insecticide.
	Aphids, Colorado potato beetle, leafhoppers	28 - 42 g/acre	Foliar application. A maximum of 3 applications may be made per season. Do not make a foliar application of a Group 4 and 4A insecticide following a soil application of Clutch.

Application information
How to apply: In-furrow application – ground application only. **Foliar application:** Ground and aerial application. **Water volume:** Ground – sufficient water volume to ensure thorough coverage. Aerial – 18 - 20 L/acre.

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Application tips
For in-furrow and foliar applications, ensure thorough coverage by using sufficient water volume.

How it works
Clothianidin is a systemic chloronicotinyl insecticide. It protects the seed and developing plant from insect damage.

Restrictions
This product is toxic to aquatic invertebrates, birds and small wild mammals. Toxic to bees exposed to direct treatment, drift or residues on flowering crops or weeds. **Re-entry interval:** 12 hours.

Toxicity
Oral LD_{50} (rats) = technical > 5,000. Toxic to bees.

Storage
Store in a cool, dry and well ventilated area. Do not store or transport near feed or food.

Concept® Insecticide

Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Concept (PCP# 29611)	Bayer	Imidacloprid: 75 g/L Deltamethrin: 10 g/L	Suspension	5.26 L

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Colorado potato beetle, aphids, leafhopper, potato flea beetle, tarnished plant bug suppression. European corn borer suppression	260 mL	Apply once the target population has reached economic threshold. Repeat if pest population levels return to damaging levels. Minimum of 5 days between applications. Do not apply more than 3 applications per year

Registered tank mixes
None registered.

Application information
How to apply: Ground application only. Do not apply by air. **Water volume:** Ground – 40 L/acre minimum.

How it works
Imidacloprid is a systemic chloronicotinyl insecticide, and deltamethrin is a non-systemic synthetic pyrethroid that works by contact and ingestion.

Application tips
Thorough coverage of all plant parts is required for optimum performance.

Restrictions
Pre-harvest intervals: Potato – 7 days. **Re-entry interval:** 24 hours.

Environmental precautions
Highly toxic to fish and other aquatic organisms. Do not allow spray drift to come into contact with aquatic areas. Imidacloprid is toxic to bees. Do not apply where runoff is likely to occur.

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Concept (cont'd)

Toxicity

Oral LD_{50} (rats) = 2,500 mg/kg. Dermal LD_{50} (rabbits) = > 4,500 mg/kg. Toxic to honey bees directly exposed to Concept during application or Concept residues present on blooming crops or weeds.

Storage

Do not store in or around the home. If stored for 1 year or longer, shake well before using. Do not store product below 0°C.

Coragen/Coragen MaX

Group 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Coragen (PCP# 28982)	FMC of Canada Limited	Chlorantraniliprole: 200 g/L	Suspension	3.79 L, 6.0 L
Coragen MaX	FMC of Canada Limited	Chlorantraniliprole: 600 g/L	Suspension	2.0 L

Crops, insects controlled and rates

Crop	Insects controlled	Coragen - rate per acre	Coragen MaX - rate per acre	Specific comments
Cereals (barley, wheat, oat, rye, triticale, millet)*	Grasshoppers	50 - 101 mL	17 - 33.5 mL	Begin applications when treatment thresholds have been reached. Do not make more than 3 applications per season. Do not apply more than once every 7 days.
	Cutworms	101 mL	33.5 mL	
	Armyworm Fall armyworm Beet armyworm Corn earworm European corn borer	101 -150 mL	33.5 - 50.5 mL	
Corn - all types	Armyworm Beet armyworm Corn earworm/tomato fruitworm European corn borer Fall armyworm Variegated cutworm Western bean cutworm	101 - 151 mL	33.5 - 50.5 mL	Time the application to coincide with peak egg hatch. Reapply if monitoring indicates it is necessary. Do not make more than 4 applications per season. Do not apply more than once every 3 days on seed corn or sweet corn. Do not apply more than once every 7 days on field corn or popcorn.
	Black cutworm	101 mL	33.5 mL	
Potato	Colorado potato beetle	101 - 202 mL	33.5 - 67.5 mL	Begin applications when treatment thresholds have been reached. For Colorado potato beetle, use the higher application rate under heavy pest pressure and/or when larger larvae are present. For control of the European corn borer, time the application to coincide with peak egg hatch. Scout for European corn borer by monitoring egg laying and egg hatch to determine application timing. Do not make more than 4 applications per season. Do not apply more than once every 3 days.
	Armyworm Beet armyworm Corn earworm European corn borer Fall armyworm Leafminers: *Liriomyza sativae, Liriomyza trifolii* Tobacco hornworm Tomato hornworm Variegated cutworm	101 - 151 mL	33.5 - 50.5 mL	

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Crop	Insects controlled	Coragen - rate per acre	Coragen MaX - rate per acre	Specific comments
	Diamondback moth Cabbage looper Black cutworm Imported cabbageworm Swede midge	101 mL	33.5 mL	
Alfalfa, clover*	Alfalfa weevil suppression	151 - 202 mL	50.5 - 67.5 mL	Begin applications when treatment thresholds have been reached. Do not make more than 1 application per cutting.
	Beet armyworm	101 - 151 mL	33.5 - 50.5 mL	
	Grasshoppers	50 - 101 mL	17 - 33.5 mL	
Lentil Pea Chickpea Bean*	Cabbage looper Cutworm	101 mL	33.5 mL	For cutworm control, apply to foliage when rain is not expected in the next 24 hours. For optimal control, apply to smaller plants or when lower portions of the plant can receive adequate coverage. Do not make more than 4 applications per season. Do not apply more than once every 3 days.
	Armyworm Beet armyworm Corn earworm European corn borer Fall armyworm Western bean cutworm	101 - 151 mL	33.5 - 50.5 mL	
	Grasshoppers	50 - 101 mL	17 - 33.5 mL	Begin applications when thresholds have been reached. Thorough coverage is important to obtain control.
Grass forage fodder and hay fed to or grazed by livestock, all pasture and range grasses grown for hay and silage	Armyworm Fall armyworm Beet armyworm Corn earworm	101 - 151 mL	33.5 - 50.5 mL	Begin applications when treatment thresholds have been reached. Do not make more than 4 applications per season. Do not apply more than once every 7 days.
	Grasshoppers	50 - 101 mL	17 - 33.5 mL	
Canola Rapeseed Mustard Flax Sunflower Safflower Borage*	Diamondback moth (larvae)	50 mL	17 mL	Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. Do not make more than 3 applications per season. Do not apply more than once every 5 days. Pre-harvest interval: 1 day.
	Bertha armyworm	50 - 151 mL	17 - 50.5 mL	
	Cabbage looper, imported cabbage worm, Swede midge, cutworms	101 mL	33.5 mL	
	Sunflower head moth, reduces damage caused by banded sunflower moth	101 - 151 mL	33.5 - 50.5 mL	
	Grasshopper	50 - 101 mL	17 - 33.5 mL	
Sugar beet	Beet webworm	101 - 151 mL	33.5 - 50.5 mL	Begin applications when thresholds have been reached. Thorough coverage is important to obtain control. Do not make more than 4 applications per season. Do not apply more than once every 3 days.
	Grasshoppers	50 - 101 mL	17 - 33.5 mL	

*See label for complete list of crops that are registered for use with Coragen/Coragen MaX.

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Coragen/Coragen MaX (cont'd)

Registered tank mixes

None registered. FMC Supports the following mixes that are not on the Coragen/Coragen MaX label. Apply mixes according to the most restrictive use limitations for either product. **Herbicides:** 2,4-D Ester/Amine, Assure® II Herbicide, Barricade® II Herbicide, Engenia® Herbicide, Glyphosate, Liberty® 150 SN Herbicide + Assure II Herbicide, MCPA ester/amine, Muster® Toss-N-Go® Herbicide, PrecisionPac® CrossSpectrum Blends +/- Perimeter® II Herbicide, PrecisionPac® PP-2525 +/- Perimeter® II Herbicide, PrecisionPac® PP-3317 +/- Perimeter® II Herbicide, PrecisionPac® PP- 23235 +/- Perimeter® II Herbicide, PrecisionPac® DB-8454, Refine® M Herbicide, Refine® SG Herbicide +/- Perimeter® II Herbicide, Roundup Xtend® Herbicide with VaporGrip® Technology, Travallas® Herbicide, Predicade® Herbicide, XtendiMax® Herbicide.

Insecticides: Pounce® Insecticide.

Fungicides: Acapela® Fungicide

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre. Aerial – 20 L/acre.

How it works

Coragen/Coragen MaX moves into leaf tissue where it is available to chewing insects feeding on the leaf surface. Feeding on leaf tissues results in paralysis and death.

Application tips

Coverage is important to obtain optimum control. Refer to label for upper limits of Coragen/Coragen MaX allowed per crop group.

Restrictions

Do not make a foliar application of Coragen/Coragen MaX for a minimum of 60 days following an in-furrow or soil application of seed or seed pieces treated with a Group 28 insecticide. **Rainfall:** Avoid application when heavy rain is forecast. **Pre-harvest intervals:** Potato, field pea, lentil, bean, chickpea, oilseed crops, cereals, sugar beet – 1 day. Corn — 1 day for seed and sweet corn. 14 days for field corn and popcorn. Grass forage, alfalfa, clover – zero days. **Re-entry interval:** 12 hours. **Re-cropping:** There are no rotational crop plant restrictions for this product.

Environmental precautions

Coragen/Coragen MaX is toxic to aquatic organisms. Do not apply this product directly to freshwater habitats. Refer to label for information on buffer zones. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. **Leaching:** The use of this product may result in contamination of groundwater, particularly in areas where soil is permeable (e.g., sandy soil) and/or the depth to the water table is shallow.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rabbits) = > 5,000 mg/kg.

Storage

Store unused product in a cool, ventilated, dry, locked area.

Cormoran

Group 4, 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cormoran (PCP# 33353)	ADAMA Canada	Acetamiprid: 80 g/L Novaluron: 100 g/L	Emulsifiable concentrate	10.08 L

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Crops, insects controlled and rates

Crops	Insects controlled	Rate per acre	Specific comments
Potato	Colorado potato beetle	178 - 283 mL	For Colorado Potato Beetle, do not apply more than twice to a single generation and do not apply to successive generations. Do not apply more than once every 10 - 14 days.
	Armyworms, cabbage looper	178 - 303 mL	
	Leafhoppers	198 - 303 mL	
	Aphids, European corn borer	263 - 303 mL	
Sweet corn	Aphids	202 - 283 mL	Begin applications when treatment thresholds have been reached.
Alfalfa (seed)	Alfalfa plant bugs, lygus bugs	303 - 364 mL	Apply prior to bloom up to the time when 50% of seedpods are ripe. Begin when adults and/or 4th to 5th instar nymphs have reached economic threshold levels.

Registered tank mixes

None registered.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** Ground – 80 L/acre.

Application tips

Adequate spray coverage is essential to obtain optimum control. Use the higher rate for heavy infestations or dense foliage.

How it works

Targets eggs and immature insect stages. Immature stages are unable to molt and as a result cannot develop into mature adults. Nictonic receptor modulator affects sucking pests systemically, which prevents them from being able to feed.

Restrictions

Rainfall: Do not apply when heavy rain is forecast. **Pre-harvest intervals:** Potato – 7 days; corn – 10 days; alfalfa – 14 days. **Grazing:** Alfalfa – do not graze treated fields. **Re-entry interval:** Potato, corn, alfalfa – 12 hours.

Environmental precautions

Do not apply this product directly to freshwater habitats. Toxic to aquatic organisms and to non-target terrestrial plants. Observe buffer zones. Toxic to bees and certain beneficial insects. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with moderate to steep slope, compacted soil or clay.

Toxicity

Acute oral LD_{50} (rats) = 146 mg/kg. Dermal LD_{50} (rats) = 1,980 mg/kg

Storage

Store in original container. Do not allow to freeze.

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Cygon 480 – Ag/Cygon 480 EC/Lagon 480 E

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cygon 480 EC (PCP# 9807)	IPCO	Dimethoate: 480 g/L	Emulsifiable concentrate	10 L
Cygon 480 - Ag (PCP# 25651)	FMC of Canada Limited		Emulsifiable concentrate	10 L
Lagon 480 (PCP# 9382)	Loveland Products Canada		Emulsifiable concentrate	10 L

Crops, insects controlled and rates

Field Crops	Insects controlled	Rate per acre	Pre-harvest interval (days)	Maximum allowable applications per season	Specific comments
Alfalfa (seed and forage production)	Aphids, leafhoppers, reduction of alfalfa weevil larvae, lygus bugs, plant bugs	172 mL	10	2	Use a water volume of at least 81 L/acre with ground equipment for blotch leafminers. Do not apply during bloom.
	Blotch leafminers	222 mL	10	1	
	Grasshoppers-nymphs	222 mL	10	1	
	Grasshoppers-adults	344 - 364 mL	10	2	
Alfalfa (seed production only)	Lygus plant bug, plant bug	445 mL	28	1	
Canola	Aphids, leafhoppers, grasshoppers	344 - 364 mL	21	3	The higher rate should be used when the proportion of mature and late nymphal stages in the population are high and spray penetration is inhibited by dense crop canopy.
Cereals: barley, oats, wheat	Aphids	172 mL	2	2	
	Thrips	405 mL	35	2	
Cereals: wheat only	Wheat midge Russian wheat aphid*	405 mL	35	2	For wheat midge control, applications should be made during the late afternoon or evening when air temperature exceeds 15°C and wind speed is less than 10 km/h.
Flax	Potato aphid	174 mL	21	1	Apply from late flowering to early green bole stage.
Pea (canning/ field)	Aphids	111 - 153 mL	3	2	Do not graze or feed for forage for 21 days after last application.
Safflower	Grasshoppers (nymphs and adults)	222 - 405 mL	21	2	Apply when grasshoppers are young or signs of insect damage are evident.
Clover (sweet, red, alsike)	Sweet clover weevil	344 - 445 mL	28	2	
Pastures, waste areas	Grasshoppers-nymphs	222 mL	2	2	
	Grasshoppers-adults	344 - 405 mL	7	2	
Potato	Aphids, leafhoppers	222 - 445 mL	7	2	

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Field Crops	Insects controlled	Rate per acre	Pre-harvest interval (days)	Maximum allowable applications per season	Specific comments
Soybean	Aphids, bean beetles, leafhoppers, tarnished plant bugs, lygus bugs	283 - 405 mL	30	3	Apply by ground or aerial equipment. Use sufficient water for good coverage. Repeat applications as necessary. Do not feed or graze treated foliage to livestock.
	Spider mites (two-spotted)	405 mL	30	2	Apply by ground or aerial equipment. Use sufficient water for good coverage. Repeat applications as necessary. Do not feed or graze treated foliage to livestock.

*Control: Cygon 480 EC, Lagon 480 E. Suppression: Cygon 480 – Ag.

Registered tank mixes
None registered.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 80 - 120 L/acre. Aerial – 4.5 - 9 L/acre minimum.

Application tips
Products should be applied when the pests first appear and repeated as infestation warrants. Use higher rates for adult insects, heavy infestation or dense canopy. Do not apply foliar spray during the heat of the day or when temperatures are exceedingly high.

How it works
Dimethoate is a broad-spectrum systemic and contact organophosphate insecticide and acaricide.

Restrictions
Rainfall: No rainfastness information is listed on the product label. **Re-cropping:** No information is specified on the label. **Pre-harvest intervals:** See above table. **Re-entry interval:** 12 hours.

Environmental precautions
Dimethoate formulations are highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application. Do not contaminate these systems through direct application, disposal of waste or cleaning equipment.

Toxicity
Oral LD_{50} (rats) = 425 - 800 mg/kg. Toxic to bees. Do not use when bees are foraging.

Storage
Store between 4°C and 30°C, away from feed and food. Do not expose to direct sunlight.

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Decis® 100 EC/Decis® 5 EC/Poleci 2.5 EC/ FBN Deltamethrin 5 EC

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Decis® 100 EC (PCP # 33700)	Bayer	Deltamethrin: 100 g/L	Emulsifiable concentrate	1.2 L
Decis® 5 EC (PCP # 17734)	Bayer	Deltamethrin: 50 g/L	Emulsifiable concentrate	2.4 L, 9.6 L
Poleci 2.5 EC (PCP # 32447)	Sharda CropChem Ltd.	Deltamethrin: 25 g/L	Emulsifiable concentrate	4.8 L
FBN Deltamethrin 5 EC (PCP # 33998)	Farmers Business Network	Deltamethrin: 50 g/L	Emulsifiable concentrate	

Crops, insects controlled and rates

Crops	Insects controlled	Rate per acre: Decis 100 EC	Rate per acre: Decis 5 EC/FBN Deltamethrin	Rate per acre: Poleci 2.5 EC	Specific comments
Alfalfa (seed production only)	Alfalfa weevil, lygus bugs,	40 - 50 mL	80 - 100 mL	160 - 200 mL	Apply when insects are present and spraying is recommended. Use the higher rate when alfalfa weevil is present. Maximum one application per year.
	grasshoppers	20 - 30 mL	40 - 60 mL	NR*	Apply when signs of insect damage are evident and grasshoppers are in the 2 - 4 nymphal stage. Best control will be achieved when application is made prior to wing development. The higher rate should be used when the proportion of mature and late nymphal stages in the population are high and/ or spray penetration is inhibited by dense crop canopy.
Field corn Seed corn (Decis 100 EC only)	European corn borer	50 - 60 mL	100 - 120 mL	200 - 240 mL	Apply when egg masses begin to hatch, but no later than when the first pinhole feeding is seen on the leaves. Direct spray into the whorl of the plant. Repeat at 5 - 8 day intervals. For control of second generation, direct spray at ear zone. Maximum 3 applications per year.
	Western bean cutworm **	50 - 60 mL	NR	NR	The user should test the product on a small area first, under local conditions and using standard practices, to confirm the product is suitable for widespread application. Maximum 3 applications per year.

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Crops	Insects controlled	Rate per acre: Decis 100 EC	Rate per acre: Decis 5 EC/FBN Deltamethrin	Rate per acre: Poleci 2.5 EC	Specific comments
Corn (Sweet)	Western bean cutworm, European corn borer, corn earworm	50 - 60 mL	NR	NR	Western bean cutworm: Application should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring. Repeat at 5 - 8 day intervals European corn borer: Apply when egg masses begin to hatch, but no later than when the first pinhole feeding is seen on the leaves. Direct spray into the whorl of the plant. For control of second generation, direct spray at ear zone. In situations where pest monitoring indicates repeat applications are required, it is recommended that Decis 100 EC Insecticide be alternated with other insecticides. Corn earworm: Apply when insects are present in the silks. Maximum 2 applications per year, only one of which may be made my air.
Dry bean, chickpea, lentil, pea	Grasshopper	20 - 30 mL	40 - 60 mL	80 - 120 mL (lentil only)	Apply when insects are present as young hoppers or signs of insect damage are evident. Apply when the grasshoppers are in the 2 - 4 nymphal stage. Best control will be achieved when application is made prior to wing development. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
	Pea leaf weevil (suppression)	30 mL	60 mL	NR	Make the first application after emergence but prior to the 5 to 6 node stage. Apply while the adults are still present on the plants, before egg laying begins. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
	Cutworms	40 mL	80 mL	160 mL	Apply when larvae are present and feeding. Do not disturb after the soil application. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
	Lygus Bug	40 mL	80 mL	NR	Apply when the insects are present at economic thresholds. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
Canola, rapeseed, mustard, flaxseed	Beet webworm	20 - 30 mL	40 - 60 mL	80 - 120 mL	Apply by ground only when larvae are present and actively feeding. Use the higher rate when infestations are high or canopy is thick. Maximum 3 applications per year.
	Bertha armyworm	20 - 30 mL	40 - 60 mL	80 - 120 mL	Apply by air only when larvae are present and actively feeding. Use the higher rate when infestations are high or canopy is thick. Maximum 3 applications per year.
	Cabbage seedpod weevil	40 mL	80 mL	160 mL	For control of adult weevil only. Apply when adults are seen on flower buds or developing pods. Must apply prior to egg laying. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
	Clover cutworm	20 - 30 mL	40 - 60 mL	80 - 120 mL	Apply when larvae are present and feeding. Do not disturb the soil after application. Apply in sufficient water to ensure thorough coverage. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.

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Decis® 100 EC /Decis® 5 EC/Poleci 2.5 EC/FBN Deltamethrin 5 EC (cont'd)

Crops	Insects controlled	Rate per acre: Decis 100 EC	Rate per acre: Decis 5 EC/FBN Deltamethrin	Rate per acre: Poleci 2.5 EC	Specific comments
	Cutworms	40 mL	80 mL	NR	Apply when larvae are present and feeding. Do not disturb the soil after application. Under severe insect pressure, application should also be made to a 15-metre strip along fencerows around the field. Apply in sufficient water to ensure thorough coverage. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
	Diamondback moth	20 - 30 mL	40 - 60 mL	80 - 120 mL	Apply by air only when insects are actively feeding. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
	Flea beetles	20 - 30 mL	40 - 60 mL	80 - 120 mL	Apply when insects are present. Application should be made when the beetles are actively feeding. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
	Grasshoppers	20 - 30 mL/ac	40 - 60 mL	80 - 120 mL	Apply when signs of insect damage are evident and grasshoppers are in the 2 - 4 nymphal stage. Best control will be achieved when application is made prior to wing development. The higher rate should be used when the proportion of mature and late nymphal stages in the grasshopper population are high and spray penetration is inhibited by dense crop canopy. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
	Lygus bugs	30 mL	60 mL	120 mL	Apply when lygus bugs are seen feeding on the buds, flowers and developing pods. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
	Swede midge	30 - 40 mL	60 - 80 mL	NR	Begin applications when a significant population of adult midge are observed as determined by local monitoring. Under heavy pressure use the higher rate. Thorough coverage is important to obtain optimum efficacy. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days.
Potatoes	Colorado potato beetle, tarnished plant bug, leafhoppers	20 - 30 mL	40 - 60 mL	80 - 120 mL	Apply when insects are present or signs of insect feeding are evident. Repeat as necessary to a maximum of 3 applications per year. Minimum interval between applications: 5 - 7 days. Use the higher rate under severe infestations. Water volume: 80 - 200 L/acre.
	Potato flea beetle	20 - 30 mL	40 - 60 mL	80 - 120 mL	Apply when first signs of insects appear and damage is visible. Insecticide will control only those insects present. Under severe flea beetle populations, application should also be made to a 15-metre strip along fencerows around the field. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days. Water volume: 80 - 200 L/acre.
	Potato aphid, buckthorn aphid	50 mL	NR	NR	Apply when insects are present or signs of insect feeding are visible. Repeat if necessary to a maximum of 2 applications per year. Minimum interval between applications: 5 - 7 days. Water volume: 120 - 160 L/acre.

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Crops	Insects controlled	Rate per acre: Decis 100 EC	Rate per acre: Decis 5 EC/FBN Deltamethrin	Rate per acre: Poleci 2.5 EC	Specific comments
	Tuber flea beetle	30 - 40 mL	NR	NR	Apply to control first generation of adult flea beetle. Maximum 3 applications per year. Minimum interval between applications: 5 - 7 days. Water volume: 240 L/acre.
	European corn borer	30 - 50 mL	NR	NR	Scout for European corn borer egg masses to determine when egg laying and egg hatch is occurring. Apply Decis 100 EC Insecticide to coincide with peak egg hatch. A second application 5 - 7 days later may be required during periods of extended egg-laying. Maximum 3 applications per year. Use the high rate to control heavy infestations. Water volume:120 - 200 L/acre.
Wheat, barley, oats, flax, lentil	Cutworm	40 mL	80 mL	160 mL	Apply when larvae are present and feeding. Do not disturb the soil after application. Under severe insect pressure, application should also be made to a 15-metre strip along fencerows around the field. Maximum 3 applications per year with no more than 2 aerial applications per year. Minimum interval between applications: 5 - 7 days.
	Grasshoppers	20 - 30 mL	40 - 60 mL	80 - 120 mL	Follow provincial forecast. Apply when insects are present as young hoppers or signs of insect damage are evident. Apply when the grasshoppers are in the 2 - 4 nymphal stage. Best control will be achieved when application is made prior to wing development. Maximum 3 applications per year with no more than 2 aerial applications per year. Minimum interval between applications: 5 - 7 days.
Sugar beet	Cutworm	40 mL	80 mL	160 mL	Apply when larvae are present and feeding. Do not disturb the soil after application. Under severe insect pressure, application should also be made to a 15-metre strip along fencerows around the field. Maximum 3 applications per year with no more than 2 aerial applications per year. Minimum interval between applications: 5 - 7 days.
Sunflower	Sunflower beetles	20 mL	40 mL	80 mL	Ground adults: Apply when the insect is present or signs of insect damage appear. Crops should be sprayed when in the cotyledon to 2-leaf stage. Aerial adults and larvae: Apply once per year when the insect is present or signs of insect damage appear. Heads should be carefully examined for larvae. Application at dusk when insects are actively feeding is preferable. Maximum 1 application per year.

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Decis® 100 EC /Decis® 5 EC/Poleci 2.5 EC/FBN Deltamethrin 5 EC (cont'd)

Crops	Insects controlled	Rate per acre: Decis 100 EC	Rate per acre: Decis 5 EC/FBN Deltamethrin	Rate per acre: Poleci 2.5 EC	Specific comments
****Rangeland, pasture**	Grasshoppers	20 - 30 mL	40 - 60 mL	80 - 120 mL	Apply when insects are young or signs of insect damage are evident. Apply when the grasshoppers are in the 2 - 4 nymphal stage. Best control will be achieved when application is made prior to wing development. Do not apply to adjacent unregistered crops. The higher rate should be used when the proportion of mature and late nymphal stages in the population are high and/or spray penetration is inhibited by dense crop canopy. Use the 30 mL/acre rate of insecticide for aerial application. Maximum 3 applications per year with no more than 2 aerial applications per year. Minimum interval between applications: 5 - 7 days.

*Not registered. ** Minor use registration.

Registered tank mixes

Decis 100 EC - Pardner, Banvel, 2,4-D, Buctril M, MCPA Ester, Puma Advance, Puma Advance with Buctril M, XtendiMax. Decis 5 EC/Poleci 25 EC: Pardner, Banvel, 2,4-D, Buctril M, MCPA , Puma Advance.

Decis 100 EC Insecticide can be tank mixed with Puma Advance for the control of grasshoppers and annual grassy weeds or with Puma Advance and Buctril M for the control of grasshoppers and annual grassy weeds and broadleaf weeds in spring wheat and durum wheat only. The durum wheat cultivar "Plenty" may sustain an elevated level of injury following application of Decis 100 EC Insecticide with Puma Advance and Buctril M.

Application information

How to Apply: Ground and aerial application. Ground only – alfalfa for seed production, corn (field and seed). Potatoes – ground only but aerial may be used for Colorado potato beetle, tarnished plant bug, leafhopper or potato flea beetle. Ground or aerial – sweet corn, bean, chickpea, lentil, pea, canola, rapeseed, mustard, flaxseed, rangeland, pastures, sunflowers, wheat, barley, oats, sugar beet. **Water volume:** Alfalfa for seed production – 40 - 120 L/acre. Corn (field and seed) – 100 L/acre. Corn (sweet) – ground – 100 L/acre. Aerial – 4.5 - 9 L/acre. Bean, chickpea, lentil, pea – ground – 40 - 80 L/acre. Aerial – 9 L/acre. Canola, rapeseed, mustard, flaxseed – ground – 40 L/acre. Aerial: 8 - 18 L/acre. Potatoes – ground – varies for each pest, see "Crops, insects controlled and rates" section. Aerial – 8 - 9 L/acre. Rangeland, pastures – ground – 40 - 80 L/acre. Aerial – 4.5 - 9 L/acre. Sunflowers – ground – 40 - 80 L/acre. Aerial – 4.5 - 9 L/acre. Wheat, barley, oats – ground – cutworm – 40 L/acre. Grasshopper – 40 - 80 L/acre. Aerial – cutworm – 40 L/acre. Grasshopper – 4.5 - 9 L/acre. Sugar beet – 40 L/acre.

Application tips

Sufficient water must be used to ensure thorough, uniform coverage over the entire plant surface for optimum insect control. More water may be required when foliage is dense and depending on the type of spray equipment used.

How it works

Deltamethrin insecticides controls insects through contact and/or ingestion.

Restrictions

Grazing: not specified. **Pre-harvest intervals:** Alfalfa for seed production – 20 days. Corn – 1 day. Sweet corn – 5 days. Beans, peas, lentils, chickpeas – 7 days. Canola, rapeseed, mustard, flaxseed – 7 days. Potatoes – 1 day. Sunflowers – 70 days. Wheat, barley – 40 days. Oats – 31 days. Sugar beets – 100 days. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on label. Toxic to small wild mammals, bees and other beneficial insects. Avoid application during the crop blooming period and minimize spray drift. If applications must be made during the crop blooming period, restrict applications to the evening when most bees are not foraging.

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Avoid applications when bees are foraging in the treatment area in ground cover containing blooming weeds. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application of this product when heavy rain is forecast. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

Toxicity

Decis 5 EC: Oral LD50 = 1,100 mg/kg. Dermal LD50 = 3,872 mg/kg. Decis 100 EC: Oral LD50 = 633 mg/kg. Dermal LD50 = > 4000 mg/kg.

Storage

Store away from food or feed. Decis 100 EC Insecticide may solidify at temperatures below -20°C but will become usable at temperatures above 0°C. Decis 5 EC and Poleci 2.5 EC cannot be stored below freezing. If stored for one year or longer, shake vigorously before using.

Delegate

Group 5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Delegate (PCP# 28778)	Corteva Agriscience	Spinetoram: 25%	Wettable granules	840 g

Crops, insects controlled and rates

Crops	Insects controlled	Rate per acre	Specific comments
Potato	Colorado potato beetle	65 - 97 g	Time application for egg hatch or small larvae. Maximum 3 applications per year with a minimum retreatment interval of 7 days.
	European corn borer	65 g	Time application to coincide with peak egg hatch. Maximum 3 applications per year with a minimum retreatment interval of 7 days.
Wheat, barley, oats, rye	Armyworm	40 - 81 g	Apply when economic thresholds dictate. Maximum 3 applications per year with a minimum retreatment interval of 5 days.
Field corn	European corn borer Western bean cutworm	48 - 85 g	Time application for egg hatch or small larvae. Maximum 3 applications per year with a minimum of 5 days between applications.
Soybean	Armyworm	40 - 80 g	Time application to target small larvae. Maximum 3 applications per year with a minimum of 5 days between applications.

Application information

How to apply: Ground and aerial application. Ground: All crops listed above. Aerial: Potato and corn (field, sweet, seed, popcorn) only.

Application tips

Apply in sufficient water volume to cover the entire plant using a combination of nozzles and pressure designed to deliver thorough, even coverage. Do not apply through irrigation systems.

How it works

Spinetoram affects the insect nervous system. It works through ingestion or contact with the target insects. Target insects cease feeding within a few minutes, although death may take a few days.

Restrictions

Pre-harvest intervals (days): Wheat, barley, oats, rye (21), potato (7), soybean (3), field corn (28), corn harvested

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Delegate (cont'd)

for forage (7). **Re-entry interval:** 12 hours. **Grazing:** No restrictions.

Environmental precautions

Delegate is toxic to bees, small mammals, aquatic organisms, non-target terrestrial plants, and may be toxic to certain beneficial insects exposed to direct treatment, drift, or residues on flowering crops or weeds. Do not apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize spray drift to reduce harmful effects on bees, and other beneficial insects or small mammals in habitats next to the application site, such as hedgerows and woodlands. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg. Toxic to bees.

Storage

Store in a cool, dry place. Keep from freezing.

Dibrom Insecticide

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Dibrom Insecticide (PCP# 7442)	Loveland Products Canada	Naled: 900 g/L	Emulsifiable concentrate	3.78 L

Crops, insects controlled and rates

Crops	Insects controlled	Rate per acre	Specific comments
Alfalfa, clover, vetch	Aphids, leafhoppers, lygus bug	425 - 850 mL	Ground and aerial application. When using the maximum rate of 850 mL/acre must limit the area treated to 200 ha (494 acres) per day.
Bean (dry or field) pea (processing)	Alfalfa looper, aphids, red spider mites	425 - 850 mL	Ground and aerial application. Workers using the maximum rate of 850 mL/acre must limit the area treated to 200 ha per day.
Potato	Colorado potato beetle, leafhoppers, flea beetles	425 mL	Ground and aerial applications.
Sugar beet	Red spider mites, leafhoppers	850 mL	Ground application only. Do not apply to food or forage crops within 5 days of harvest or grazing.
Rangeland, field areas and pastures	Grasshoppers – nymphs	215 - 332 mL	Ground and aerial application. Animals may be present during treatment. If animals must be handled within 48 hours of application, wear chemical resistant gloves.
	Grasshopper – adults	271 - 389 mL	

Application information

How to apply: Ground and aerial application with the exception of sugar beet, which require ground application only.
Water volume: Ground – 40 - 120 L/acre. Aerial – 4 - 12 L/acre.

Application tips

Thorough coverage required. Do not apply when temperature is over 32°C.

How it works

Naled is a contact insecticide.

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Restrictions

Grazing: Do not apply to food or forage crops within 4 days of harvest or grazing, unless otherwise specified.
Re-entry interval: 48 hours. If animals must be handled within 48 hours of application, wear chemical resistant gloves.

Environmental precautions

This product is toxic to fish, birds and other wildlife. Keep out of any body of water. Do not contaminate water when cleaning equipment or disposing of wastes.

Toxicity

Oral LD_{50} (female rats) > 235 mg/kg (technical). Dermal LD_{50} (rabbits) > 5,050 mg/kg (technical).
Toxic to bees. Avoid application during periods of bee activity.

Storage

Do not use or store near heat or open flame. Store in a cool, dry place.

Eco Bran

Group 1A

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Eco Bran (PCP# 25815)	Peacock Industries	Carbaryl: 2%	Granules	20 kg

Crops, insects controlled and rates

Crops	Insects controlled	Rate	Specific comments
Wheat, oats, rye	Grasshopper	20 - 40 g/100 m^2	Apply when pest emergence is at its peak and populations are above the economic threshold. The higher rate should be used for older grasshoppers or severe infestations.
Barley			
Corn (field and sweet)			
Canola			
Bean			
Alfalfa, clover			
Field borders, headlands, rights-of-way, roadsides, wastelands			

Application information

How to apply: Ground application only. Do not apply by air. Broadcast applications may be made with spreaders, hand applicators or by hand.

Application tips

Timing is essential for effective control.

How it works

A carbamate insecticide that works by ingestion. Moderate to rapid in speed of action with moderate to long residual effectiveness (2 days to 4 weeks) depending on crop/pest complex, formulation and climatic conditions.

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Eco Bran (cont'd)

Restrictions
Rainfall: Do not apply just before rain. **Grazing:** May be used in pastures while beef cattle are grazing.
Pre-harvest intervals (days): Barley (28); canola (treat only seedlings), bean (5), oats, rye, wheat (14), field corn, sweet (1), alfalfa, clovers (2), forage crops (2), field borders, headlands, rights-of-way; roadsides, wasteland (zero).
Livestock re-entry period to pasture or rangeland (days): Beef cattle or other livestock (1), dairy cattle (2).
Re-entry interval: 12 hours.

Environmental precautions
Do not allow product to contaminate feed troughs or drinking water. Do not apply within 50 metres of sloughs, ponds, streams, dugouts or open water. Apply when winds are between 3 to 8 km/h and do not favor drift.

Toxicity
Oral LD_{50} (rats) = 540 mg/kg.

Storage
Store apart from food and feeds.

Harvanta 50SL

Group 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Harvanta (PCP# 32889)	ISK Biosciences distributed by Belchim Crop Protection Canada	Cyclaniliprole: 50 g/L	Suspension	3.79 L

Crops, insects controlled and rates

Crops	Insects controlled	Rate per acre	Specific comments
Potato	Colorado potato bettle Cabbage looper Beet armyworm Bertha armyworm Fall armyworm Potato psyllid suppression	323 - 485 mL	Thorough coverage is required to achieve best results. Use the higher rate for high pest pressure.

Registered tank mixes
None registered.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground: 80 L/acre minimum.
Aerial: 20 L/acre minimum.

Application tips
Do not exceed 3 applications per growing season. Do not exceed 1.45 L/acre per year.

How it works
Harvanta moves into leaf tissue where it is available to chewing insects feeding on the leaf surface. Feeding on leaf tissue results in paralysis and death.

Restrictions
Rainfall: Avoid application when heavy rain is forecast. **Pre-harvest interval:** Potato – 7 days. **Re-entry interval:** 12 hours.

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Environmental precautions

Toxic to bees. Avoid application during the crop blooming period. **Runoff:** Avoid applications with a moderate to steep slope, compacted soil or clay. **Leaching:** The use of this product may result in contamination of groundwater where soils are permeable and/or depth to water table is shallow.

Toxicity

Acute oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Keep product in original container during storage. Store in a cool, dry well ventilated storage facility.

Imidan WP Insecticide

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Imidan WP Insecticide (PCP# 29064)	Gowan Company	Phosmet: 70%	Wettable powder	2.265 kg (5 x 0.453 kg)

Crops, insects controlled and rates

Crops	Insects controlled	Rate per acre	Specific comments
Alfalfa	Alfalfa weevil, alfalfa blotch leafminer	648 g	Do not apply during bloom. Do not apply more than once per cutting or within 7 days of harvest. Do not make more than 3 applications per season.
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, potato aphid	648 g	Do not apply within 7 days of harvest. Maximum of 5 applications per season.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** Apply in sufficient water to provide good coverage.

Application tips

Imidan is packaged in water-soluble sachets that are to be dropped into the spray tank unopened. Do not use in low-volume, gear-type spray equipment. Do not apply during periods of dead calm or when winds are gusty.

How it works

Phosmet is a non-systemic, contact, organophosphorous insecticide.

Restrictions

Re-entry interval: 5 days.

Environmental precautions

Imidan is toxic to birds, small wild mammals and aquatic organisms. Do not apply within 15 metres of sloughs, ponds, streams, dugouts or open water. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast.

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Toxicity
Oral LD_{50} (rats) = 285 mg/kg. Toxic to bees.

Storage
Store above 0°C. Keep water soluble sachets in their protective container and store in a cool, dry place.

Lannate

Group 1A

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lannate (PCP# 10868)	Corteva Agriscience	Methomyl: 90%	Soluble powder	225 g

Crops, insects controlled and rates

Crops	Insects controlled	Rate per acre	Specific comments
Pea	Alfalfa looper, pea aphids	205 g	Ground applications only. Maximum 1application per year.
Corn (sweet)	Aphids, corn earworm	175 - 250 g	Ground applications. Corn earworm: Begin applications when 25% of the ears show silk. European corn borer: Begin applications when egg masses start to hatch, but no later than when the first feeding damage is seen on leaves.
	European corn borer	253 g	

Application information
How to apply: Ground application only. Do not apply by air. See above table for details. **Water volume:** Ground – 40 - 140 L/acre.

Application tips
Apply when insects are causing economic damage; continue applications at 5 - 7 days intervals or as needed. Apply the low rates on small plants, small insects and light insect infestations. Use 1 - 3 applications of the highest recommended rate for controlling severe infestations. Early morning or late evening application times are recommended.

How it works
A carbamate insecticide that works by contact and ingestion and has some systemic action. Rapidly degraded in green, growing plants; short-term residual.

Restrictions
Pre-harvest intervals (days): Pea (1), sweet corn (3). **Re-entry interval:** 12 hours.

Environmental precautions
This product is toxic to fish, birds and other wildlife. Keep out of any body of water. Do not apply where runoff is likely to occur. Do not apply when weather conditions favour drift from areas treated.

Toxicity
Oral LD_{50} (rats) = technical 17 - 24 mg/kg. Toxic to bees.

Storage
Store product in original container only. Store away from other pesticides, fertilizer, food or feed. Do not allow product to freeze.

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Lorsban NT/Pyrinex/Nufos/Citadel/ Warhawk 480 EC/Sharphos

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lorsban NT (PCP# 29650)	Corteva Agriscience	Chlorpyrifos: 452 g/L	Emulsifiable concentrate	10 L, 208 L
Nufos 4E (PCP# 25831)	FMC of Canada Limited	Chlorpyrifos: 480 g/L		10 L, 115 L, 208 L
Pyrinex 480 EC (PCP# 23705)	ADAMA Canada			10 L, 205 L
Citadel 480 EC (PCP# 27479)	IPCO			10 L, 115 L
Warhawk 480 EC (PCP# 29984)	Loveland Products Canada			10 L, 205 L
Sharphos (PCP# 32768)	Sharda CropChem Ltd.			10 L

Note: Inventory of chlorpyrifos based products can be sold by retails until December 2022. Last date of permitted use of chlorpyrifos products will be December 2023.

Crops, insects controlled and rates

Crops	Stage	Insects controlled	Rate per acre
Barley, oats, wheat	Soil or foilage	Armyworm (including Bertha armyworm), army cutworm, darksided cutworm, pale western cutworm, redbacked cutworm	355 - 485 mL
		Brown wheat mite	250 mL
		Grasshoppers – nymphs	235 mL*
		Grasshoppers – adults	355 mL
		Russian wheat aphids	202 mL
Wheat	Foilage	Wheat midge	335 - 405 mL
Canola	Soil or foilage	Army cutworm, darksided cutworm, pale western cutworm, redbacked cutworm, variegated cutworm	355 - 485 mL
Canola	Foilage	Alfalfa looper, armyworm, Bertha armyworm	305 - 405 mL
		Diamondback moth (larvae)	405 - 607 mL
		Lygus bugs	202 - 405 mL
		Grasshoppers	235 - 355 mL
Field corn, sweet corn	Seedling: 2- 5 leaf	Black cutworm, dark-sided cutworm, red-back cutworm	485 - 970 mL
	Soil: Pre-plant	Black cutworm, dark-sided cutworm, red-back cutworm	970 mL
Flax	Soil or foliage	Army cutworm, darksided cutworm, pale western cutworm, redbacked cutworm, variegated cutworm, armyworm	355 - 485 mL
		Bertha armyworm	305 - 405 mL
Sunflower	Soil or foliage	Army cutworm, pale western cutworm, redbacked cutworm	485 mL
Lentil	Soil or foilage	Pale western cutworm	354 - 485 mL
		Grasshoppers	234 - 485 mL
Potato	Soil or foilage	Colorado potato beetle (larvae), potato flea beetle, tarnished plant bug	404 mL
		Black cutworm, darksided cutworm, redback cutworm	Soil: 970 mL Seedling: 485 - 970 mL
Sugar beet	Soil or seedling	Pale western cutworm, redbacked cutworm	485 - 970 mL

*Not registered for Warhawk 480 EC.

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Registered tank mixes

Citadel, Lorsban NT, Sharphos and Pyrinex may be tank mixed with 2,4-D amine and ester, Avenge, Banvel II + 2,4-D amine, Buctril M, MCPA amine and ester. Warhawk, Nufos may be tank mixed with Avenge, Banvel II, 2,4-D amine and ester, MCPA amine and ester, Buctril M. Logic M can be tank mixed only with Citadel.

Caution: When tank mixing, always add the herbicide to the spray tank first and then add the chlorpyrifos insecticide.

Application information

How to apply: Ground and aerial application (unless otherwise specified on the label).
Water volume: Ground – 20 - 80 L/acre. Aerial – 4 - 12 L/acre minimum.

Application tips

Uniform coverage of crop is essential: use a boom configuration that provides optimum coverage. Use higher rates when infestations are heavy and when foliage is dense.

Bertha armyworm, and armyworm: Use higher rate for large larvae and when canopy is dense.

Cutworms: Higher rates and water volumes when the top 1 cm of soil surface is extremely dry or when the infestation is heavy.

Foliage treatments: When spraying crops near maturity, an application system that gives maximum penetration of the crop canopy is necessary to get good insect kill. Do not apply to crops in bloom. Best results will be obtained when application is made during early evening. Avoid application under hot temperatures. Do not apply to plants under extreme drought stress.

How it works

Chlorpyrifos is a broad-spectrum, non-systemic and contact organophosphate insecticide and acaricide.

Expected results

Insects must come in direct contact with the insecticide to be affected. Degrades on foliage by weathering, and a significant kill of insects eating treated foliage may not last beyond 48 hours after treatment. Somewhat more persistent in soil; control of soil-dwelling insects may be more durable.

Restrictions

Rainfall: Foliar treatments: should be made 4 - 6 hours before forecast rainfall. **Soil treatment:** Should not be applied if heavy rainfall is forecast. **Grazing:** Cereals grown for cover crop treated with chlorpyrifos insecticide should not be harvested for human or animal consumption if treated within 60 days of harvest. **Pre-harvest interval (days):** Barley, oats, wheat (60), canola (21), corn – field and sweet only (70), flax (21), lentil (21 days for applications up to 354 mL/acre, 60 daysdays for applications greater than 354 mL/acre), potato (7), sugar beet (90), sunflowers (42). **Re-entry interval:** 12 hours. **Re-cropping:** No information is specified on the label. **Maximum allowable applications:** Barley, oats, wheat, canola, corn, flax, lentil, sunflower, potato – do not apply more than once per season. See label for restrictions on other crops.

Environmental precautions

Chlorpyrifos is toxic to birds and wildlife and extremely toxic to fish and aquatic organisms. Do not apply directly to water. Drift and runoff from treated areas may be hazardous to aquatic organisms in adjacent aquatic sites. **Runoff:** To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment. **Leaching:** Binds to organic matter in soil. As a result it is less likely to leach in soils with adequate organic matter levels.

Toxicity

Oral LD_{50} (rats) formulation = 200 - 776 mg/kg. Toxic to bees.

Storage

Keep away from heat, sparks and open flame. Do not store above 38°C for extended periods of time. Keep away from food, drinks and animal feed.

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Malathion

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Malathion 500 EC (PCP# 5821)	IPCO	Malathion: 500 g/L	Emulsifiable concentrate	10 L
Malathion 85 E (PCP# 8372)	Loveland Products Canada	Malathion: 85%		10 L
Malathion 95 ULV (PCP# 25638)	Loveland Products Canada	Malathion: 96.5%		205 L
Malathion Grain Protector Dust (PCP# 15896)	Loveland Products Canada	Malathion: 2%	Dust	15 kg

Crops, insects controlled and rates

Crops	Insects controlled	Rates per acre		
		Malathion 500	Malathion 85 E	Malathion 95 ULV
Alfalfa	Alfalfa weevil larvae, aphids, grasshoppers, leafhoppers, lygus bugs, spider mites, spittlebugs (adult)	0.81 - 1.2 L	0.45 - 0.54 L	0.45 L (alfalfa weevil larvae only)
	Alfalfa blotch leafminer	1.2 L	0.54 L	
Flax	Grasshoppers	0.45 - 0.69 L	0.22 - 0.35 L	
Barley, oats, rye, wheat	Armyworms, English grain aphids, greenbugs, winter grain mites	0.61 - 0.81 L	0.45 - 0.54 L	0.17 - 0.22 L (armyworms only)
	Grasshoppers	0.69 L		
	Cereal leaf beetle	0.22 - 0.45 L	0.44 L	0.11 - 0.22 L
Bean	Aphids, leafhoppers, Mexican bean beetle, spider mites	0.57 - 1.2 L	0.3 - 0.54 L	
	Marmorated stink bug suppression		0.54 L	
Canary grass (seed production)	Aphids		0.27 L	
Canola, mustard	Flea beetles, grasshoppers	0.45 - 0.69 L	0.22 - 0.35 L	
	Diamondback moth (larvae)	0.22 - 0.34 L	0.11 - 0.17 L	0.11 - 0.17 L (canola)
Clover	Aphids, grasshoppers, leafhoppers, spider mites		0.45 - 0.54 L	0.22 L (greenworms)
Clover (sweet)	Sweet clover weevil	0.57 - 1.01 L	0.3 – 0.49 L	
Corn (grain/forage)	Earworms, European corn borers		0.45 - 0.54 L	
Lentil	Grasshopper	0.69 L	0.34 L	
	Marmorated stink bug suppression		0.34 L	
Pea	Pea aphid, leafhoppers, pea weevil, spider mites, marmorated stink bug suppression		0.45 L	
Pasture and rangeland	Grasshopper		0.34 L (pasture/ rangeland) 0.4 - 0.6 L (alfalfa)	0.22 - 0.34 L
Potato	Aphids, leafhoppers, Colorado potato beetles, spider mites	0.57 - 0.81 L	0.3 - 0.45 L	

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Malathion (cont'd)

Crops	Insects controlled	Rates per acre		
		Malathion 500	Malathion 85 E	Malathion 95 ULV
Sugar beet	Flea beetle		0.22 L	

When to apply

Foliar spray

Legumes: When economic thresholds are reached. Do not apply to legumes in bloom. **Sweet clover:** Spray field margins of first-year clover in late summer or early fall when migration of weevil adults is occurring. **Canola, flax:** when bees are absent from field and temperatures is above 18°C. **Sugar beet:** At 3 - 5 leaf stage when insects or damage first appears.

Stored grain treatments: To be used only for stored cereal grains and corn. As grain is being loaded or turned into final storage. Surface protectant – immediately after grain is loaded into storage.

Storage protectant: Prior to filling of grain storage structures.

Crop	Insects controlled	Liquid (per 1,000 kg grain)	2.0% Dusts (per 1,000 kg grain)
Barley	Confused flour beetle, flat grain beetle, grain mites, granary weevil, Indian meal moth, lesser grain borers, red flour beetle, rice weevil, rusty grain beetle, saw-toothed grain beetle	12 g	520 g
Corn		10 g	–
Oats		17 g	735 g
Rye		10 g	450 g
Wheat		10 g	415 g
Barley, corn, oats, rye, wheat	Indian meal moth	300 mL/100m^2 of grain surface	–

Note: The Canadian Grain Commission does not recommend the use of grain protectants. Malathion is more effective in dry grain than in tough or damp grain because the pesticide breaks down rapidly.

Application information

Foliar treatments: (Malathion 500, 85 E and Malathion 95 ULV) – ground and aerial application. See product label for restrictions. **Water volume:** Ground – 400 L/acre. Aerial – 12 L/acre minimum.

Stored grain treatments: Apply with sprayer or dust applicators. **Water volume:** 10 - 20 L water – Indian meal moth (surface treatment) – 295 mL in 5 - 10 L water/100 m^2. **Incorporation:** Add to grain as it is being augered, or scatter proper amount of dust on each load and cut in with shovel before dumping.

Application tips

All crops: Apply when day temperature is expected to exceed 20°C. Do not apply to plants in bloom. **Stored grain:** To protect from Indian meal moth, spray evenly over the surface of uninfested grain and rake to a depth of 15 cm. Where special application equipment is not available, any type of low pressure sprayer holding 5 L or more can be used. Apply spray to the grain stream as it is being elevated into storage.

Before storing new grain: Thoroughly clean up old grain and debris from bins, elevators or grain handling equipment. Remove and burn all sweepings. After cleaning the premises, apply a residual malathion spray to walls, floors and machinery in grain elevators or farm storage. Force spray into cracks and crevices. Apply 5 L of spray/100 m^2 of surface area using a coarse wetting spray. Wait until spray has thoroughly dried before storing grain in treated areas. Spray this mixture around the outside of bins and elevators to help prevent the insects from entering the bins.

How it works

A non-systemic, contact, organophosphate insecticide and acaricide of brief to moderate persistence. Generally non-phytotoxic.

Restrictions

Grazing: For pasture and range grass, repeat as necessary. Do not apply to fields occupied by dairy animals, but may be grazed or harvested on the day of application. **Pre-harvest intervals:** Lentil – 14 days. Canary grass (seed production) – 14 days. All other field crops and pasture – 7 days. **Stored grain sales:** Do not apply within 7 days of selling grain. Do not apply to barley destined for malting, canola, flax or pulses.

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Environmental precautions

Malathion is highly toxic to aquatic organisms. Avoid contamination of aquatic systems during application. Do not contaminate these systems through direct application, disposal of waste or cleaning equipment.

Toxicity

Oral LD_{50} (rats): 1,375 - 2,800 mg/kg. Dermal LD_{50} (rabbit): > 2,000 mg/kg.

Storage

This product is flammable. Do not store near food or feed. Store in cool, dry place.

Matador 120 EC/Silencer 120 EC/ Labamba Insecticide

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Matador 120 EC (PCP# 24984)	Syngenta	Lambda-cyhalothrin: 120 g/L	Emulsifiable concentrate	3.78 L
Silencer 120 EC (PCP# 29052)	ADAMA Canada			3.78 L
Labamba Insecticide (PCP# 33576)	Sharda CropChem Ltd.			3.78 L

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Alfalfa[1]	Alfalfa weevil, lygus bug, pea aphid, potato leafhopper, tarnished plant bug	34 mL (ground or air)	Do not apply within 3 days of livestock foraging. Do not use more than 3 applications per year. Allow a 7 day interval between treatments. Aerial application: Do not make more than 1 application of 34 mL/acre of the allowed seasonal total by air. Pre-harvest interval: 3 days. Maximum number of applications per season: 3.
Alfalfa[1]**, unimproved pasture, summer-fallow**	Grasshoppers	25 - 34 mL (ground) 34 mL (air)	
Barley, oats, wheat	Grasshoppers	25 - 34 mL (ground) 34 mL (air)	Do not apply within 14 days of livestock foraging.Pre-harvest interval: 28 days. Maximum number of aerial applications: 2.
Barley, oats, wheat	Armyworm	34 mL (ground or air)	Spray no later than when first feeding damage is seen on foliage. Do not exceed 3 applications per year. Do not apply within 14 days of livestock foraging. Pre-harvest interval: 28 days.
Canola and mustard	Bertha armyworm, cabbage seedpod weevil, crucifer flea beetle, diamondback moth (larvae), lygus bug, cabbage looper, imported cabbage worm	34 mL (ground or air)	Do not apply within 7 days of harvest. Do not exceed 3 applications per year. Allow a 7 day interval between treatments. Aerial application: Do not make more than 1 application of 34 mL/acre of the allowed seasonal total by air. For cabbage seedpod weevil, make only 1 application per season by either ground or aerial application equipment.
	Grasshoppers	25 - 34 mL (ground) 34 mL (air)	
Corn (field, sweet)[2]	Armyworm	34 - 84 mL (ground or air)	Sweet Corn: Do not apply within 1 day of harvest. Corn for silage: Do not apply within 14 days of harvest. Field corn, popcorn and corn grown for seed: Do not apply within 21 days of harvest.
Corn (field, silage, pop seed)	Corn earworm, European corn borer	76 mL (ground or air)	

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Matador 120 EC/Silencer 120 EC/Labamba Insecticide (cont'd)

Crop	Insects controlled	Rate per acre	Specific comments
Flax	Grasshoppers	25 - 34 mL (ground or air) 34 (air)	Do not apply within 7 days of harvest. Do not use more than 3 applications per year. Allow a 7 day interval between treatments. Aerial Application: Do not make more than 1 application of 34 mL/acre of the allowed seasonal total by air.
Lentil[2]	Aphids	34 - 94 mL (ground or air)	Do not graze or harvest treated forage, straw or hay for livestock feed. Pre-harvest interval for dry bean, chickpea, lentil, faba bean and dry pea: 21 days. Pre-harvest interval: 7 days. Do not use more than 3 applications per season. Aerial application: Do not make more than 2 applications of 34 mL/acre of the allowed seasonal total by air.
	Cutworms, grasshoppers lygus bug, potato leafhoppers	34 mL (ground or air)	
Pea (dry, succulent) faba bean (broad bean), chickpea[2]	Aphids	34 - 94 mL (ground or air)	
	Cutworms, grasshoppers, pea leaf weevil, potato leaf hopper	34 mL (ground or air)	
	Bean leaf beetle	34 - 94 mL (ground) 34 mL (air)	
Potato	Potato flea beetle, potato leafhopper, tarnished plant bug, tuber flea beetle	34 mL (ground or air)	The maximum rate per season must not exceed 101 mL of product per acre. Do not apply within 7 days of harvest. Do not use more than 3 applications per year if using the 34 mL/acre rate. Do not use more than 2 applications per year if using the 51 mL/acre rate. Aerial Application: Do not make more than 1 application of 34 L/acre of the allowed seasonal total by air. Pre-harvest interval: 7 days.
	European corn borer	34 mL (ground or air)	
	Colorado potato beetle	34 - 51 mL (ground) 34 mL (air)	
	Armyworm[2]	34 mL (ground or air)	
Sunflower	Sunflower beetle	17 - 26 mL (ground)	Pre-harvest interval: 7 days. Do not make more than 3 applications per season. Aerial Application: Do not make more than 1 application of 34 L/acre of the allowed seasonal total by air.
		34 mL (air)	
	Lygus bug	34 mL (ground or air)	
Timothy (hay or seed)[2]	Grasshoppers	25 - 34 mL (ground)	Do not apply within 14 days of harvest. Treated crops may be fed to non-lactating dairy animals and other livestock following a 14 day interval from application to harvest or foraging. Do not apply by air.

[1] Alfalfa seed from treated crops is not to be used for production of "alfalfa sprouts" for human consumption. [2] Registered under User Requested Minor Use Label Expansion Program.

Registered tank mixes

Matador, Labamba: Achieve Liquid, Horizon, Quadris, Quilt, Tilt.

Silencer: Achieve Liquid, Bison 400, Bumper, Headline, Horizon, Ladder, Quadris.

Application information

How to apply: Ground and aerial application. See above table for details. **Water volume:** Ground – 40 - 80 L/acre. Aerial – 4 - 16 L/acre.

Application tips

Control of some insect species with synthetic pyrethroid insecticides decreases as temperature rises. For best results, apply Matador 120EC, Labamba or Silencer 120EC during early morning before temperature rise and during the evening, past the heat of the day. Temperature must be warm enough for insects to be active.

How it works

Cyhalothrin-lambda is a photostable, synthetic pyrethroid insecticide. It is a fast acting stomach and contact insecticide. It has no fumigant or systemic activity. Best results will be obtained when applied during early developmental stages of pests as determined by regular monitoring.

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Restrictions
Rainfall: Avoid application when heavy rain is forecast. **Grazing:** Do not graze or feed livestock treated forage or cut green crop for hay or silage. **Pre-harvest intervals:** See above table. **Re-entry interval:** 24 hours.

Environmental precautions
Toxic to aquatic organisms and fish. Do not apply within 15 metres of environmentally sensitive areas using ground equipment and 100 metres of environmentally sensitive areas when applying by air. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity
Oral LD_{50} (female rats) Matador 120 EC/Silencer 120 EC/Labamba = 278 mg/kg; technical = 56 mg/kg.

Storage
Heated storage not required. Storage below 0°C will not impair the effectiveness of this product; however, following such storage, agitate well before use. Store in a cool, well ventilated area away from food or feed.

Minecto Duo 40WG

Group 4, 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Minecto Duo 40WG (PCP# 30900)	Syngenta	Thiamethoxam: 20% Cyantraniliprole: 20%	Wettable granule	3.04 kg

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Aphids, Colorado potato beetle, flea beetles, potato leaf hopper	178 - 283 g	Minecto Duo is applied as an in-furrow application at the seeding depth or as a narrow surface band above the seedline during planting. Prepare no more spray mixture than is needed for the immediate operation. Do not let spray mixture stand overnight in the spray tank.

Registered tank mixes
None registered.

Application information
How to apply: Ground application only. Do not apply by air.

Application tips
Apply in sufficient water volume to ensure uniform application and incorporation into the soil. Do not use a foliar application of a product containing a Group 4 (neonicotinoid) or Group 28 (diamide) insecticide following in-furrow or soil application of Minecto Duo 40WG.

How It works
Thiamethoam is a neonicitinoid insecticide. Insects are controlled through contact and ingestion. Cyantraniliprole exposure results in paralysis and death.

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Minecto Duo 40WG (cont'd)

Restrictions

Rainfall: Avoid application of Minecto Duo 40WG when heavy rain is forecast. **Pre-harvest intervals:** 7 days. **Re-entry interval:** 12 hours. **Re-cropping:** Treated areas may be replanted immediately following harvest or as soon as practical following the last application with any crop listed on the label or to sorghum, wheat, barley and canola. Any cover crop planted for erosion control or soil improvement may be planted as soon as practical following the last application. However, the cover crop may not be grazed or harvested for food or feed. For all other crops, a 120-day plant-back interval must be observed.

Environmental precautions

Minecto Duo is toxic to aquatic organisms. Do not apply this product directly to freshwater, estuaries or marine habitats. **Runoff**: to reduce runoff from the treated areas to aquatic habitats, consider the characteristics and conditions of the site before treatment. Site characteristics and conditions that may lead to runoff include, but are not limited to, heavy rainfall, moderate to steep slope, bare soil, poorly draining soil.

Toxicity

Oral LD_{50} (rats) >5,000 mg/kg. Dermal LD_{50} (rats) = >5,000 mg/kg. Toxic to bees.

Storage

Store in cool, dry place.

Minecto Pro

Group 6, 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Minecto Pro (PCP# 33023)	Syngenta	Abamectin: 28.5 g/L Cyantraniliprole: 135 g/L	Suspension concentrate	3.78 L

Crops, insects controlled, rates and staging

Crop	Insects controlled	Rate per acre	Specific comments
Potato	European corn borer	150 - 225 mL	Time the application to coincide with peak egg hatch. Scout for European corn borer by monitoring egg laying and egg hatch to determine application timing.
	Spider mites, potato psyllids, flea beetle	150 - 271 mL	Spider mites: Make the first application when mites first appear. Repeat application as needed to maintain control. Psyllid: Can be a vector for zebra chip disease. Apply at low populations to help suppress the expression of zebra chip.
	Colorado potato beetle	225 - 271 mL	Make the first application after approximately 50% of the egg masses have hatched and larvae are present. If 2 applications are needed, limit them to a single Colorado potato beetle generation per crop. Do not apply Minecto Pro for Colorado potato beetle control if any Group 28 was used at planting as an in-furrow, soil or seed-piece treatment.

Registered tank mixes

None registered.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 80 L/acre minimum. Apply with a non-ionic surfactant (0.1 - 0.5% v/v).

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Application tips
Ensure adequate water volumes are used for optimum coverage. Apply no later than when insect feeding is first seen on foliage. Re-apply after 7 days if populations reach economic threshold levels.

How it works
A broad spectrum foliar translaminar insecticide. Delivers rapid activity through 2 complementary active ingredients: abamectin and cyantraniliprole.

Restrictions
For European corn borer, spider mites, potato psyllids and flea beetle, do not make a foliar application of Minecto Pro for a minimum of 60 days following an in-furrow or soil application or planting of seed pieces treated with any Group 28 insecticide. Refer to label for more information. **Applications per season:** 2 at upper rate range or 3 at lower rate range. Make up to 2 consecutive applications, then switch to a non-Group 6 and non-Group 28 insecticide.
Rainfall: Avoid application if heavy rainfall is forecast. **Re-entry interval:** 12 hours.
Pre-harvest intervals: 14 days. **Re-cropping:** No restrictions.

Environmental precautions
Do not apply this product directly to freshwater habitats or contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Toxic to fish and aquatic organisms. Toxic to bees: do not apply Minecto Pro or allow it to drift to flowering crops or weeds if bees are visiting the treatment area.
Runoff: Do not apply Minecto Pro where runoff is likely to occur. To reduce runoff, avoid application to areas of moderate to steep slope, bare soil, poorly drained soils.

Toxicity
Acute oral LD_{50} (rats) = 451 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store in original container in a cool, dry, secure place. Do not store near food or feed.

Movento® 240 SC Insecticide

Group 23

Formulation

Product	Company	Active ingredient	Formulation	Container size
Movento 240 SC (PCP# 28953)	Bayer	Spirotetramat: 240 g/L	Suspension concentrate	2 L

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Aphids	89 - 148 mL	Apply when insect populations begin to build and before a damaging population becomes established. Maximum application per crop season: 295 mL. Minimum interval between applications: 7 days. Do not apply within 7 days of harvest.

Application Information
How to apply: Ground application only. Do not apply by air. **Water volume:** Ground – 120 L/acre minimum.

Application tips
Rate selected for use depends on aphid infestation level. Apply in adequate water for uniform coverage.
For high insect pressure a follow-up application may be necessary 1 to 2 weeks after initial application.

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How it works
Movento 240 SC is fully systemic, moving through phloem and xylem to all plant tissues including new shoot, leaf and root growth. Movento 240 SC is active primarily during ingestion by immature insect life stages.

Restrictions
Re-cropping: Plant-back interval – a plant-back restriction of 30 days is required for all crops not on the label.
Re-entry interval: 12 hours.

Environmental precautions
This product is toxic to aquatic organisms. Do not apply to any body of water. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast. **Drift:** Movento is toxic to non-target terrestrial plants. Maintain a buffer zone of 1 metre between the point of direct application and the closest downwind edge of sensitive terrestrial habitats.

Toxicity
Oral LD_{50} (female rats) = > 2,000 mg/kg. Dermal LD_{50} (male/female combined rats) = > 4,000 mg/kg. Toxic to bees.

Storage
Do not allow product or containers to freeze. Store in a cool, dry place. Store in original container.

Oberon® Insecticide

Group 23

Formulation

Product	Company	Active ingredient	Formulation	Container size
Oberon (PCP# 28905)	Bayer	Spiromesifen: 240 g/L	Suspension	2 L

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Alfalfa (seed production only)	Two-spotted spider mite	200 - 400 mL	Do not exceed 3 applications per season with a minimum interval of 7 days between applications. Maximum allowed per crop season: 1,200 mL/acre.
Corn (field and seed)	Bank grass mite, two-spotted spider mite	160 - 240 mL	Maximum amount allowed per crop season: 480 mL/acre. Maximum number of applications per crop season: 2.

Registered tank mixes
None registered.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

How it works
Spiromesifen is in the tetronic acid class of insecticides and works by contact, inhibiting lipid biosynthesis in the insect. Oberon has activity on all mite developmental stages. Immature mite stages tend to be more susceptible to Oberon than adults.

Restrictions
Pre-harvest intervals: Forage corn – 5 days; grain corn – 30 days. Alfalfa – none listed.
Re-entry interval: 12 hours. **Re-cropping:** Field corn – immediate plant back. Wheat, barley and alfalfa – 30 days. All other crops – 12 months.

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Environmental precautions

To prevent potential harm to bee brood, avoid application of this product during crop flowering period or when flowering weeds are present. Do not apply this product directly to freshwater habitats, estuaries or marine habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) => 4,000 mg/kg.

Storage

Store in a cool, dry place. Do not store below freezing.

Orthene

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Orthene (PCP# 14225)	UPL AgroSolutions Canada	Acephate: 75%	Soluble powder	1.5 kg

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Corn (seed, sweet)	European corn borer	228 - 334 g	Apply when egg mass count indicates an economically damaging population. Use the high rate only when heavy pest infestations are present.
Potato	Green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug	228 - 334 g	Begin applications at first sign of insects and repeat on a 7 - 10 day schedule.

Note: If Orthene is to be used on a commodity that may be exported to the U.S. and you require information on acceptable residue levels in the U. S., visit CropLife Canada's web site at *www.croplife.ca.*

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** Ground – corn – 90 - 400 L/acre. Potato – 90 - 660 L/acre.

Application tips

Do not apply more than 4 applications per season.

How it works

Systemic insecticide: Stomach poison.

Restrictions

Grazing: Do not feed trimmings to livestock or allow animals to graze on treated areas. Do not feed corn fodder or forage from treated crop to livestock. **Pre-harvest intervals:** Do not apply within 21 days of harvest. **Re-entry interval:** Corn – 5 days. Potatoes – 1 day.

Environmental precautions

Orthene is toxic to aquatic organisms. Do not apply to any body of water. Orthene is also toxic to birds and mammals. Observe buffer zones as specified on the label. **Leaching:** Orthene has a potential to leach through soil to groundwater. The use of this product may result in contamination of groundwater particularly in areas where soils are permeable (e.g., sandy soil) and/or where the depth to the water table is shallow.

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Orthene (cont'd)

Toxicity
Oral LD_{50} (rats) = 1494 mg/kg. Toxic to bees.

Storage
Store in cool, dry place. Protect from excessive heat.

Phostoxin

Group 8B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Phostoxin Tablets* (PCP# 15736)	Gardex Chemicals Ltd.	Aluminum phosphide: 55%	Fumigants	1 kg
Phostoxin Pellets (PCP# 15735)**				
Phostoxin Sachet* (PCP# 16438)**				

* Tablets (3 g) release 1.0 g phosphine upon decomposition. **Pellets (0.6 g) release 0.2 g phosphine upon decomposition.

*** Sachet: (34 g) release 11.0 g phosphine upon decomposition.

Note: Order directly – 1-800-561-7302 (Gardex Home Office, Etobicoke, Ontario).

Insects controlled

Angoumois grain moth
bean weevil
cadelle
cigarette beetle
dermestids
dried fruit moth
flour beetles
granary weevils
Indian meal moth
khapra beetle
lesser grain borer
Mediterranean flour moth
rusty grain beetle
saw-toothed grain beetle

Rates

Crop	Tablets
Raw agricultural commodities, animal feeds and processed foods	4 - 6/m^3
Commodity temperature °C	**Exposure times (days)**
Over 20	3
16 - 20	4
12 - 15	5
5 - 11	10
Below 5	Do not fumigate

Note: suggested exposures should be observed. A shortened exposure period cannot be compensated for by increased dosage.

Application tips
General: This product is for retail sale to and use only by individuals holding an Alberta Fumigation Pesticide Applicator Certificate or a Farmer Pesticide Certificate with the Fumigation Endorsement. Read the entire label, applicator's manual and guidance for preparation of a fumigation management plan before use. This product can only be used with a detailed fumigation management plan. The plan must be written for all fumigations prior to treatment.

Fumigating grain storage units: Make sure the structure is tight enough to retain the fumigant. Seal the structure as necessary. Tablets may be probed into grain or fed into the grain stream as the grain is transferred from 1 bin to another. A minimum buffer zone of 30 metres in all directions from the fumigation site must be established. Placarding is required for both the fumigated site and the buffer zone perimeter. The buffer zone must not include within it any structures unless they are unoccupied during the application. Entry into these structures or the buffer zone must be restricted and is not permitted until the fumigated site has been aerated and the hydrogen phosphide level is at or below 0.1 ppm in the fumigated site and the buffer zone. After application, all openings should be sealed and entries locked and placarded. After the exposure period, open doors and windows for aeration. Fumigated commodities must be aerated for 48 hours prior to selling. Remove all warning placards when aeration is complete.

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How it works

Phosphine (hydrogen phosphide) is a colourless gas with a carbide-like odour and high volatility. Formulated product consists of aluminium phosphide, ammonium bicarbonate, urea and paraffin. Upon exposure to air, the ammonium bicarbonate breaks down to form ammonia (a pungent, warning gas) and carbon dioxide (a fire suppressant). Within 1 - 4 hours hours, depending on temperature and humidity, the product begins to decompose and release phosphine. After decomposition, there remains a grey-white dust composed almost entirely of non-poisonous aluminum hydroxide with trace amounts of undecomposed aluminum phosphide. The dust is eliminated when raw agricultural commodities are moved.

Expected results

The effectiveness of this product depends on the fumigation achieved by the release of phosphine gas. Therefore, tightness of the area to be fumigated and temperature of the commodity are essential when determining dosage rates and exposure rates. The tighter the bin and the warmer the temperature of the commodity, the lower the dosage required and vice versa.

Restrictions

Aerate finished food for 48 hours before it is offered to the consumer.

Toxicity

Hydrogen phosphide gas is very toxic to all forms of animal life, and exposure to even small amounts should be prevented. Poisoning results from ingestion or inhalation as hydrogen phosphide is not absorbed through the skin. It is also insoluble in water, fats and oils.

Precautions

Protective equipment

A self-contained breathing apparatus must be worn during delivery/dispensing of products/attending leaks or spills/ de-activation of granules and while monitoring hydrogen phosphide levels during fumigation and aeration periods (i.e., worn at all times when the hydrogen phosphide levels are above 0.1 ppm or unknown).

Reduce gas hazards

Never let tablets come in direct contact with liquid. This contact causes the immediate release of hydrogen phosphide. Never open a container except for immediate usage. Never confine the product in small gas proof enclosures such as plastic bags. Such confinement could cause the gas concentration to reach the lower flammability level. Take precautions in areas where copper, brass or gold are present, as corrosion may occur. Never fumigate in areas containing electronic or telephone equipment, photographic film or copy paper. Remove such items or protect them from exposure to the gas. Hydrogen phosphide has great penetrating power, and gas may slowly seep through concrete block walls. Hydrogen phosphide does not layer, but expands to fill the available space.

Symptoms of poisoning

Severity depends on concentration of hydrogen phosphide involved. Mild poisoning results in fatigue, nausea, pressure or pain in the chest, ringing in the ears and uneasiness. Hydrogen phosphide is not a chronic poison, and these symptoms will readily disappear with rest and fresh air. Greater quantities of gas produce such symptoms as vomiting, stomach ache, diarrhea, disturbance in equilibrium and dyspnea (difficulty in breathing). Very high concentrations quickly cause bluish-purple skin colour, agitation, poor muscle co-ordination, sub-normal blood oxygen content, unconsciousness and death. Death can occur very quickly or be delayed several days as a result of pulmonary edema and collapse, by paralysis of the central respiratory system. In cases of severe poisoning, disturbance in liver and kidney function can also occur.

First aid

Should exposure to hydrogen phosphide be documented or suspected, remove patient from gas atmosphere to open air. Call a physician immediately. Have the patient lie down, keeping him warm and comfortable. Treat as for shock. Make no antidotal use of fats, oil, butter or milk. Do not administer atropine as it is contraindicative. Begin artificial respiration if breathing has ceased. When exposure to low concentrations of hydrogen phosphide has been documented or suspected, the individual involved should rest for 24 hours, and under no circumstances should he resume any work dealing with fumigation. If ingested, induce vomiting by touching the back of the throat with a blunt object.

Storage

Tablets are received in resealable flasks. As long as flasks remain intact, the storage life of the product is unlimited. Storage should be in a dry, locked, ventilated area and out of the reach of children and irresponsible persons.

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Pounce 384EC/Ambush 500 EC/Perm-UP/ IPCO Syncro

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Pounce 384EC (PCP# 16688)	FMC of Canada Limited	Permethrin: 384 g/L	Emulsifiable concentrate	1 L, 10 L
Ambush 500 EC (PCP# 14882)	AMVAC	Permethrin: 500 g/L		3.78 L
Perm-UP (PCP# 28877)	UPL AgroSolutions Canada	Permethrin: 384g/L		1 L, 6 L
IPCO Syncro (PCP# 33838)	IPCO	Permithrin: 384 g/L		7.5 L

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre		Specific comments
		Pounce/ Perm-UP /IPCO Syncro	Ambush	
Barley, oats, rye, wheat, triticale*	Pale western cutworm *Cutworms: army, black, dark-sided, pale western, red-backed	73 - 158 mL	57 - 121 mL	Apply up to the 5-leaf stage. Under dry soil conditions or where cutworms are large (2.5 - 4 cm), use higher rate of product. Applications should be made under warm, moist conditions in the evening or at night when cutworm activity is highest.
Canola, corn (excluding sweet corn), flax, lentil, pea, potato, sugar beet, sunflower	Army cutworm, black cutworm, dark-sided cutworm, pale western cutworm, red-backed cutworm	73 - 158 mL	57 - 121 mL	
Potato	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug	73 - 105 mL	57 - 80 mL	Use the higher rate for heavy infestations. Repeat as necessary. May be applied up to the day before harvest.
	Variegated cutworm, European corn borer	73 mL	57 mL	Variegated cutworm – apply when insects or damage appears. European corn borer – apply when egg masses begin to hatch.
Sweet corn	European corn borer, corn earworm	111 - 152 mL	80 - 111 mL	Use the higher rate when severe insect pressure is anticipated. Spray no later than when first feeding is seen on the foliage. For second brood borers in late plantings, apply before tassels show.
	Fall armyworm	73 mL	57 mL	
Canola	Crucifer flea beetle Striped flea beetle (Pounce only)	36 - 73 mL	28 - 57 mL	

* Ambush 500 EC only.

Registered tank mixes

None registered. For Pounce 384EC only: FMC supports the following mixes that are not on the Pounce 384EC label. Apply mixes according to the most restrictive use limitations for either label. Canola: Glyphosate (up to the 5-leaf stage), Liberty 150 SN (up to the 5-leaf stage), Liberty 150 SN + Centurion (up to the 5-leaf stage).

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Application information
How to apply: Ground and aerial application. **Water volume:** Apply sufficient water for thorough coverage of foliage. See label for details on water volume.

Application tips
For control of corn earworm, spray to ensure coverage of ears and silk. For European corn borer control, consult with company representative for proper timing of spray. For cutworms, do not disturb soil surface for 5 days after application.

How it works
Works by contact and as a stomach poison on a wide range of pests. No systemic or fumigant activity.

Restrictions
Grazing: Cover crop or crop treated with permethrin should not be used as a green feed for animals. **Re-entry interval:** 12 hours except for corn, sweet corn if hand detasselling and/or hand harvesting – 8 days.

Environmental precautions (applies to all of the permethrins listed)
Pounce 384 EC/Ambush/Perm-UP/IPCO Syncro is moderately to highly toxic to aquatic organisms, including fish. Avoid contamination of aquatic systems during application. To reduce risk to aquatic organisms from run-off, a vegetative filter strip of at least 10 metres wide between the field edge and adjacent, downhill aquatic habitats must be observed. Avoid drifting of spray onto any body of water or other non-target areas. Do not apply by any ground application within 15 metres or by any aerial application within 100 metres of any body of water. Toxic to birds.

Toxicity
Oral LD_{50} (rats) = 789 - 3,000 mg/kg. Toxic to bees.

Storage
Store in a cool, dry, well ventilated area. Keep product from freezing.

Pyrifos 15G

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Pyrifos 15G (PCP# 24648)	Loveland Products Canada	Chlorpyrifos: 15%	Granular	22.7 kg

Crops, insects controlled and rates

Crop	Insects controlled	Rate	Specific comments
Corn	Larvae of northern and western corn rootworms (control), cutworm larvae (suppression)	75 g per 100 m of row	Do not apply within 70 days of harvest. Incorporate granules in top 2.5 cm of soil.
Potato (in-furrow)	Wireworm	0.1 kg per 100 m of row	Do not apply within 70 days of harvest.

Application information
Ground application only. See label for information on row spacing, amounts to be applied and equipment calibration.

Application tips
Do not apply in heavy rain. Not more than 1 application per season.

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Pyrifos 15G (cont'd)

How it works
Chlorpyrifos is an organophosphate that is a cholinesterase inhibitor.

Restrictions
A plant-back interval of 30 days must be observed between application and planting of rotational crops.
Re-entry interval: 24 hours.

Environmental precautions
Toxic to birds, certain beneficial insects (bees), wild mammals, fish and aquatic organisms. Do not contaminate water, food or feed by storage or disposal.

Toxicity
Oral LD_{50} (rats) = 409 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Avoid heating above 60°C. Contains petroleum derivative solvent and will burn.

Rimon 10 EC Insecticide

Group 15

Formulation

Product	Company	Active ingredient	Formulation	Container size
Rimon 10 EC Insecticide (PCP# 28881)	UPL AgroSolutions Canada	Novaluron: 10%	Emulsifiable concentrate	10 L

Crops, insects controlled, and rates

Crop	Insects Controlled	Rate per acre	Specific comments
Potato	Colorado potato beetle, European corn borer	166 - 332 mL	Colorado potato beetle: Application should be made when majority of the population is at egg hatch to the second instar of larval development. European corn borer: First application should be made just prior to egg hatch. Scout to monitor egg-laying and egg hatch to determine time of application. Do not apply more than 2 applications per crop per season. Do not apply more than 664 mL product/acre/crop/season.
Alfalfa (grown for seed)	Lygus bug nymphs	338 mL	Begin application when lygus bugs appear and oviposition is initiated. Reapplication on a 7 - 10 day interval may be required if monitoring indicates the need.

Registered tank mixes
None registered.

Application information
How to apply: Ground application only. Do not apply by air. **Water volume:** Potato: 40 L/acre minimum. Alfalfa: 80 L/acre minimum.

Application tips
Apply recommended dosage by conventional ground sprayer equipment capable of delivering sufficient water to obtain thorough, uniform coverage of the target crop. Spray equipment boom and nozzles should be oriented in a manner to minimize boom height to optimize coverage uniformity, maximize deposition and reduce spray drift. Drop nozzles may be required to obtain uniform coverage against certain pests that develop down in the canopy. Higher water volume will provide better coverage and performance.

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How it works

Rimon insecticide is an insect growth regulator that must be absorbed by eggs or ingested by insect larvae to be fully effective. The primary mode of action is by disrupting cuticle formation and deposition occurring when insects change from 1 developmental stage to another, resulting in death at molting. Due to this mode of action, Rimon does not have any effect on adult stages of insects that have completed larval development.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Re-entry interval:** 12 hours.
Pre-harvest interval: 14 days.

Environmental precautions

May be toxic to bee colonies exposed to direct treatment, drift or residues on flowering crops or weeds. Avoid applying this product to flowering crops or weeds if bees are visiting the treatment area. Toxic to aquatic organisms. Avoid application of this product when heavy rainfall is forecast. Do not apply directly to water or to areas where surface water is present. Rimon insecticide is toxic to immature insects. Minimize spray drift in habitats next to the application site to reduce harmful effects on beneficial insects.

Toxicity

Oral LD_{50} (rat) 3,914 mg/kg. Dermal LD_{50} (rabbit) 8,000 mg/kg.

Storage

Store in cool, dry place. Keep from freezing. Store this product away from food or feed.

Sefina

Group 9D

Formulation

Product	Company	Active ingredient	Formulation	Container size
Sefina (PCP# 33265)	BASF Canada	Afidopyropen: 50 g/L	Emulsifiable concentrate	3.24 L

Crops, insects controlled and rates

Crop	Insects	Rate per acre	Specific comments
Soybean	Soybean aphid	81 mL	Allow a minimum of 7 days between applications. Do not apply more than 2 applications per year. Do not apply more than 162 mL/acre per year.
Potato	Green peach aphid, potato aphid	81 mL	Allow a minimum of 7 days between applications. If whitefly pressure is high, use the highest label rate for optimum control. Do not make more than 2 sequential applications of Sefina before using an insecticide with a different mode of action. Do not exceed 4 applications per year. Do not apply more than 1011 mL/acre per year of product.
	Sweet potato whitefly, silverleaf whitefly	283 - 405 mL	
Grass for forage, fodder and hay*	Pea aphid Suppression: blue alfalfa aphid, spotted alfalfa aphid	81 mL	Allow a minimum of 7 days between applications. Do not apply more than 4 applications per year. Do not exceed 486 mL/acre per year. Do not make more than 2 sequential applications of Sefina before using an insecticide with a different mode of action.
	Potato leafhopper suppression	81 - 162 mL	

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Sefina (cont'd)

Crop	Insects	Rate per acre	Specific comments
Nongrass animal feeds for forage, fodder, straw and hay*	Pea aphid Suppression: Blue alfalfa aphid, spotted alfalfa aphid	81 mL	
	Potato leafhopper suppression	81 - 162 mL	
Sorghum (grain and sweet)	Sugarcane aphid suppression	81 - 162 mL	Allow a minimum of 14 days between applications. Do not apply more than 4 applications per year. Do not exceed 356 mL/acre per year. Do not make more than 2 sequential applications of Sefina before using an insecticide with a different mode of action.

*Refer to label for complete list of registered grass and nongrass crop types.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 - 80 L/acre. Aerial – 20 L/acre.

Application tips:
Always use adequate water volume to ensure thorough coverage. Application during the crop blooming period may be made only in the evening when most bees are not foraging.

How it works
Sefina is a selective contact insecticide that causes immediate cessation of feeding.

Restrictions
Rainfall: Rain within 1 hour may reduce control. **Pre-harvest intervals:** Grass and nongrass forage crops – zero days. Potato, soybean, sorghum – 7 days. **Re-cropping:** A 30-day plant-back interval is required for crops not listed on the label. **Re-entry interval:** 12 hours.

Environmental precautions
Toxic to aquatic organisms. Observe buffer zones and vegetative filter strips specified in the product label. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay. Avoid application when heavy rain is forecast. **Bees:** Application during the crop blooming period, and when flowering weeds are present, may be made in the evening when most bees are not foraging. Minimize spray drift to reduce exposure to bees in habitats close to the application site.

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in cool, dry, well-ventilated area without floor drain. Store the leftover product in original container. To prevent contamination store this product away from food or feed.

Sevin XLR

Group 1A

Formulation

Product	Company	Active ingredient	Formulation	Container size
Sevin XLR (PCP# 27876)	Tessenderlo Kerley Inc.	Carbaryl: 466 g/L	Liquid suspension	10 L

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Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Alfalfa, clover, barley, oats, rye, wheat	Blister beetles, flea beetles, leafhoppers, three-cornered alfalfa hopper	1.01 - 1.6 L	Apply when insects or their damage appear. Repeat in 7 - 14 days if necessary.
	Alfalfa caterpillar, armyworm, webworms	1.01 - 2.1 L	
	Grasshoppers	0.50 - 1.01 L	
Bean	Mexican bean beetle	0.5 - 0.6 L	Apply when insects or damage appear. Repeat at intervals of 7 - 10 days or as necessary.
	Flea beetle, leafhopper	1.01 L	
	Lygus bugs, stink bugs	2.1 - 2.6 L	
	Climbing cutworm	30 - 35 mL/100 m of row	Spray in 25 - 30 cm band over row.
Corn (field and sweet)	Corn earworm, northern corn rootworm (adults), European corn borer, fall armyworm	1.0 - 1.6 L	For larvae in whorls and for foliage feeders, treat the entire plant. Repeat as necessary. For insects attacking silks and ears, apply at intervals of 2 - 4 days starting when first silks appear and continuing until silks begin to dry.
	Grasshoppers	0.5 - 1.01 L	
	Cutworms (climbing)	45 mL/ 100 m of row	Spray in 25 - 30 cm band over row.
Canola, including rapeseed	Flea beetle	0.2 L	Applications may be made up to 4 weeks following plant emergence.
Ditchbanks, field borders, forage grasses, headlands, pasture, rangelands, rights-of-way, wastelands	Grasshopper – nymphs or sparse vegetation	0.5 - 1.0 L	
	Grasshoppers – adults or dense vegetation	1.0 - 1.4 L	
Pea	Alfalfa looper	1.9 L	Apply when insects or damage appear. Repeat at intervals of 7 - 10 days or as necessary.
Potato	Colorado potato beetle	0.50 L	Apply when insects or damage appear. Repeat at intervals of 7 - 10 days or as necessary.
	Potato flea beetle, leafhoppers	1.01 L	
	Tarnished plant bugs	2.1 - 2.6 L	

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 12 L/acre minimum. Aerial – 4 L/acre minimum.

Application tips

Timing and good coverage are essential for effective control. Sevin XLR applications are more resistant to wash-off when applied as a concentrated suspension. To ensure wash-off resistance, apply dilutions 1 part Sevin XLR to no greater than 39 parts water. Application should be made to dry foilage to maximize wash-off resistance.

How it works

A carbamate insecticide that works by contact and ingestion. Moderate to rapid in speed of action with moderate to long residual effectiveness (2 days to 4 weeks) depending on crop/pest complex, formulation and climatic conditions. Some immediate control is expected, but the majority of control occurs 24 to 48 hours after application.

Restrictions

Rainfall: Do not apply just before rain. **Grazing:** Forage and feed crops, including bean vines, hay, pea vines, may be grazed or harvested for use as feed for dairy animals 48 hours after treatment and meat animals 24 hours after treatment without resulting in illegal residues in milk or meat. Remove cattle from area to be sprayed. Treated forage and feed crops may be fed to dairy animals and animals for slaughter provided sprays are applied as directed. Beef cattle may be re-introduced to range 1 day after application; dairy cattle 2 days after application.

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Sevin XLR (cont'd)

Pre-harvest intervals (days): Barley (28), oats, rye, wheat (14), pea (3), bean (5), corn (1), potato (7), alfalfa, clover (2), forage grasses, non-crop areas, pasture, rangeland (1).

Environmental precautions:
Do not apply when weather conditions favour runoff or drift. Do not contaminate surface or ground water. Do not apply directly to water or to areas where surface water is present. **Drift:** Do not apply or allow to drift to blooming crops or weeds if bees are visiting the treatment area.

Toxicity
Oral LD_{50} (rats) = 699 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg. Toxic to bees.

Storage
Do not store where temperature frequently exceeds 38°C. All formulations will withstand freezing.

Ship 250 EC

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Ship 250 EC (PCP# 32563)	Sharda CropChem Ltd.	Cypermethrin: 250 g/L	Emulsifiable concentrate	3.79 L

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Corn	European corn borer	113 mL	For control of corn borer, apply when egg masses begin to hatch but no later than when first feeding is seen on foliage. For second brood borers in late planting, apply before tassels show.
Canola	Bertha armyworm	80 -113 mL	Apply when insects or signs of insect feeding first appear. Repeat treatment as necessary.
	Flea beetle	56 mL	Apply when insects or signs of insect feeding first appear. Repeat treatment as necessary. Ground application only.
Sunflower	Sunflower beetle, sunflower seed weevil	40 mL	Apply when insects or signs of insect feeding first appear. A second treatment may be required after 5 days.
Potato	Colorado potato beetle, flea beetles, leafhoppers	56 mL	Apply when insects or signs of insect feeding are present. Use the high rate for severe infestations.

Application information
How to apply: Ground application only. Do not apply by air. **Water volume:** Ground – corn – 120 - 202 L/acre. Canola, potato – 40 - 202 L/acre. Sunflower – 40 - 48 L/acre.

Application tips
Ensure uniform application.

How it works
Cypermethrin is a synthetic pyrethroid insecticide. It works by contact and stomach action.

Restrictions
Grazing: Do not graze the treated crops or cut for hay; there are not sufficient data to support such use.
Pre-harvest intervals (days): Wheat (30), barley (45), canola (30), sunflower (70), potato (7), corn (5).
Maximum applications per season: See label for specific crop and use information. **Re-entry interval:** 12 hours.

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Environmental precautions

Ship 250 EC is highly toxic to aquatic organisms, including fish. An untreated border of 15 metres for ground applications and 100 metres for aerial applications must always be left around environmentally sensitive areas such as sloughs, streams, rivers, dugouts and wetlands.

Toxicity

Oral LD_{50} (rats) = 542 mg/kg. Toxic to bees.

Storage

Store in a heated chemical shed.

Sivanto® Prime Insecticide

Group 4D

Formulation

Product	Company	Active ingredient	Formulation	Container size
Sivanto® Prime (PCP# 31452)	Bayer	Flupyradifurone: 200 g/L	Suspension	2 L

Crops, insects controlled and rates

Crop	Insects	Rate per acre	Specific comments
Potato	Aphids, leafhoppers	202 - 303 mL	Ensure thorough coverage. Minimum 10 days between applications.
	Whiteflies, Colorado potato beetle	303 - 404 mL	
Corn (field, sweet, pop, seed)	Aphids	202 - 303 mL	Ensure thorough coverage. Minimum 7 days between applications.
Alfalfa (forage, silage and hay production only)	Aphids, leafhoppers	202 - 303 mL	Ensure thorough coverage. Minimum 10 days between applications.
Chickpea, dry bean, faba bean, lentil, soybean	Aphids, leafhoppers	202 - 303 mL	Ensure thorough coverage. Minimum 10 days between applications.
	Whiteflies	303 - 405 mL	

Application anformation

How to Apply: Ground and aerial application. **Water volume:** Potato, corn – ground – 40 L/acre. Aerial – 8 L/acre minimum. Alfalfa – ground – 40 L/acre minimum.

Application tips

Maximum Sivanto Prime insecticide allowed per crop season: Potato, corn, alfalfa – 809 mL/acre.

Do not make any application of Sivanto Prime insecticide following a soil, in-furrow, or seed treatment application of a Group 4D Insecticide.

How it works

Sivanto Prime is a broad-spectrum insecticide that is systemic, moving from roots to the leaves in the case of soil applications.

Restrictions

Rainfall: Do not apply within 1 hour of rain. Avoid application when heavy rain is forecast. **Grazing:** Potato – do not graze tops. Corn, alfalfa — do not graze within 7 days after application. Re-entry interval**:** 12 hours. **Pre-harvest interval:** Potato, alfalfa, chickpea, dry bean, faba bean, field pea, lentil – 7 days. Corn – sweet, silage, hay cutting – 7 days. Grain, stover – 21 days. Soybean grain – 21 days. **Re-entry interval:** 12 hours.

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Sivanto® Prime Insecticide (cont'd)

Environmental precautions
Toxic to aquatic organisms. Observe buffer zones specified on the label. Minimize spray drift to reduce exposure to bees and beneficial insects. **Runoff:** To reduce risk of runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity
Acute oral LD_{50} (female rats) > 2,000 mg/kg. Dermal LD_{50} (male/female rats) > 2,000 mg/kg.

Storage
Store in cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food and feed.

Superior 70 Oil

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Superior 70 Oil (PCP# 14981)	Loveland Products Canada	Mineral oil: 99%	Liquid	10 L, 200 L, 1000 L

Crops, insects controlled and rates

Crop	Insect controlled	Rate per 100 m row	Specific comments
Potato	Aphids	1% solution (e.g., 4 L of product per 405 L of water)	Superior 70 Oil is used to reduce the spread of potato virus Y (PVY) that is vectored by aphids. Spray at 1 week intervals when aphid populations are present.

Application information
How to apply: Ground application only. Do not apply by air. **Water volume:** 405 L/acre.

Application tips
Thorough coverage is essential. Do not apply Superior 70 Oil in more concentrated solutions than recommended. Do not apply just before or during freezing weather or in direct sunlight. Do not use within 30 days before or after using sulphur.

Restrictions
Pre-harvest intervals: Potato – do not apply closer than 14 days to harvest. **Re-entry interval:** 12 hours.

Environmental precautions
Toxic to aquatic organisms. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soils or clay. Avoid application when heavy rain is forecast.

Toxicity
Oral LD_{50} (male rats): > 5,000 mg/kg. Dermal LD_{50} (rabbits): > 2,000 mg/kg.

Storage
Do not store below 0°C or near heat or flame.

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Thimet 20 G

Group 1B

Formulation

Product	Company	Active ingredient	Formulation	Container size
Thimet 20 G (PCP# 29000)	AMVAC	Phorate: 20%	Granules	22 kg SmartBox

Crops, insects controlled and rates

Crop	Insect controlled	Rate per 100 m row	Specific comments
Potato	Wireworms	105 g in sandy or light soil 161 g in silt or heavy soils	Distribute the granules evenly in the furrow at planting time. Do not apply later than at planting time. Do not harvest potato within 90 days of planting.

Application information

How to apply: Product must be applied with a SmartBox pesticide application system properly calibrated to ensure accurate placement and rate.

Application tips

Potato: Do not place in direct contact with the seed. Do not use in muck soils. Do not apply to any area not specified on the label.

How it works

A systemic, organophosphorus insecticide with effective initial residual activity against soil insects and other arthropods.

Restrictions

Rainfall: Relatively insoluble in water; therefore, the effect of normal rainfall is not appreciable. **Grazing:** Do not feed treated foliage within 60 days of treatment. **Re-entry interval:** 48 hours. **Re-cropping:** Potato – no restrictions. All other crops - 6 months.

Environmental precautions

This product is highly toxic to birds, small mammals, fish and aquatic invertebrates. Any spilled or exposed granules must be incorporated into the soil or otherwise cleaned up from the soil surface.

Toxicity

Oral LD_{50} (rats) = 2 - 4 mg/kg. Dermal LD_{50} (rabbits) = 226 mg/kg.

Storage

Do not use or store in or around the home. Store open bags in labelled, sealed drums or heavy plastic bags.

Titan

Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Titan (PCP# 27449)	BASF Canada	Clothianidin: 600 g/L	Suspension	2 L

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Titan (cont'd)

Crops, insects controlled and rates

Crop	Rate	Specific comments
Potato, in-furrow application*	2.0 - 3.33 mL per 100 m of row	Colorado potato beetle, leafhoppers.
Potato seed piece treatment	20.8 mL per 100 kg potato seed pieces	Wireworm suppression (*Agriotes obscurus, A. lineatus, Limonius agonus, Melanotus spp., M. communis)*. May reduce the damage caused by other wireworm species. Aphid, Colorado potato beetle, potato leafhopper, potato flea beetle (overwintered adults and suppression of second generation).
	10.4 - 20.8 mL per 100 kg potato seed pieces	Aphid, Colorado potato beetle, potato leafhopper, potato flea beetle (overwintered adults and suppression of second generation).

* Length of control may vary due to climate and soil conditions. The higher rate is recommended when extended length of control is needed.

Application information

Soil application: Apply as a narrow band in-furrow. For best results, direct spray on the seed pieces or seed potato in the furrow. **Seed piece treatment:** Refer to label for details regarding application to potato seed pieces.

Application tips

Do not apply any subsequent application of a Group 4 Insecticide (e.g., foliar) following an in-furrow application with Titan insecticide. Do not apply Titan insecticide in conjunction with a Group 4 insecticide seed piece treatment. Do not apply more than once per season as a soil application.

How it works

The active ingredient clothiandin is a chloronicotinyl, systemic (within the plant) insecticide that works by contact or ingestion. Control periods may vary due to climate change and soil conditions.

Restrictions

Re-cropping: Acceptable plant-back intervals for cereal grains, grasses, non-grass animal feed, soybean and dried bean – Minimum 30 days. Leafy, root and tuber vegetables (except potato) – 12 months. Corn, canola and potato – May be replanted anytime. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms. Treated seed is toxic to birds and small wild mammals. Any spilled or exposed seeds pieces must be incorporated into the soil or otherwise cleaned-up from the soil surface. The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow. Toxic to bees.

Toxicity

Titan: Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage

Store in a cool place away from feeds and other foodstuffs. Do not store in direct sunlight. Protect from freezing temperatures.

vayego® 200 SC Insecticide

Group 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
vayego® 200 SC (PCP #33711)	Bayer	Tetraniliprole: 200g/L	Suspension concentrate	3 L

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Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Colorado potato beetle, European corn borer, flea beetles, aphids (suppression)	60 mL	Begin applications when treatment thresholds have been reached. Apply as a directed foliar spray ensuring thorough coverage. Maximum of 2 applications per season. Minimum interval between applications (ground or aerial) is 10 days. Maximum vayego allowed per crop season: 120 mL/ac.
Corn	European corn borer, corn earworm, cutworms, armyworms, flea beetles Suppression of aphids	60 mL	Begin applications when treatment thresholds have been reached. For control of European corn borer and corn earworm, time the application with peak egg hatch.
Soybean	Cutworms, armyworms	60 mL	Begin applications when treatment thresholds have been reached.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum.
Aerial (potato only) – 20 L/acre minimum.

Application tips

Do not apply during crop blooming stage. Where possible, rotate the use of vayego insecticide or other Group 28 insecticides with different groups that control the same pests.

How it works

Tetraniliprole disrupts muscle activity in the insects, resulting in paralysis. Treated pests stop feeding quickly after ingestion, become lethargic and lose mobility.

Restrictions

Rainfall: Rainfast 1 hour after application. **Pre-harvest intervals:** Potatoes – 14 days. Field corn – 14 days. Sweet corn – 1 day. Soybean – 14 days. **Plant-back interval:** All labelled crops may be planted back immediately following application. Observe a 30-day plant-back interval for root vegetables, leaves of root and tuber vegetables, bulb vegetables, legumes, cucurbits, cereal grains for grain, forage, fodder or straw, rapeseeds, sunflowers and alfalfa. Observe a 120-day plant-back interval for all other crops.
Re-entry interval: 12 hours.

Environmental precautions

Toxic to bees. Do not apply this product or allow drift to blooming crops or weeds. Toxic to aquatic organisms. Observe buffer zones specified on the label. Toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland. Tetraniliprole is persistent in soils and aquatic systems. This product demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of tetraniliprole in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

Toxicity

Oral LD50 (rats) = > 2,000 mg/kg. Dermal LD50 (rats) = > 2,000 mg/kg.

Storage

To prevent contamination, store this product away from food or feed.

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Verimark

Group 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Verimark (PCP# 30892)	FMC of Canada Limited	Cyantraniliprole: 200 g/L	Suspension	2.365 L

Crops, insects controlled and rates

Crop	Insects controlled	Rate	Specific comments
Potato	Colorado potato beetle, potato flea beetle (early season control of spring adults)	6.75 to 9 mL per 100 metre of row OR 304 to 405 mL per acre (based on 90 cm row spacing)	In-furrow application: Apply as a narrow band in-furrow. For best results, direct spray on the seed pieces in the furrow. Thorough coverage of seed pieces is important to obtain optimum control.

Registered tank mixes

None registered.

Application information

Mix with water for application as in-furrow spray or seed-piece treatment with appropriate equipment. Always add Verimark to water; never put Verimark into a dry tank or other mixing equipment without first adding water. Mix thoroughly; once dispersed, continued agitation is required. Spray mix should not be stored overnight in the spray tank.

Application tips

When pest populations are expected to be high, use the highest listed application rate for that pest. Coverage is important to obtain optimum control. Do not make more than 1 soil application per season.
Do not exceed a total of 0.607 L/acre per season.

How it works

After exposure to Verimark, affected insects will rapidly stop feeding, become paralyzed and typically die within 1 - 3 days.

Restrictions

Do not make a subsequent foliar application of any Group 28 insecticide for a minimum of 60 days following an in-furrow application or planting of seed pieces treated with Verimark insecticide. **Colorado potato beetle resistance management:** Do not apply any Group 28 insecticide for Colorado Potato Beetle control if Verimark was used at planting as in-furrow. **Re-cropping:** Plant-back Intervals (PBI) for rotational crops range from zero to 365 days. See the label for information on PBI for specific crops. **Re-entry interval:** 12 hours.

Environmental precautions

Verimark is toxic to aquatic organisms. Do not contaminate irrigation or drinking water supplies or aquatic habitats by the cleaning of equipment or disposal of wastes. Toxic to bees. This product is systemic, and bees can be exposed to product residues in flower, leaves, pollen and/or nectar resulting from soil applications. However, when this product is applied and used according to label directions, the risk to bees is expected to be negligible.

Toxicity

Low acute toxicity. Oral LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store product in original container only, away from other pesticides, fertilizer, food or feed. Do not let product freeze.

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Voliam Xpress

Group 3, 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Voliam Xpress (PCP# 30325)	Syngenta	Lambda-cyhalothrin: 50 g/L Chlorantraniliprole: 100 g/L	Suspension	3.78 L

Crops, insects controlled and rates

Crop	Insects controlled	Rate per acre	Specific comments
Potato	Cutworms, corn earworm, beet armyworm, leafminers, psyllids	202 mL	Do not make more than 2 applications per year. Allow 7 days between applications. Pre-harvest interval: 7 days.
Bean, chickpea, faba bean, lentil, pea, soybean	Grasshopper, lygus bug, pea leaf weevil, potato leaf hopper	91 mL	Maximum of 3 applications per season by ground application. Maximum of 1 application per year by air. Allow 7 days between applications. Pre-harvest interval: 14 days except soybean 21 days. Do not exceed 90 g chlorantraniliprole per acre per year (by ground or aerial application) and 30 g lambda-cyhalothrin per acre per year (by ground application) or 10 g lambda-cyhalothrin per acre per year (by aerial application).*
	Soybean aphid, pea aphid, bean aphid, bean leaf beetle	91 - 202 mL	
	Western bean cutworm, cabbage looper, armyworm, fall armyworm, beet armyworm, corn earworm, European corn borer	202 mL	
Corn (field and sweet)	Armyworm, corn earworm, European corn borer	202 mL	Do not make more than 2 applications per year. Allow 7 days between applications. Pre-harvest interval: silage corn 14 days, field corn 21 days. Do not exceed 90 g chlorantraniliprole per acre per year (by ground or aerial application) and 27.6 g lambda-cyhalothrin per acre per year (by ground application) or 20 g lambda-cyhalothrin per acre per year (by aerial application), to all types of corn.*
Sunflower **Canola** **Mustard (condiment and seed)**	Bertha armyworm, cabbage looper, cabbage seedpod weevil, imported cabbageworm, diamondback moth (larvae), flea beetles, lygus bug, sunflower beetle	91 mL	For cabbage seedpod weevil, make only 1 application per season by ground or air application. Maximum of 3 applications per season by ground application. Maximum of 1 application per year by air. Allow 7 days between applications. Pre-harvest interval: 7 days.

* Maximum application amounts per acre include Voliam Xpress as well as other Group 3 and/or Group 28 insecticides. Consult the label of other products containing these active ingredients prior to treatment to ensure the annual maximum is not exceeded.

Application information

How to apply: Ground and aerial application. **Water volume:** Potato and corn – ground – 60 L of water per acre. Air – 16 L of water per acre. Bean, chickpea, faba bean, lentil, pea, soybean, canola, rapeseed, mustard (seed and condiment) and sunflower – ground – 40 - 80 L water per acre. Air – 16 L of water per acre.

Application tips

Ensure adequate water volumes are used for optimum coverage. Apply no later than when insect feeding is first seen on foliage. Re-apply after 7 days if populations reach economic threshold levels. Avoid application at temperatures above 25°C. Control of insects may be reduced at higher temperatures.

How it works

Voliam Xpress insecticide works through contact and ingestion. It provides rapid knockdown and residual control of Lepidopteran (e.g., moth larvae) and sucking and chewing insects. Insecticide components: lambda-cyhalothrin is a synthetic pyrethroid insecticide and chlorantraniliprole is a diamide insecticide.

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Voliam Xpress (cont'd)

Restrictions

Potato: Do not apply Voliam Xpress, which contains a Group 28 insecticide, following a seed piece, in-furrow or soil application of any Group 28 insecticide. **Other registered crops:** Do not make a foliar application of Voliam Xpress for a minimum of 60 days following an in-furrow or soil application or planting of seed treated with any Group 28 insecticide. **Re-cropping:** No restrictions. **Grazing:** Do not graze or harvest treated forage, straw or hay for livestock feed. **Re-entry interval:** 24 hours. **Rainfall:** Avoid application when heavy rain is forecast.

Environmental precautions

This product is highly toxic to bees exposed to direct treatment or residues on flowering crops or weeds. Do not apply this product or allow it to drift to flowering crops or weeds if bees are visiting the treatment area. Toxic to fish and aquatic organisms. **Runoff:** Do not apply Voliam Xpress where runoff is likely to occur and be hazardous to aquatic organisms in neighboring areas. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Oral LD_{50} (rats, female) = 98.11 mg/kg. Dermal LD_{50} (rats, male and female) > 5,000 mg/kg.

Storage

Store above 0°C in the original container to prevent freezing. If solids are present, return to room temperature and agitate until solids are dissolved.

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Insecticide selector chart

Cereals

Products	Chlorpyrifos***	Coragen/Coragen MaX	Cygon/Lagon	Decis/Poleci 2.5 EC/FBN Deltamethrin	Delegate	Eco Bran	Mako	Malathion	Matador/Silencer	Pounce/Perm-UP/Ambush /IPCO Syncro	Sevin XLR
Wheat, barley and oats											
aphids			C					C			
brown wheat mite	C										
cereal leaf beetle								C			
cutworms	C	C		C			C*			C	
grasshoppers	C	C		C		C	C*	C	C		C
thrips			C								
armyworm	C	C			C			C	C		C
wheat midge**	C		C								
wireworm											
Fall rye											
aphids								C			
cutworm		C								C	
grasshopper		C				C		C			C
armyworm		C			C			C			C

C = Control, S = Suppression

* Wheat and barley only.

** Wheat only.

*** Chlorpyrifos products include Lorsban NT, Pyrinex, Nufos, Citadel, Warhawk 480 EC, Sharphos.

Forages, pasture and rangeland

Products	Beleaf	Coragen/Coragen MaX	Cygon/Lagon	Decis/Poleci 2.5 EC/ FBN Deltamethrin	Dibrom	Eco-Bran	Mako	Malathion	Matador/Silencer	Oberon	Sevin XLR	Sivanto Prime
Forages												
Alfalfa												
alfalfa weevil		S		C				C	C			
aphids	C		C		C			C	C			C
blotch leafminer			C					C				
grasshopper		C	C	C				C	C		C	
leafhopper			C		C			C	C		C	C
lygus bugs	C		C	C	C			C	C			
plant bugs			C						C			
spider mites								C				
spittle bug								C				
two-spotted spider mite										C[1]		
Clover												
aphids	C				C			C[2]				
leafhoppers					C			C[2]			C	
spider mites								C[2]				
sweet clover weevil			C					C				
grasshoppers		C						C[2]			C	
tarnished plant bug	C											
Timothy												
grasshoppers									C			
Forage grasses												
grasshoppers		C									C	
Pasture, rangeland, headlands and roadside												
grasshoppers		C	C	C	C	C	C[3]	C	C		C	

[1] Alfalfa grown for seed production only.

[2] Only registered for Malathion 85E.

[3] Headlands and roadsides only.

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Insecticide selector chart

Oilseeds

Products	Chlorpyrifos*	Coragen/Coragen MaX	Cygon/Lagon	Decis/Poleci 2.5 EC/FBN Deltamethrin	Eco-Bran	Mako/Ship 250 EC	Malathion	Matador/Silencer	Pounce/Perm-UP/Ambush /IPCO Syncro	Sevin	Voliam Xpress
Canola (including herbicide tolerant)											
alfalfa looper	C										
leafhopper			C								
beet webworm				C							
Bertha armyworm	C	C		C		C		C			C
cabbage looper		C						C			C
cabbage seedpod weevil				C				C			C
clover cutworm				C							
cutworm	C	C		C					C		
diamond-back moth (larvae)	C	C		C			C	C			C
flea beetle				C		C	C	C	C	C	C
grasshopper	C	C	C	C	C	C**	C	C			
lygus bugs	C			C				C			C
red turnip beetle											
armyworm	C										
turnip aphids			C								
variegated cutworm	C										

C = Control, S = Suppression

Products	Chlorpyrifos*	Coragen/Coragen MaX	Cygon/Lagon	Decis/Poleci 2.5 EC/ FBN Deltamethrin	Malathion	Matador/Silencer	Pounce/Perm-UP/Ambush / IPCO Syncro	Voliam Xpress
Flax								
beet webworm				C				
Bertha armyworm	C	C						
clover cutworm				C				
cutworm	C	C		C			C	
grasshopper		C		C	C	C		
true armyworm								
variegated cutworm	C							
potato aphid			C					
Mustard								
beet webworm				C				
Bertha armyworm		C		C		C		C
cabbage seedpod weevil				C		C		C
clover cutworm				C				
diamond-back moth (larvae)		C		C	C	C		C
flea beetle				C	C	C		C
grasshopper		C		C	C	C		
lygus bugs				C		C		C
red turnip beetle								

C = Control, S = Suppression

* Chlorpyrifos products include Lorsban NT, Pyrinex, Nufos, Citadel, Warhawk 480 EC, Sharphos.

** Mako only.

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Insecticide selector chart

Sugar beet

Products	Chloryrifos*	Closer	Coragen/Coragen MaX	Decis/Poleci 2.5 EC/FBN Deltamethrin	Malathion	Pounce/Perm-UP/Ambush /IPCO Syncro
Sugar beet						
aphids		C				
beet webworm			C			
cutworm	C			C		C
flea beetle					C	

Pulses

Products	Chlorpyrifos*	Coragen/Coragen MaX	Cygon/Lagon	Decis/Poleci 2.5 EC/FBN Deltamethrin	Lannate	Malathion	Matador/Silencer	Pounce/Perm-UP/Ambush /IPCO Syncro	Sevin XLR	Voliam Xpress
Pea										
alfalfa looper					C				C	
cutworm		C					C	C		
grasshopper		C					C			C
leafhopper						C	C			
pea aphids			C		C	C	C			C
pea leaf weevil							C			C
spider mite						C				
Lentil										
cutworm	C	C		C			C	C		
grasshopper	C	C		C		C	C			C
lygus bugs							C			C
pea aphids							C			C
potato leafhopper							C			C
Chickpea										
aphids										C
cutworm		C					C			
grasshopper		C					C			C
lygus bugs										

C = Control, S = Suppression

* Chlorpyrifos products include Lorsban NT, Pyrinex, Nufos, Citadel, Warhawk 480 EC, Sharphos.

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Insecticide selector chart

Potato

Products	Actara	Admire	Agri-Mek SC	Assail/Aceta	Beleaf	Chlorpyrifos*	Cimegra	Closer	Clutch	Concept	Coragen/Coragen MaX	Cormoran	Cygon/Lagon	Decis/Poleci 2.5 EC	Delegate	Dibrom	Harvanta	Imidan	Lannate
Potato																			
aphids	C	C		C	C			C	C	C		C	C					C	C
cutworm						C					C								
Colorado potato beetle	C	C		C		C			C	C	C	C		C	C	C		C	
European corn borer										S	C	C			C				
leafhoppers	C	C						C	C	C		C	C	C		C		C	C
potato flea beetle		C				C				C				C		C		C	C
variegated cutworm											C								C
wireworms							C												
spider mites			C																
tarnished plant bug						C				C				C					
psyllid			C		S												S		

C = Control, S = Suppression

(continued)

* Chlorpyrifos products include Lorsban NT, Pyrinex, Nufos, Citadel, Warhawk 480 EC, Sharphos.

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Insecticide selector chart

Potato *(continued)*

Products	Mako/Ship 250 EC	Malathion	Matador/Silencer/Labamba	Minecto Duo WG	Minecto Pro	Movento	Orthene	Pounce/Perm-UP/Ambush /IPCO Syncro	Pyrifos	Rimon	Sefina	Sevin XLR	Sivanto Prime	Superior 70 Oil	Thimet 20G	Titan	Vayego	Verimark	Voliam Xpress
Potato																			
aphids		C		C		C	C				C		C	C		C	S		
cutworm	C**																		C
Colorado potato beetle	C	C	C	C	C			C		C		C	C			C	C	C	
European corn borer			C		C					C							C		
leafhoppers	C	C	C	C			C	C				C	C			C			
potato flea beetle	C		C	C	C		C	C				C				C	C	C	
variegated cutworm	C**																		
wireworms									S						C	S			
spider mites		C			C														
tarnished plant bug			C				C	C				C							
psyllids					C														C

C = Control, S = Suppression

* Chlorpyrifos products include Lorsban NT, Pyrinex, Nufos, Citadel, Warhawk 480 EC, Sharphos.

** Mako only.

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Active ingredient names for registered products can be found in the *seed treatment fungicide group classification by mode of action* table starting on page 564

Seed treatment index

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Seed treatment of cereal, forage, oilseed and pulse crops

Purpose of seed treatment

Seed treatment provides economical insurance against many diseases and some insect pests of seed and seedlings. Chemical treatment can give seedlings a head start by preventing or reducing damage resulting from certain crop pests.

Diseases are controlled by contact fungicides that destroy fungi carried on the seed, such as common bunt of wheat, the surface-borne smuts of barley and oats, fungus stripe of barley and some leaf-spotting and seed decay fungi. Systemic fungicides destroy fungi carried in the seed, such as loose smut of wheat and barley, and they protect the early growth of the seedling.

Specific recommendations:

- Rye and flax should be treated because they are very susceptible to seed decay.
- Winter wheat should be treated to prevent bunt and seed decay as well as to promote good seedling growth.
- If bunt or smut was observed in a crop that will be used for seed, the grain should be treated. If a variety is grown that is susceptible to bunt or smut and the presence of the disease is uncertain, it may be wise to treat the seed annually or every second year, depending on the susceptibility of the variety.
- Canola should always be treated to control the seed-borne phase of blackleg.
- Alfalfa seed is treated to control verticillium wilt.

Insecticidal seed treatment will prevent or reduce damage caused by certain crop pests.

Methods of seed treatment

Custom treatment

Fungicides are applied to the seed sometime before planting. Seed cleaning plants are equipped to treat seed with liquid fungicides. Canola can only be treated by custom applicators as there are no farmer-applied seed fungicides available. Farmers can use a variety of methods for both liquid and dry formulation application.

Precautions

- **Read** and **follow** label directions carefully.
- **Treated** seed must not be allowed to contaminate grain intended for food, feed or commercial use.
- **Bury** leftover treated seed or store it safely in labelled bags for future use as seed.
- **Treated** seed offered for sale must be labelled with the name of the treated chemicals (Seed Act).
- **Treated** seed in transit must be bagged or bulk loads tarped to prevent spillage.

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Seed treatment fungicide group classification by mode of action					
Chemical family	**Active ingredients**	**Found in**			
Group 1	**Inhibition of tublin formation.**				
Benzimidazole	thiabendazole	Apron Advance	Crown	Mertect SC	
	thiophanate-methyl	Senator PSPT			
Group 3	**Demethylation inhibitors.**				
Triazoles	difenoconazole	Dividend Extreme Cruiser Maxx Potato Extreme*	Cruiser Vibrance Quattro* Helix Vibrance*	Interest Forte Maxim D	Vibrance Quattro Vibrance Ultra Potato
(includes conazoles)	ipconazole	Rancona VRS			
	tebuconazole	Raxil MD	Raxil Pro Raxil Pro Shield*	Raxil WW* Sharda Meteb	
	triticonazole	Insure Cereal FX4	Teraxxa F4*		
	metconazole	METLOCK CT	NipsIt SUITE Cereals OF Seed Protectant*		
	prothioconazole	Emesto Silver EverGol Energy	Raxil Pro Raxil Pro Shield	Titan Emesto*	
Group 4	**Phenylamides. Affects RNA synthesis.**				
Acylamides	metalaxyl	Allegiance FL Belmont 2.7 FS Cruiser Vibrance Quattro*	Dividend Extreme EverGol Energy Insure Pulse METLOCK CT	NipsIt SUITE Cereals OF Seed Protectant* Prosper EverGol* Raxil MD	Raxil WW Teraxxa F4* Trilex EverGol SHIELD Trilex EverGol Vibrance Quattro
	metalaxyl-M	Apron Advance Apron Maxx RTA Cruiser Maxx	Vibrance Beans* Dividend XL RTA Helix Vibrance*	Insure Cereal FX4 Interest Forte Orondis Gold Potato	Sharda Meteb Vercoras*
Group 7	**Succinate dehydrogenase. Inhibits mitochondrial function.**				
Carboxamides	carbathiin	Crown Loveland Vitaflo	Rancona VRS	Vitaflo 280	Vitaflo SP
	penflufen	Emesto Silver EverGol Energy	Prosper EverGol* Titan Emesto*	Trilex EverGol	Trilex EverGol SHIELD
	sedaxane	Cruiser Maxx Vibrance Beans*	Cruiser Vibrance Quattro*	Helix Vibrance* Vibrance Quattro	Vibrance Ultra Potato
	fluxapyroxad	Insure Cereal FX4	Insure Pulse	Teraxxa F4*	Vercoras*
	inpyrfluxam	Zeltera Pulse			
Group 11	**Strobilurin type action and resistance. Inhibit mitochondrial respiration.**				
Strobilurin	trifloxystrobin	Prosper EverGol*	Trilex EverGol	Trilex EverGol SHIELD	
	pyraclostrobin	Insure Cereal FX4	Insure Pulse	Teraxxa F4*	Vercoras*
Group 12	**Phenylpyrroles.**				
Phenylpyrroles	fludioxonil	Apron Advance Apron Maxx RTA Cruiser Maxx Potato Extreme*	Cruiser Maxx Vibrance Beans*	Cruiser Vibrance Quattro* Helix Vibrance*	Maxim D Maxim MZ PSP Vibrance Quattro
Group 22					
Thiiazole carboxamide	ethaboxam	INTEGO Solo			
Group 40					
Amide fungicide	mandipropamid	Vibrance Ultra Potato			
Group M	**Multi-site activity.**				
Dithiocarbamates	mancozeb	MancoPlus PSPT Maxim MZ PSP	Potato ST 16 Solan MZ	Tuberseal PSPT	
	thiram	Loveland Vitaflo	Thiram 75WP	Vitaflo 280	Vitaflo SP

*Contains fungicide and insecticide combination. Information on insecticide mode of action can be found in the insecticide section.

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Allegiance™ FL Fungicide Seed Treatment/Belmont 2.7 FS

Fungicide Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Allegiance™ FL (PCP# 26674)	Bayer	Metalaxyl: 317 g/L	Liquid suspension	3.79 L
Belmont 2.7 FS (PCP# 30246)	UPL AgroSolutions Canada			500 mL, 10 L, 200 L

Crops, diseases controlled and rates

Crops	Diseases	Rate per 100 kg seed	Water	Total volume
Cereals (wheat, barley, oat, rye, triticale)	Seed rot and seedling blight	6.3 - 12.6 mL	493.7 - 487.4 mL	500 mL
Chickpea, dry pea	Seed rot and seedling blight	16 - 110 mL	484 - 390 mL	500 mL
Canola, rapeseed, pea (processing)	Seed rot and seedling blight	32 - 110 mL	468 - 390 mL	500 mL
Alfalfa, bean, bird's-foot trefoil, clover, vetch, sainfoin	Seed rot and seedling blight	46 - 110 mL	454 - 390 mL	500 mL
Grasses (forage)	Seed rot and seedling blight	46 - 93 mL	454 - 407 mL	500 mL
Sunflower	Seed rot and seedling blight, downy mildew	110 - 189* mL	390 - 311 mL	500 mL
Lentil (low tannin)**	Pythium seed rot	16 mL	484 mL	500 mL
Soybean	Seed rots and seedling blights, early season Phytophthora	46 - 93 mL	454 - 407 mL	500 mL
Corn (field, sweet)	Seed rots and seedling blights	46 - 110 mL	454 - 390 mL	500 mL

*Higher rate needed for downy mildew. **For use on low tannin lentil destined for export or seed production only.

Registered tank mixes

None registered.

Application information

Mix with water to form a slurry seed treatment. A suitable seed colourant must be added to the slurry prior to application on seed. See instructions supplied with the applicable seed treater system for information on proper application techniques.

Crops intended for export

If the crop is intended for export, consult with the importer to establish what rates of metalaxyl are used on the crop in their country for controlling specific diseases.

Application tips

Use only the recommended rates.

How it works

Metalaxyl is a systemic fungicide that is absorbed into the germinating seed and is transported through the growing seedling, providing control of seed and seedling diseases.

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Restrictions

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting. Treated seed must not be used for food, feed or oil processing.

Environmental precautions

Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure that treated seed is properly incorporated at planting. Do not apply this product directly to freshwater habitats, estuaries or marine habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (rats) = 2,900 mg/kg. Dermal LD_{50} (rabbit) = 2,000 mg/kg.

Storage

Store product in original container away from other pesticides, fertilizer, food or feed. Do not store product in direct sunlight. Do not store Allegiance FL above 35°C or below 0°C.

Apron Advance

Fungicide Group 1, 4, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Apron Advance (PCP# 30627)	Syngenta	Thiabendazole: 150 g/L Fludioxonil: 25 g/L Metalaxyl-M: 20 g/L	Liquid suspension	10 L

Crops, diseases controlled and rates

Crops	Diseases	Rate per 100 kg seed
Chickpea	Seed-borne Ascochyta blight caused by *Ascochyta rabiei* Seed rot, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed rot and seedling blight caused by seed-borne *Botrytis* spp. Seedling blight caused by *Fusarium* spp. and *Pyhthium* spp.	100 mL
Lentil	Seed-borne Ascochyta blight caused by *Ascochyta lentis* Seed rot, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed rot and seedling blight caused by seed-borne *Botrytis* spp. Seedling root rot caused by *Fusarium* spp.	

Registered tank mixes

Apron Advance can be tank mixed with Cruiser 5FS for wireworm protection.

Application information

Apply 100 mL of Apron Advance seed treatment per 100 kg of seed as a water-based slurry utilizing standard slurry seed treatment equipment that provides uniform seed coverage. **To achieve an accurate slurry, fill each jug with water and shake well prior to application.** Uneven or incomplete seed coverage may not give the desired level of disease control. Thoroughly mix the recommended amount of Apron Advance seed treatment into the required amount of water for the slurry treater and dilution rate to be used. Slurry volumes will vary depending on seed size.

Seed treatment and inoculants: Apron Advance can be used with most Rhizobium-based inoculants. Contact inoculant manufacturer for proper recommendations. Treated seed may not flow at the same rates through seeding equipment as untreated seed. Mixing with inoculants may increase drying time. With rough-coated seed, the addition of water to Apron Advance will increase coverage; contact Syngenta for more information.

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How it works

Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against certain fungal diseases. Thiabendazole is a systemic benzimidazole fungicide with activity against certain fungal diseases.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting. **Re-cropping:** Do not plant any crop other than soybean, bean, chickpea, lentil, lupin, faba bean and pea within 30 days to fields in which treated seeds were planted.

Environmental precautions

Apron Advance is toxic to fish and other aquatic organisms. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or cleaned up.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,050 mg/kg.

Storage

Heated storage required. Do not store above 30°C. Store product in original container.

Apron Maxx RTA

Fungicide Group 4, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Apron Maxx RTA (PCP# 27577)	Syngenta	Fludioxonil: 0.73% Metalaxyl-M: 1.1%	Liquid suspension	450 L

Crops, diseases controlled and rates

Crops	Diseases	Rate per 100 kg seed
Chickpea	Seed rot, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp.	325 mL
	Seed rot and seedling blight caused by seed-borne *Botrytis* spp.	
	Seedling blight caused by *Fusarium* spp. and *Pyhthium spp*	
	Seed-borne ascochyta blight caused by *Ascochyta rabiei*	
Dry bean	Damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp.	
	Seeedling blight caused by *Pythium* spp.	
	Anthracnose caused by seed-borne *Colletotrichum* spp.	
Lentil	Seed rot, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp.	
	Seed rot and seedling blight caused by seed-borne *Botrytis* spp.	
	Seedling root rot caused by *Fusarium* spp.	
	Seed-borne ascochyta blight caused by *Ascochyta lentis*	

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Apron Maxx RTA (cont'd)

Crops	Diseases	Rate per 100 kg seed
Pea (field and succulent)[1]	Seed rot, seedling blight, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed-borne Aschochyta blight and foot rot caused by *Ascochyta pinodes*	325 mL
	Seed-borne Ascochyta blight and foot rot caused by *Asychota pinodes*	
Soybean[2]	Damping-off and seed rots caused by *Pythium* spp., *Fusarium* spp. and *Rhizoctonia* spp.	
	Seedling blight caused by *Fusarium* spp. and *Pythium* spp.	
	Seedling root rot caused by *Fusarium* spp.	
	Seed rot and seedling blight caused by seed-borne *Phomopsis* spp.	
	Early season root rot caused by *Phytophthora megasperma* var. *sojae*.[3]	
Faba bean[1]	Seed rot/pre-emergence damping-off, post-emergence damping-off and seedling blight caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp.	

[1] Registered under User Requested Minor Use Label Expansion program. [2] Based on 6,660 soybean seeds per bushel. [3] Apron Maxx RTA provides early season protection against Phytophtora root rot for tolerant varieties of soybean. If target fields have a history of high Phytophtora pressure, or susceptible varieties are to be treated then tank mix 325 mL of Apron Maxx RTA with 31 mL of Apron XL LS fungicide per 100 kg of seed.

Registered tank mixes

Apron Maxx RTA can be tank mixed with Cruiser 5FS to produce Cruiser Maxx Pulses.

Application information

Apron Maxx RTA is a ready-to-apply seed treatment for use in commercial seed treatment plants and for on-farm treatment. Apron Maxx RTA may also be used in treat-on-the-go air seeders. The equipment must provide uniform coverage on the seed. Allow the seed to dry before bagging, storing or seeding.

Seed treatment and inoculants

Apron Maxx RTA can be used with some Rhizobium-based inoculants. Contact inoculant manufacturer for proper recommendations. Treated seed may not flow at the same rates through seeding equipment as untreated seed. With rough coated seed, the addition of water to Apron Maxx will increase coverage; contact Syngenta for more information.

How it works

Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against certain fungal diseases.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting. **Re-cropping:** Do not plant any crop other than soybean, bean, chickpea, lentil, lupin, faba bean and pea within 30 days to fields in which treated seeds were planted.

Environmental precautions

Apron Maxx RTA is toxic to fish and other aquatic organisms. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Any spilled or exposed seeds must be incorporated into the soil or cleaned up.

Toxicity

Oral LD_{50} (rats) = 5,050 mg/kg. Dermal: LD_{50} (rabbit) = 2,020 mg/kg.

Storage

Heated storage required. Do not store Apron Maxx RTA above 30°C. Store product in original container.

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BUTEO™ start 480 FS

Group 4D

Formulation

Product	Company	Active ingredient	Formulation	Container size
BUTEO™ start 480 FS (PCP # 31451)	Bayer	Flupyradifurone: 480 g/L	Suspension	0.25 - 1000 L

Crops, diseases controlled and rates

Crops	Insects controlled	Rate per 100 kg seed	Specific comments
Canola	Flea beetle	625 mL	Do not apply any subsequent application of a Group 4D insecticide (in-furrow, soil or foliar application) following planting of BUTEO start 480 FS treated seeds.

Application information

BUTEO start is for use in commercially available equipment designed for seed treatment only.

How it works

BUTEO start 480 FS is a systemic seed treatment insecticide that provides protection of canola from damage caused by listed chewing and sucking insects though contact and systemic activity.

Restrictions

Re-cropping: Immediate plant back for cereal grains (except rice), soybean, oilseeds. A 6-month plant-back interval applies to sugar beet.

Environmental precautions

Follow best management practices to help minimize dust exposure to pollinators during planting of treated seed; refer to the complete guidance "Pollinator Protection: reducing risk from treated seed" on the Health Canada website (*www.healthcanada.gc.ca/pollinators*).

Toxic to aquatic organisms. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Toxic to birds and small wild mammals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned-up from the soil surface. Left over treated seed should be double-sown around the headland, or buried away from water sources.

Toxicity

Oral LD_{50} (rats) = 1,030 mg/kg. Dermal LD_{50} (rats) = > 5000 mg/kg.

Storage

Store product in original container Store in a cool, dry area. Do not store in direct sunlight. Do not store above 35ºC. Do not allow to freeze

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Cover 2

Fungicide Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cover 2 Fungicide (PCP# 32950)	Loveland Products	Ipconazole: 4.61 g/L Metalaxyl: 6.15 g/L	Solution	10 L, 115 L

Crops, diseases controlled and rates

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seed
Barley	General seed rots (*Penicillium* and *Aspergillus*), seed rot, damping off and seedling blight (seed- and soil-borne *Fusarium*, *Cochliobolus sativus, Rhizoctonia solani*) True loose smut (*Ustilago nuda*) Covered smut (*Ustilago hordei*) False loose smut (*Ustilago nigra*) Leaf stripe (*Pyrenophora graminea*)	Common root rot (*Cochliobolus sativus*) Crown and foot rot (*Fusarium* spp.)	325 mL
	True loose smut control. Use the higher rate for highly infected seed lots only		433 mL
Wheat (spring and winter)	General seed rots (*Penicillium* and *Aspergillus*), seed rot, damping off and seedling blight (seed- and soil-borne *Fusarium*, *Cochliobolus sativus, Rhizoctonia solani*) Loose smut (*Ustilago tritici*) Common bunt (*Tilletis caries, T. foetida*)	Common root rot (*Cochliobolus sativus*) Crown and foot rot (*Fusarium* spp.)	325 mL
Oats	General seed rots (*Penicillium* and *Aspergillus*), seed rot, damping off and seedling blight (seed- and soil-borne *Fusarium*, *Cochliobolus sativus, Rhizoctonia solani*) Loose smut (*Ustilago avenae*) Covered smut (*Ustilago kolleri*)	Common root rot (*Cochliobolus sativus*) Crown and foot rot (*Fusarium* spp.)	325 mL
Rye and triticale	General seed rots (*Penicillium* and *Aspergillus*), seed rot, damping off and seedling blight (seed- and soil-borne *Fusarium, Rhizoctonia solani*, *Cochliobolus sativus*)	Common root rot (*Cochliobolus sativus*) Crown and foot rot (*Fusarium* spp.)	325 mL

Registered tank mixes

For control of Pythium, Rancona Pinnacle Fungicide can be tank mixed with Apron XL LS for applications to wheat (spring or winter), barley, oats or rye. Apply Rancona Pinnacle at registered rates for these crops, and apply Apron XL LS at 2.7 mL/100 kg of seed.

Application information

Rancona Pinnacle is a ready to use formulation and should be applied utilizing mechanical, slurry or mist-type on-farm or commercial seed treating equipment.

How it works

Rancona Pinnacle is a broad-spectrum fungicide with systemic properties.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 30 days after planting. Do not use treated seed for food, feed or oil processing.

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Environmental precautions

Treated seed is toxic to birds and small wild mammals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface. Do not contaminate irrigation water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50}(rabbit) = > 5,000 mg/kg.

Storage

Keep product stored away from food and feed. Store product at temperatures between 0°C and 35°C.

Crown

Fungicide Group 1, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Crown (PCP# 23430)	Chemtura Canada	Carbathiin: 92 g/L Thiabendazole: 58 g/L	Liquid	10 L, 200 L, 1000 L

Crops, diseases controlled and rates

Crops	Diseases	Rate per 25 kg seed	Comments
Lentil	Post-emergence damping off, seed rot (*Botrytis* and *Fusarium*)	75 - 150 mL	Apply the higher rate when there is a history of high disease pressure in the field.
	Seed-borne ascochyta (*Ascochyta lentis*)	150 mL	
Chickpea	Seed-borne ascochyta (*Ascochyta rabiei*)	75 - 150 mL	Use the higher rate for smaller seed size varieties.

Application information

Commercial treaters and on-farm auger treating: Crown is added directly to the seed as it enters a mixing chamber or auger. When a grain auger is used for treating, running the auger less than full is key to adequate mixing. **Application to seed in a hopper box or seed drill:** Partially fill the hopper box or seed drill with a pre-measured amount of seed. Apply the proper amount of Crown evenly over the surface of the seed. Mix with a paddle until all seed is of a uniform red colour, indicating adequate coverage. Repeat this procedure until the hopper box or seed drill is filled. Seed can be planted immediately after treatment without drying. **Seed treatment and inoculum sticker:** Crown's liquid properties enable this product to perform as a sticker for inoculants. Partially fill the hopper box or seed drill with a pre-measured amount of seed. Apply the proper amount of Crown evenly over the surface of the seed. Read inoculum label before use. Apply the recommended amount of inoculum evenly over the treated seed and mix thoroughly. Repeat this procedure until the hopper box or seed drill is filled. Seed treated with Crown will remain damp for a period of time following treatment. This enables inoculant added to the hopper box or seed drill to adhere uniformly to seed, thus ensuring adequate nodulation of lentil and chickpea seedlings.

How it works

Thiabendazole, a fungicide, controls seed-borne diseases. Carbathiin, a systemic fungicide, penetrates the seed coat to control diseases of the seed and seedling.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting. Do not use treated seed for food, feed or oil processing.

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Crown (Cont'd)

Environmental precautions

Crown contains a petroleum distillate, which is moderately to highly toxic to aquatic organisms. Do not contaminate water during application, cleaning of equipment or disposing of wastes. Any spilled or exposed seed must be incorporated into the soil or cleaned up from the soil surface.

Toxicity

Oral LD_{50} (rats) carbathiin = 3,820 mg/kg; thiabendazole = 3,300 mg/kg.

Storage

Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed. Do not store Crown in direct sunlight. Do not store Crown above 35°C or below 0°C.

Cruiser 5FS

Insecticide Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cruiser 5FS (PCP# 27045)	Syngenta	Thiamethoxam: 47.6%	Liquid suspension	56.78 L

Crops, insects controlled and rates

Crops	Insects	Rate per 100 kg of seed	Specific Comments
Wheat and barley	Wireworms	17 mL, 33 - 50 mL	Use the 17 mL/100 kg seed rate for wireworm suppression. For moderate or high wireworm pressure, treat crops at the 33 - 50 mL/100 kg seed. May be applied on-farm or by commercial treaters using closed transfer including closed mixing, loading, calibrating and closed treatment equipment.
	European chafer	50 mL	
Chickpea, lentil, dry pea, faba bean	Wireworms	17 mL, 33 - 50 mL	Use the 17 mL/100 kg seed rate for wireworm suppression. For moderate or high wireworm pressure, treat crops at the 33 - 50 mL/100 kg seed. May be applied on-farm or by commercial treaters using closed transfer including closed mixing, loading, calibrating and closed treatment equipment.
Dry pea (including field pea)	Pea leaf weevil	50 mL	

Registered tank mixes

Cruiser 5FS can be tank mixed with Apron Maxx RTA, Dividend XL RTA and Vibrance 500FS. Follow the more stringent precautionary measures for mixing, loading and applying as stated on both product labels.

Application information

Ensure product is thoroughly mixed prior to application. Apply Cruiser 5FS Seed Treatment utilizing closed system seed treatment equipment that provides uniform seed coverage. Thoroughly mix the recommended amount of Cruiser 5FS Seed Treatment into the required amount of water for the slurry rate to be used. Maintain constant agitation of the slurry. Allow the seed to dry before bagging or storing into bulk containers. Depending on planting equipment, seed treated with Cruiser 5FS Seed Treatment may not flow through planting equipment at the same rate as untreated seed. Recalibrate equipment before planting treated seed.

How it works

Cruiser 5FS Seed Treatment belongs to the neonicotinoid class of chemistry that controls listed chewing and sucking insects through contact and systemic activity. When seed is treated for post-planting protection against registered pests, Cruiser 5FS Seed Treatment will also provide protection during post-treatment storage of the seed against damage from many storage insect pests.

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Seed treated with Cruiser 5FS Seed Treatment has been tested and found to be effective against rusty grain beetle, saw-toothed grain beetle, red flour beetle, rice weevil, lesser grain borer, European corn borer and Indian-meal moth.

Restrictions

Treated seed must not be used for food, feed or oil processing. **Grazing:** Do not graze or feed livestock on seeded area for 45 days after planting.

Environmental precautions

Thiamethoxam is toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatment applications. Do not apply directly to water or to areas where surface water is present. Treated seed is toxic to birds and small wild mammals. Spilled or exposed seeds and dust must be incorporated into the soil or cleaned up from the soil surface.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rabbit) = > 5,050 mg/kg. Toxic to bees.

Storage

Heated storage required. Store product in original container, ideally at temperatures below 30°C.

Cruiser Maxx Potato Extreme

Insecticide Group 4 Fungicide Group 3, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cruiser Maxx Potato Extreme (PCP# 31024)	Syngenta	Thiamethoxam: 250 g/L Fludioxonil: 64.5 g/L Difenoconazole: 123 g/L	Liquid suspension	5.54 L

Crops, insects and diseases controlled, rates

Crops	Insects	Diseases	Rate per 100 kg of seed
Potato	Colorado potato beetle, aphids (including green peach, potato, buckthorn and foxglove aphid), potato leafhopper	Black scurf (suppression), stem and stolon canker (*Rhizoctonia solani*) Silver scurf (*Helminthosporium solani*) Fusarium dry rot (*Fusarium* spp.)	20 mL

Application information

Store cut seeds between 7°C. and 10°C. Apply only in areas with adequate ventilation or in areas that are equipped to remove mist or dust. Seed loading onto the belt should be uniform. If the treated seed is to be stored for several days, ensure there is adequate cool air movement through the pile of cut seed potato at a relative humidity of 85 to 90%. An inert dust may be used to help suberization. Cut and treated seed should not be piled above 1.8 metres in height. Optimal results are obtained if potatoes are planted immediately after being treated. Do not apply more than 190 mL/acre (rate required for seeding rate of 21 cwt/acre). For seeding rates higher than 21 cwt/acre, use Maxim D plus Actara (consult labels for rates).

How to apply

Apply as a water-based slurry utilizing standard slurry seed treatment equipment that provides uniform seed coverage. Thoroughly mix the recommended amount of Cruiser Maxx Potato Extreme into the required amount of water or tank mix partner for the slurry treater and dilution rate to be used. Maintain constant agitation of the slurry during treatment.

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Cruiser Maxx Potato Extreme (cont'd)

How it works

Cruiser Maxx Potato Extreme is active against black scurf, stem and stolon canker, silver scurf and fludioxonil resistant Fusarium dry rot and contains thiamethoxam, a systemic neonicotinoid insecticide that controls listed sucking and chewing insects through contact and ingestion.

Restrictions

Grazing: Do not graze or feed livestock on seeded area for 45 days after planting. Do not use treated seed for food, feed or oil processing. **Re-cropping restrictions:** Treated areas may be replanted immediately following harvest or as soon as practical following the last application with any crop listed on the label or to sorghum, wheat, barley and canola. Any cover crop planted for erosion control or soil improvement may be planted as soon as practical following the last application. The cover crop may not be grazed or harvested for food or feed. For all other crops, a 120-day plant-back interval is required.

Environmental precautions

This product is toxic to fish and aquatic invertebrates. Do not apply this product directly to water or to areas where surface water is present. Toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatment applications. Treated seed is toxic to birds and small wild animals. Any spilled or exposed seed must be incorporated into the soil or collected and disposed of in a safe manner.

Toxicity

Oral LD_{50} > 5,050 mg/kg. Dermal LD_{50} > 5,000 mg/kg.

Storage

Heated storage required. Store product in original container, ideally at temperatures below 30°C.

Cruiser Maxx Vibrance Beans

Insecticide Group 4 fungicide Group 4, 7, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cruiser Maxx Beans (PCP# 28821)	Syngenta	Thiamethoxam: 22.6% Metalaxyl-M: 1.70% Fludioxinil: 1.12%	Liquid suspension	56.78 L (Cruiser Maxx Beans) + 1.45 L (Vibrance)
Vibrance 500FS (PCP# 30438)		Sedaxane: 500 g/L		

Crops, insects and diseases controlled, rates

Crop	Insects	Diseases	Rate per 100 kg of seed
Soybean[1]	Wireworm Seed corn maggot European chafer Bean leaf beetle Soybean aphid*	Control of seed rot/pre-emergence damping-off and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp. Control of seedling blight caused by *Fusarium* spp. and *Pythium* spp. Control of seedling root rot caused by *Fusarium* spp. Seed rot and seedling blight caused by seed-borne *Phomopsis* spp. Early season root rot caused by *Phytophthora megasperma* var. sojae.[2] Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	195 mL Cruiser Maxx Beans + 10 mL Vibrance

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Crop	Insects	Diseases	Rate per 100 kg of seed
Dry bean	Wireworm Seed corn maggot Potato leafhopper**	Control of seed rot/pre-emergence damping-off, and post-emergence damping-off caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp. Control of seedling blight caused by *Pythium* spp. Anthracnose caused by seed-borne *Colletotrichum* spp. Seed decay, seedling blight and damping off caused by *Rhizoctonia solani*	195 mL Cruiser Maxx Beans + 10 mL Vibrance

Note

*Early season protection. **Replaces one (1) application of a foliar insecticide spray.

[1] Based on 6,600 soybean seeds per kg, Cruiser Maxx Beans Seed Treatment delivers 85 μg of active ingredient (76 μg of thiamethoxam, 5.7 μg of metalaxyl-M and 3.8 μg of fludioxonil) per seed. [2] Cruiser Maxx Beans Seed Treatment provides early season protection against Phytophthora root rot for tolerant varieties of soybean. If target fields have a history of high Phytophthora pressure or susceptible varieties are to be treated, then tank mix 195 mL of Cruiser Maxx Beans Seed Treatment with 31 mL of APRON XL® LS Fungicide per 100 kg of seed.

Registered tank mixes

Apron XL LS at 31 mL/100 kg seed.

Application information

For use in a closed application system; no open transfer of product is permitted. Apply Cruiser Maxx Vibrance Beans utilizing seed treatment equipment that provides uniform seed coverage. Seed treated with Cruiser Maxx Vibrance Beans Seed Treatment or a combination of Cruiser Maxx Vibrance Beans Seed Treatment and seed inoculants may not flow through planting equipment at the same rate as untreated seed. Recalibrate equipment before planting treated seed. Mixing with inoculants may increase drying time.

Seed treatment and inoculants: Cruiser Maxx Vibrance Beans is compatible with Rhizobium-based inoculants. Check with inoculant manufacturer for application details prior to use.

How it works

Cruiser Maxx Vibrance Beans controls wireworms and other listed insects through contact and systemic activity of thiamethoxam. Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against certain fungal diseases.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 45 days after planting. Treated seed must not be used for food, feed or oil processing.

Environmental precautions

This product is toxic to fish and aquatic invertebrates. Do not apply this product directly to water or to areas where surface water is present. Toxic to bees. Bees can be exposed to product residues, flowers, leaves, pollen and /or nectar resulting from seed treatment applications. Treated seed is toxic to birds and small wild animals. Any spilled or exposed seed must be incorporated into the soil or cleaned up.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rabbit) = > 5,000 mg/kg.

Storage

Heated storage required. Store product in original container, ideally at temperatures below 30°C.

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Cruiser Vibrance Quattro

Insecticide Group 4 fungicide Group 3, 4, 7, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cruiser Vibrance Quattro (PCP# 31453)	Syngenta	Thiamethoxam: 61.5 g/L Difenoconazole: 36.9 g/L Sedaxane: 15.4 g/L Metalaxyl: 9.2 g/L Fludioxonil: 7.7 g/L	Liquid suspension	10 L, 115 L, 450 L

Crops, insects and diseases controlled, rates

Crops	Insects	Diseases	Diseases supressed[3]	Rate per 100 kg of seed - Dividend Extreme
Barley	Wireworms European chafer[1]	General seed rots[2], seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Covered, false loose and true loose smut	Common root rot (*Cochliobolus* spp.), Fusarium crown and foot rot, take-all	325 mL
Wheat, spring	Wireworms European chafer[1]	General seed rots[2], seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Common bunt[4] and loose smut	Common root rot (*Cochliobolus* spp.), Fusarium crown and foot rot, take-all	325 mL
Wheat, winter	Wireworms European chafer[1]	General seed rots[2], seedling blight, root rot, and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Common and dwarf bunt[4] Loose smut	Common root rot (*Cochliobolus* spp.), Fusarium crown and foot rot, take-all	325 mL
Oats	Wireworms	General seed rots[2], seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Covered and loose smut	Common root rot (*Cochliobolus* spp.)	325 mL

Note

[1] For control of European chafer activity, mix Cruiser Vibrance Quattro with Cruiser 5FS Seed Treatment to achieve a total use rate of 30 g of thiamethoxam per 100 kg seed. Consult each product label for registered use rates and follow all label use instructions. Read the label directions for each product and follow the most restrictive label precautions and limitations.

[2] General seed rots controlled include those caused by saprophytic organisms such as *Fusarium, Pythium, Rhizoctonia, Penicillium* and *Aspergillus* spp.

[3] Suppression means consistent control at a level that is not optimal but is still of commercial benefit.

[4] Controls both seed- and soil-borne bunts (common, dwarf).

Registered tank mixes

When wireworm activity is high, Cruiser Vibrance Quarttro can be tank mixed with Cruiser 5FS Seed Treatment to achieve a total use rate of 30 g of thiamethoxam per 100 kg seed.

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Application information

Cruiser Vibrance Quattro is a ready-to-use water-based formulation for use in commercial seed treatment facilities or on-farm. Treatment equipment must provide uniform coverage of Cruiser Vibrance Quattro on the seed. This product does not require the addition of water for application. Thiamethoxam is a Group 4 insecticide. Do not make any subsequent application of a Group 4 insecticide (i.e., in-furrow or foliar application) following treatment with Cruiser Vibrance Quattro.

How it works

Cruiser Vibrance Quattro controls or suppresses certain insect pests and seed- and soil-borne diseases of cereal crops. When seed is treated for post-planting protection against registered pests, Cruiser Vibrance Quattro will also provide protection during post-treatment storage of the seed against damage from many storage insect pests. Seed treated with thiamethoxam has been tested and found to be effective against rusty grain beetle, saw-toothed grain beetle, red flour beetle, rice weevil, lesser grain borer, European corn borer and Indian meal moth.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 45 days after planting. **Re-cropping:** Do not plant any crop other than cereals, corn, soybean, members of Crop Subgroup 6C (dried, shelled pea and bean), members of Crop Subgroup 20A (canola and rapeseed subgroup) or potato within 60 days to fields in which seeds treated with Cruiser Vibrance Quattro were planted.

Environmental precautions

Toxic to aquatic organisms. Treated seed is toxic to birds and small wild mammals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface. Toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar resulting from seed treatment applications.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Heated storage required. Do not store above 30°C. If the product should freeze, bring the product back to room temperature and ensure the contents are mixed well prior to application.

Dividend Extreme/Interest Forte

Fungicide Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Dividend Extreme (PCP# 29490)	Syngenta	Difenoconazole: 7.73% Metalaxyl-M: 1.93%	Suspension	10 L
Interest Forte (PCP # 34196)	Sharda Crop Chem	Difenoconazole: 3.37 % Metalaxyl-M and S-isomer: 0.27 %	Suspension	10 L, 115 L, 450 L

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Dividend Extreme/Interest Forte (cont'd)

Crops, diseases controlled and rates

Crops	Diseases controlled	Diseases suppressed [3]	Rate per 100 kg of seed - Dividend Extreme	Rate per 100 kg of seed – Interest Forte
Barley	General seed rots[1], seedling blight caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, seedling root rot caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, *Pythium* and *Fusarium* damping-off seed-borne *Septoria*[2], covered smut, false loose smut	Common root rot (*Cochliobolus spp.*) *Fusarium* crown and foot rot, take-all	130 - 260 mL	325 - 650 mL
Corn (commercial treatment only)	General seed rots[1], seedling blight caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, seedling root rot caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium, Pythium* and *Fusarium* damping-off		130 - 260 mL	325 - 650 mL
Oats (commercial treatment only)	General seed rots[1], seedling blight caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, seedling root rot caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium, Pythium* and *Fusarium* damping-off, covered smut, loose smut	Common root rot (*Cochliobolus spp.*)		
Rye	General seed rots[1], seedling blight caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, seedling root rot caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, seed-borne *Septoria*[2], *Pythium* and *Fusarium* damping-off, common bunt[5], dwarf bunt[5]	Common root rot *(Cochliobolus spp.), Fusarium* crown and foot rot, take-all		
Triticale	General seed rots[1], seedling blight caused by seed- and soil-borne Fusarium and soil-borne Pythium, seedling root rot caused by seed- and soil-borne Fusarium and soil-borne Pythium, Pythium and Fusarium damping-off, loose smut	Common root rot *(Cochliobolus spp.), Fusarium* crown and foot rot, take-all		
Wheat, spring	General seed rots[1], seedling blight caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, seedling root rot caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium, Pythium* and *Fusarium* damping-off, seed-borne *Septoria*[2], common bunt[5], loose smut	Common root rot *(Cochliobolus spp.), Fusarium* crown and foot rot, take-all		
Wheat, winter	General seed rots[1], seedling blight caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, seedling root rot caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium, Pythium* and *Fusarium* damping-off, seed-borne *Septoria*[2], *Septoria* leaf blotch[2, 4], common bunt[5] dwarf bunt[5], loose smut	Common root rot *(Cochliobolus spp.), Fusarium* crown and foot rot, take-all		
Buckwheat, millet, sorghum	General seed rots[1], seedling blight caused by seed- and soil-borne *Fusarium* and soil-borne *Pythium*, seedling root rot caused by seed and soil-borne *Fusarium* and soil-borne *Pythium, Pythium* and *Fusarium* damping-off		130 - 260 mL	325 - 650 mL
Sweet and seed corn	Penicillium 3 leaf dieback		130 mL	325 mL

Note: One (1) 10 L jug of Dividend Extreme applied at the 130 mL/100 kg of seed will treat 112 bushels of wheat, and 140 bushels of barley.

[1] General seed rots controlled include those caused by saprophytic organisms such as Fusarium, Pythium, Penicillium and Aspergillus. [2] Dividend Extreme: Use the 260 mL rate for control of these diseases. Interest Forte: Use the 650 mL rate for control of these diseases. [3] Suppression means consistent control at a level which is not optimal but is still of commercial benefit. [4] Early season foliar disease control for first 4 weeks after planting. For full season control apply a foliar fungicide according to label directions. [5] Dividend Extreme controls both seed-borne and soil-borne bunts (common, dwarf).

Registered Tank Mixes

For protection from certain insects on registered crops, Dividend Extreme may be mixed with Cruiser® 5FS in commercial seed treatment facilities with closed transfer including closed mixing, loading, calibrating and closed treatment equipment only. This tank-mix option is only valid for those crops common to the registered labels of

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Dividend Extreme Fungicide and Cruiser 5FS/350FS Seed Treatment Insecticides.

For the control of true loose smut (*Ustilago nuda*) in barley, mix Dividend Extreme with Raxil® 250FL.

Application information

Apply as a water-based slurry utilizing standard slurry treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of disease control.

How it works

Dividend Extreme is a systemic seed treatment that controls or suppresses certain seed- and soil-borne diseases of registered crops.

Restrictions

Do not use treated seed for food, feed or oil purposes. Do not graze, feed green forage or cut for hay within 35 days of planting treated cereal grain seeds. **Re-cropping:** Do not plant any crop other than barley, corn, oats, rye, triticale or wheat within 30 days to fields in which treated seeds were planted.

Environmental precautions

This product is toxic to fish and aquatic invertebrates. Do not apply this product directly to freshwater habitats, estuaries or marine habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion.

Toxicity

Acute oral LD_{50} (rats) = 5,050 mg/kg., Dermal LD_{50} (rats) = > 5,050 mg/kg

Storage

Heated storage required.

Emesto® Silver Fungicide Seed Treatment

Fungicide Group 3, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Emesto® Silver (PCP# 30361)	Bayer	Penflufen: 100 g/L Prothioconazole: 18 g/L	Suspension	3.85 L

Crops, Diseases Controlled and Rates

Crops	Diseases	Rate per 100 kg of seed
Potato	Seed-borne black scurf and stem and stolon canker caused by *Rhizoctonia solani*. Silver scurf caused by *Helminthosporium solani*. Fusarium tuber rot caused by *Fusarium* spp.	20 mL

Registered tank mixes

Refer to label for registered tank mix options.

Application information

For optimal disease control, good coverage of the seed piece is required. Apply no more than 150 mL of slurry/100 kg of seed pieces. Agitate or stir the slurry solution as needed. Seed pieces should be treated immediately after cutting. Plant seed pieces as soon as possible after cutting and treating.

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Emesto® Silver Fungicide Seed Treatment (cont'd)

How it works
The active ingredient penflufen is a carboxamide (SDHI) fungicide with systemic activity. The active ingredient prothioconazole is a demethylation inhibitor with broad-spectrum systemic activity.

Restrictions
For resistance management, rotate the use of Emesto Silver or other products containing a Group 3 or 7 fungicide with different groups that control the same pathogens. **Re-cropping:** Potato, corn, cereals, legumes, soybean, canola, mustard, rapeseed, borage and flax may be re-planted anytime. All other crops, do not plant back within 30 days of planting Emesto Silver treated seed pieces.

Environmental precautions
Toxic to aquatic organisms and non-target terrestrial plants. Dispose of all excess treated seed. **Leaching:** The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow.

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store unused product in a cool, ventilated, dry, locked area and avoid cross contamination with other pesticides, fertilizers, food and feed. Do not allow prolonged storage in temperatures that exceed 40°C or that go below -10°C.

EverGol® Energy Fungicide Seed Treatment

Fungicide Group 7, 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
EverGol® Energy (PCP# 30364)	Bayer CropScience	Penflufen: 38.4 g/L Prothioconazole: 76.8 g/L Metalaxyl: 61.4 g/L	Suspension	33.75 L

Crops, diseases controlled and rates

Crops	Diseases	Rate per 100 kg of seed
Soybean	Seed rot/pre-emergence damping-off and post-emergence damping-off caused by *Rhizoctonia solani, Fusarium* spp. and *Pythium* spp. Early-season root rot and seedling blight caused by *Rhizoctonia solani* and *Fusarium* spp. *Botrytis cinerea.* Seed rot/pre-emergence damping-off of soybean caused by *Phomopsis longicolla.*	65 mL

Registered tank mixes
EverGol Energy may be combined with Stress Shield for control of certain insect pests in soybean. For control of early season *Phytophthora* in soybean, EverGol Energy can be tank mixed with 35 mL of Allegiance FL per 100 kg seed.

Application information
EverGol Energy is designed for commercial seed treating equipment. Allow seeds to dry before bagging, storing or seeding.

Seed treatment and inoculants: Check with inoculant manufacturers prior to use.

Restrictions
Re-cropping: Registered crops for EverGol Energy, as well as canola, mustard, rapeseed, borage, flax, crambe

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and potato, may be replanted at any time. For all other crops, do not plant back within 30 days of seeding with EverGol Energy-treated seed.

Environmental precautions

EverGol Energy is toxic to aquatic organisms. Dispose of all excess treated seed. Leftover treated seed may be double-sown around the headland or buried away from water sources in accordance with local requirements.
Leaching: The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or depth to the water table is shallow.

Toxicity

Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store product in original container in a cool, dry place. Do not store in direct sunlight. Do not allow prolonged storage in temperatures that exceed 40°C or go below -10°C.

Fortenza

Insecticide Group 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Fortenza (PCP# 30899)	Syngenta	Cyantraniliprole: 600 g/L	Suspension	Bulk

Crops, insects controlled and rates

Crops	Insects	Rate per 100 kg of seed*
Potato	Colorado potato beetle	10 - 22.5 mL
Corn (field, pop and sweet)	Cutworm	83 - 167 mL
	Wireworm, European chafer	167 mL
Canola, mustard seed, rapeseed, oilseed mustard, including *B. carinata*	Cutworm	500 mL
	Flea beetles	1,333 mL
Condiment mustard	Cutworm	500 mL
	Flea beetles	1,333 mL

* When rate ranges are given, use the higher rate when insect pressure is expected to be high.

Registered tank mixes

See label for complete list of tank mix options.

Application information

Apply Fortenza as a water-based slurry utilizing standard slurry seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of insect control. This product contains no colourant. An appropriate colourant must be added when this product is applied. Regulations pertaining to the *Seeds Act* must be strictly adhered to when using this product. Seed must be conspicuously coloured at the time of treatment.

Application tips

Potato: Cut seed is particularly vulnerable to excess moisture. Too much moisture will induce seed decay. Fortenza has been designed to be delivered in very low volumes of liquid to ensure good coverage without increasing tuber decay. Store cut seed at or below 7°C. When treating cut seed, Fortenza can be followed with a dust/talc treatment to improve suberization. Apply only in areas with adequate ventilation or in areas that are equipped to remove mist or dust.

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Fortenza (cont'd)

How it works
Fortenza is a systemic insecticide belonging to the chemical class of diamides. The length of control of the major insect pests will vary depending on the product use rate, insect pressure, crop growth and maturity as well as soil and environmental conditions.

Restrictions
Application to corn, canola, rapeseed and mustard (condiment or oilseed) must be completed by commercial treaters (facilities and mobile treaters) with closed transfer systems only. Do not apply any subsequent application of a Group 28 insecticide (e.g., in-furrow, soil or foliar application) following Fortenza seed treatment. **Grazing:** Do not use for food, feed or oil processing. **Re-cropping:** See label for recommended plant-back intervals for rotational crops.

Environmental precautions
Toxic to aquatic organisms. Do not apply this product directly to freshwater habitats, estuaries or marine habitats. Toxic to bees. This product is systemic, and bees can be exposed to product residues in flower, leaves, pollen and/or nectar resulting from seed treatment applications. If treated seeds are spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion.

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg body weight.

Storage
Ideal storage temperature for Fortenza is above freezing and below 30°C. If the product should freeze, bring the product back to room temperature, and ensure the contents are mixed well prior to application.

Helix Vibrance

Insecticide Group 4 fungicide Group 3, 4, 7, 12

Available to commercial seed treaters only

Formulation

Product	Company	Active ingredient	Formulation	Container size
Helix XTra (PCP# 26638)	Syngenta	Thiamethoxam: 20.7% Difenoconazole: 1.25% Metalaxyl-M: 0.39% Fludioxonil: 0.13%	Liquid suspension	Bulk
Vibrance 500FS (PCP# 30438)		Sedaxane: 500 g/L		
Helix Vibrance (PCP# 31454)		Thiamethoxam: 269 g/L Difenoconazole: 26 g/L Metalaxyl-M and S-isomer: 5 g/L Sedaxane: 3.4 g/L Fludioxonil: 1.7g/L	Suspension	Bulk

Crops, insects and diseases controlled, rates

Products	Crops	Insects	Diseases	Rate per 100 kg seed
Helix Xtra	Canola, oriental mustard (oil seed[1] and condiment type)	Early season control of flea beetle: (28 - 35 days)	Seed-borne blackleg, seed-borne alternaria and the seedling disease complex (damping-off, seedling blight, seed rot and root rot) caused by *Pythium* spp., *Fusarium* spp. and *Rhizoctonia* spp.	1.5 L
Vibrance 500FS	Canola		Seed decay, seedling blight and damping off caused by *Rhizoctonia solani*	5 - 10 mL

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Products	Crops	Insects	Diseases	Rate per 100 kg seed
Helix Vibrance	Canola, rapeseed and mustard (condiment and oilseed)	Flea beetles	Seed-borne blackleg (*Leptoshaeria maculans*), seed-borne alternaria (*Alternaria* spp), seedling disease complex (damping-off, seedling blight, seedling blight seed rot and root rot) caused by *Pythiium* spp., *Fusarium* spp. and *Rhizoctonia* spp.	1.5 L

Note: Helix Vibrance is only available as a co-pack of Helix Xtra and Vibrance 500FS.

[1] Registered under User Requested Minor Use Label Expansion program.

Application information

For use in commercial seed treatment facilities with closed transfer systems only. All seed treated with this product must be conspicuously coloured at the time of treatment. Consult the manufacturer of the seed treating equipment for advice on the operation and calibration of the equipment. Allow the seed to dry before bagging.

How it works

Helix Vibrance seed treatment contains an insecticide (thiamethoxam) and 5 fungicides (difenoconazole, metalaxyl-M and S-isomer, fludioxonil and sedaxane). The insecticide provides early season control of flea beetles (28 to 35 days). The fungicide component provides early season control of seed-borne diseases and seedling diseases.

Restrictions

Treated seed must not be used for food, feed or oil processing.

Environmental precautions

Do not apply this product directly to freshwater habitats, estuaries or marine habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. If treated seed is spilled outdoors, promptly clean up.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Heated storage required. Helix Vibrance treated canola and mustard can be stored for 18 months without loss in germination or insect and disease performance.

Insure Cereal FX4

Group 3, 4, 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Insure Cereal FX4 (PCP# 33210)	BASF Canada	Pyraclostrobin: 16.7 g/L Triticonazole: 16.7 g/L Metalaxyl: 10 g/L Fluxapyroxad: 8.35 g/L	Liquid suspension	9.8 L, 120 L, 450 L

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Insure Cereal FX4 (cont'd)

Crops, diseases controlled and rates

Crops	Diseases controlled	Diseases suppressed*	Rate per 100 kg of Seed
Barley, canary seed (including food use), oat, rye, triticale and wheat (all types)	Seed rot/pre-emergence damping-off caused by *Fusarium* spp., *Cochliobolus sativus, Rhizoctonia solani* and *Pythium* spp. Post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia solani* and *Pythium* spp. Seedling blight caused by *Fusarium* spp., *Rhizoctonia solani* and *Pythium* spp. Root rot caused by *Fusarium* spp., *Rhizoctonia solani* and *Pythium* spp. Loose smut (*Ustilago tritici*) - rye, triticale, wheat Common bunt (*Tilletia tritici*, *T. lavies*) - rye, triticale, wheat True loose smut (*Ustilago nuda*) - barley Covered smut (*Ustilago hordei*) - barley False loose smut (*Ustilago nigra*) - barley Loose smut (*Ustilago avenae*) - oat Covered smut (*Ustilago kolleri*) - oat	Seedling blight caused by *Cochliobolus sativus* Root rot caused by *Cochliobolus sativus* Fusarium crown and root rot caused by *Fusarium* spp.	300 mL

*Suppression means consistent control at a level not optimal but still of commercial benefit.

Bushels treated

Container size	Barley*	Oat**	Wheat***	Canary seed	Rye, triticale
9.8 L	150	211	120	144	128
120 L	1,837	2,584	1,470	1764	1,567
450 L	6,888	9,689	5,510	6614	5,878

*Based on barley at 21.8 kg/bu (48 lb./bu). **Based on oat at 15.4 kg/bu (34 lb./bu). ***Based on wheat at 27.3 kg/bu (60 lb./bu).

Registered tank mixes

None registered.

Application information

Insure Cereal FX4 is a ready-to-use seed treatment formulation for use in commercial seed treatment plants and for use in on-farm, standard gravity flow or mist type treatment machines. Insure Cereal FX4 can be used in "On the Go" air seeder treatment systems. Agitate thoroughly prior to use. Agitate thoroughly prior to use. When used at the recommended rate of 300 mL/100 kg seed, no additional dyes or dilutions with water are needed unless recommended by the manufacturer of the seed treatment application equipment. If water is added, increase the use rate proportionally to the dilution rate (e.g., add 100 mL of water to 300 mL of Insure Cereal FX4, then apply 400 mL/100 kg seed).

How it works

The active ingredients in Insure Cereal FX4 are pyraclostrobin, triticonazole, metalaxyl and fluxapyroxad. Pyraclostrobin is a strobilurin fungicide that provides systemic broad-spectrum activity against seed- and soil-borne diseases. Triticonazole is a triazole fungicide that provides systemic broad-spectrum protection against seed- and soil-borne diseases. Metalaxyl is a phenylamide fungicide with systemic activity against seed and seedling diseases caused by oomycete fungi. Fluxapyroxad is a carboximide fungicide that provides systemic broad-spectrum protection against seed- and soil-borne diseases.

Restrictions

Do not use treated seed for food, feed or oil processing.

Environmental precautions

Insure Cereal FX4 is toxic to birds and wildlife. Ensure proper soil incorporation of the seeds. If treated seed is spilled outdoors, promptly clean up or bury to prevent ingestion. Ensure proper disposal of any surplus treated seed not intended for later planting. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water.

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Leaching: The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow.

Toxicity

Oral LD_{50} (rats) = > 2,000 mg/kg rats. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in original container. Store in an area away from food, feedstuffs, fertilizers and seed. Protect from freezing.

Insure Pulse

Fungicide Group 4, 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Insure Pulse (PCP# 32011)	BASF Canada	Fluxapyroxad: 16.7 g/L Pyraclostrobin: 16.7 g/L Metalaxyl: 13.3 g/L	Liquid flowable	9.8 L, 120 L, 450 L

Crops, diseases controlled and rates

Crops*	Diseases controlled	Diseases suppressed	Rate per 100 kg of seed
Field pea, lentil, chickpea, dry bean, faba bean	Seed rot and seedling blight caused by soil-borne *Fusarium* spp. Seed rot, seedling blight and root rot caused by soil-borne *Rhizoctonia solani* Seed rot and seedling blight caused by soil-borne *Pythium* spp. Seedling blight caused by seed-borne *Ascochyta* spp.	Root rot caused by soil-borne *Fusarium* spp. Seed rot and seedling blight caused by seed-borne *Botrytis cinerea* Anthracnose seedling blight caused by seed-borne *Colletotrichum lindemuthianum*	300 mL
Flax seed (*Linum usitatissimum*)	Seed rot, seedling blight, and root rot caused by soil-borne *Fusarium* spp. Seed rot, seedling blight, and root rot caused by soil-borne *Rhizoctonia solani*		300 - 600 mL**

*Please see label for complete list of registered crops. **Use the lower rate under normal field conditions. Use the higher rate if there is a history of high disease pressure in the field or where field conditions favour seed and soil-borne pathogens.

Application information

Insure Pulse is a ready-to-use seed treatment formulation for use in commercial seed treatment plants and for use in on-farm standard gravity flow or mist-type treatment machines. Insure Pulse can also be used in "On the Go" air seeder treatment systems. Agitate thoroughly prior to use. When used at the recommended rate of 300 mL/100 kg seed, no additional dyes or dilutions with water are needed unless recommended by the manufacturer of the seed treatment application equipment. If water is added, increase the use rate proportionally to the dilution rate (e.g., add 100 mL of water to 300 mL of Insure Cereal Pulse, then apply 400 mL/100 kg seed). NOTE: If using the 600 mL per 100 kg rate (flax), it is recommended that the seed be treated into a bin or truck box to allow the treated seed to dry prior to placing into the seeder hopper. This will prevent clumping and bridging in the seeder.

How it works

The active ingredients in Insure Pulse are pyraclostrobin, fluxapyroxad and metalaxyl. Pyraclostrobin is a strobularin fungicide that provides systemic broad spectrum activity against seed- and soil-borne diseases. Fluxapyroxad is a carboxamide fungicide that provides systemic broad spectrum protection against seed- and soil-borne diseases. Metalaxyl is a phenylamide fungicide with systemic activity against seed and seedling diseases caused by oomycete fungi.

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Insure Pulse (cont'd)

Restrictions
Do not use treated seed for food, feed or oil processing.

Environmental precautions
Insure Pulse is toxic to birds and wildlife. Ensure proper soil incorporation of the seeds. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water. Do not contaminate water by cleaning of equipment or disposal of wastes. Leaching: The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow.

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg rats. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in original, tightly closed container. Prevent from freezing. Do not ship or store near food, feed, seed and fertilizers.

INTEGO Solo

Fungicide Group 22

Formulation

Product	Company	Active ingredient	Formulation	Container size
INTEGO Solo (PCP# 31324)	Valent Canada Inc. distributed by Nufarm Agriculture	Ethaboxam: 383g/L	Suspension	3.78 L

Crops, insects and diseases controlled, rates

Crops	Diseases controlled	Diseases suppressed	Rates per 100 kg seed
Wheat (all), barley, rye, oats, triticale, millet (pearl, proso), buckwheat	Seed rot/pre-emergence damping-off caused by *Pythium* spp.		13 - 17 mL
Corn (sweet, field, pop)	Seed rot/pre-emergence damping-off caused by *Pythium* spp.		13 - 19.6 mL
Lentil, field pea, chickpea, faba bean, dry bean	Seed rot/pre-emergence damping-off caused by *Pythium* spp.	Early-season root rot caused by *Aphanomyces euteiches*	19.6 - 39.1 mL
Canola, rapeseed, Ethiopian mustard (*Brassica carinata*), flax, mustard seed	Seed rot/pre-emergence damping-off caused by *Pythium* spp.		13 - 19.6 mL
Sunflower	Seed rot/pre-emergence damping-off caused by *Pythium* spp. Seed-borne downy mildew *(Plasmopara halstedii)*		402 - 603 mL
Soybean	Seed rot/pre-emergence damping-off caused by *Pythium* spp. Early season root rot caused by *Phytophthora sojae*		19.6 - 39.1 mL

Registered tank mixes

Supported tank mix partner	Crop
NipsIt SUITE	Wheat (all)
Apron Advance	Chickpea, lentil, dry pea, dry bean, faba bean, soybean
Apron Maxx RTA	Chickpea, lentil, dry pea, dry bean, faba bean, soybean

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Supported tank mix partner	Crop
Cruiser Maxx Vibrance Beans	Soybean, dry bean
Cruiser Maxx Pulses	Dry pea, lentil, chickpea
Trilex AL	Bean, chickpea, pea, lentil, soybean
Trilex Evergol, Trilex Evergol SHIELD	Bean, chickpea, pea, lentil
Vibrance Maxx	Pea, lentil, chickpea, soybean
Vibrance RFC	Chickpea, lentil, dry pea, dry bean, faba bean, soybean
VitaFlo 280	Wheat, barley, oat, rye, triticale, dry bean, corn (field, sweet), flax, lentil, pea, soybean
EverGol Energy	Chickpea, lentil, field pea, bean, soybean, cereal

Application information
INTEGO Solo does not contain a colourant; any seed treated with INTEGO Solo must be conspicuously coloured. Ensure INTEGO Solo is thoroughly mixed with tank-mix partner. INTEGO Solo does not control Fusarium spp. INTEGO Solo should be tank mixed with an appropriate partner to provide Fusarium spp. control.

How it works
INTEGO Solo contains ethaboxam. Its mode of action is to inhibit cell division.

Restrictions
Grazing: do not graze soybean or field pea fields grown from treated seeds or feed soybean forage or hay from such fields to livestock. Do not use treated seed for feed, food or oil processing.

Environmental precautions
Toxic to aquatic organisms.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rabbit) = > 5,000 mg/kg.

Storage
Store this product away from feed or food. Store in a cool place. Do not allow this product to freeze.

Lumiderm

Insecticide Group 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lumiderm (PCP# 30894)	Corteva Agriscience	Cyantraniliprole: 625 g/L	Flowable suspension	Bulk

Crops, insects controlled and rates

Crop	Insects	Rate per 100 kg of seed	Specific comments
Canola **Rapeseed** **Oilseed mustard**	Flea beetles	960 - 1600 mL	The application rates for flea beetles will also provide early season protection from cutworm feeding damage
	Cutworms	480 - 960 mL	

Registered tank mixes
Lumiderm is supplied pre-treated either with Propser EverGol or Helix Vibrance seed treatments.

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Lumiderm (Cont'd)

Application information
For use in closed treatment systems at commercial seed treatment facilities only.

Application tips
Regulations pertaining to the *Seeds Act* must be strictly adhered to when using this product. Seed must be conspicuously coloured at the time of treatment. Dilute in sufficient volume to obtain thorough, uniform coverage. Follow Canola Council of Canada guidelines for best management practices and good crop stand establishment.

How it works
Lumiderm is a flowable suspension that is applied as a seed treatment for early season protection from flea beetle feeding damage for 28 to 35 days and early season protection from cutworm feeding damage.

Restrictions
Do not make a subsequent foliar application of any Group 28 insecticide for a minimum of 60 days after planting seed treated with Lumiderm seed treatment. See the Lumiderm label for labelling requirements for all bags containing treated seed .

Environmental precautions
Do not contaminate irrigation or drinking water supplies or aquatic habitats by the cleaning of equipment or disposal of wastes.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg. Toxic to aquatic organisms. Toxic to bees. When this product is applied and used according to label directions, the risk to bees is expected to be negligible.

Storage
Store product in original container only, away from other pesticides, fertilizer, food or feed. Do not freeze.

Lumivia CPL

Insecticide Group 28

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lumivia CPL (PCP# 33335)	Corteva Agriscience	Chlorantraniliprole: 625 g/L	Suspension	3.5 L

Crops, insects controlled and rates

Crop	Insects	Rate per 100 kg of seed	Specific comments
Wheat, barley, oats and rye	Cutworms and armyworms	8 - 24 mL	Use higher rates in areas with high pest pressure
	Wireworms	24 - 40 mL	
Bean (includes field bean), chickpea, field pea and lentil	Cutworms and armyworms	32 - 64 mL	
	Larvae of pea leaf weevil	64 – 96 mL	

Registered tank mixes
For control of seed- and soil-borne diseases, Lumivia CPL can be mixed with fungicide seed treatments in compliance with the application recommendations of the product being mixed.

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Application information
For use in commercial facilities and on-farm seed treatment equipment. This product contains no colourant. An appropriate colourant must be added when this product is applied. All seed must be conspicuously coloured at time of application. Apply only in areas with adequate ventilation or in areas that are equipped to remove mist or dust.

Application tips
Dilute in a sufficient volume to obtain thorough, uniform coverage. Polymers, colourants, and other additives should be tested for compatibility and seed safety prior to use in combination with Lumivia CPL insecticide seed treatment.

How it works
Chlorantraniliprole is a systemic insecticide seed treatment, which, when ingested, impairs the muscle function of the target pest.

Restrictions
Do not use treated seed for food, feed, or oil processing. Do not make a subsequent foliar application of any Group 28 insecticide for a minimum 60 days after planting seed treated with Lumivia CPL. If a foliar spray is required during this window, it must be made with an insecticide other than Group 28.

Environmental precautions
Toxic to birds. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface. Toxic to aquatic organisms. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Leaching:** The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow. Do not use products containing chlorantraniliprole on areas treated with this product in the previous season.

Toxicity
Acute oral LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed. Do not store at temperatures below 0˚C.

Maxim D/Maxim MZ PSP

Fungicide Group Maxim D 3,12; Maxim MZ PSP 12, M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Maxim D (PCP# 30599)	Syngenta	Fludioxonil: 19.4 g/L Difenoconazole: 19.4 g/L	Liquid suspension	9.2 L
Maxim MZ PSP (PCP# 27965)		Fludioxonil: 0.5% Mancozeb: 5.7%	Dry powder	10 kg

Crops, diseases controlled and rates

Crops	Diseases	Rate per 100 kg seed
Potato (seed piece treatment)	Black scurf including stem and stolon canker (*Rhizoctonia solani*), silver scurf (*Helminthosporium solani*) and fusarium dry rot (*Fusarium* spp.)	65 - 130 mL* of Maxim D 500 g of Maxim MZ PSP

*Maxim D is only labelled to control silver scurf at the 130 mL/100 kg seed rate.

Registered tank mixes
None registered.

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Maxim D/Maxim MZ PSP (Cont'd)

Application information
Apply using equipment that ensures uniform and thorough coverage of each seed piece. Cut pieces should be treated immediately after cutting. Treated seed pieces should be planted in soil above 7°C with adequate soil moisture required for planting. If cut seed needs to be stored or held for a few days, make sure that there is adequate cool air (15.5°C) movement through the pile of cut seed potatoes at relative humidity of 85 to 90%. Cut and treated seed should not be piled above 1.8 metres in height.

How it works
Fludioxonil is a phenylpyrrole chemistry that possesses contact and local penetrant properties. Mancozeb is a dithiocarbamate fungicide with contact activity.

Restrictions
Do not use treated seed pieces for food or feed purposes.

Environmental precautions
Maxim D/Maxim MZ PSP is toxic to fish and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. Do not contaminate water by cleaning of equipment or disposal of equipment wash waters.

Toxicity
Oral LD_{50} (rats) = > 5,050 mg/kg. Dermal LD_{50} (rabbit) = > 2,200 mg/kg.

Storage
Heated, dry storage required.

Mertect SC

Fungicide Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Mertect SC (PCP# 13975)	Syngenta	Thiabendazole: 500 g/L	Water dispersible suspension	5 L

Crops, diseases controlled and rates

Crops	Diseases	Rate
Potato (post-harvest)	Post harvest control of storage rots caused by *Fusarium* spp., *Phoma* spp., *Helminthosporium* spp., *Oospora* spp. and *Rhizoctonia* spp.	7.5 L of Mertect SC per 170 L of water. Spray 2 L of this suspension per 1,000 kg of potato tubers

Application information
Shake well before using. Potato must rotate along the conveyor line into storage to ensure complete coverage.

Restrictions
Grazing: Do not feed or allow livestock to graze on treated crops. **Re-entry interval:** 12 hours.

Environmental precautions
Mertect SC is toxic to aquatic organisms. Do not allow effluent or runoff containing this product to enter lakes, streams, ponds or other waters. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

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Toxicity
Oral LD_{50} (rats) = > 3,100 mg/kg. Dermal LD_{50} (rabbit) = > 2,000 mg/kg.

Storage
Store in a dry place.

METLOCK CT

Fungicide Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
METLOCK CT (PCP# 32371)	Valent Canada Inc. distributed by Nufarm Agriculture	Metconazole: 23.2 g/L Metalaxyl: 46.5 g/L	Solution	10 L, 100 L

Crops, diseases controlled and rates

Crops	Diseases	Diseases suppressed	Rate per 100 kg of seed
Wheat (all)	Early season seed rot/pre-emergence damping-off caused by *Fusarium* spp. and *Rhizoctonia solani* Early season seed rot/pre-emergence damping-off, post emergence damping-off, seedling blight and seedling root rot caused by *Pythium* spp. Common bunt (*Tilletia laevis*) Loose smut (*Ustilago tritici*)	Common root rot caused by *Cochliobolus sativus*	65.2 mL
Barley	Early season seed rot/pre-emergence damping-off caused by *Fusarium* spp. and *Rhizoctonia solani* Early season seed rot/pre-emergence damping-off, post emergence damping-off, seedling blight and seedling root rot caused by *Pythium* spp. Covered smut (*Ustilago hordei*) True loose smut (*Ustilago nuda*)	Common root rot caused by *Cochliobolus sativus*	65.2 mL
Corn (sweet, field, pop)	Seed rot/pre-emergence damping-off caused by *Fusarium* spp. Seed rot/pre-emergence damping-off, post emergence damping-off caused by *Rhizoctonia solani* Early season seed rot/pre-emergence damping-off, post emergence damping-off, seedling blight and seedling root rot caused by *Pythium* spp.		65.2 mL
Oats, buckwheat, millet (pearl, proso), rye, triticale	Early season seed rot/pre-emergence damping-off caused by *Fusarium* spp. and *Rhizoctonia solani* Early season seed rot/pre-emergence damping-off, post emergence damping-off, seedling blight and seedling root rot caused by *Pythium* spp.	Common root rot caused by *Cochliobolus sativus*	65.2 mL

Registered tank mixes
Nufarm Agriculture supports the following mixes that are not on the METLOCK CT label. Apply mixes according to the most restrictive use limitation for either product.

Supported tank mix partner	Crop
NipsIt INSIDE	Wheat (all)
INTEGO Solo	Wheat (all), barley, corn (field, sweet, pop), oats, buckwheat, millet (pearl, proso), rye, triticale

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METLOCK CT (cont'd)

Application information
METLOCK CT does not contain a colourant; any seed treated with METLOCK CT must be conspicuously coloured (red). METLOCK CT is a concentrated formulation and should be mixed with water at a ratio of 5 parts water to 1 part METLOCK CT to ensure sufficient seed coverage. More water can be used if necessary. All labelled crops are registered for commercial application facilities and mobile treaters. Cereal grains (excluding corn) are registered for on-farm use.

How it works
METLOCK CT is a systemic product used to control or suppress listed seed-borne and soil-borne diseases of cereal grains. The fungicide active ingredients in METLOCK CT are metconazole, a broad-spectrum, systemic triazole fungicide and metalaxyl, an oomycete-active, systemic acylalanine fungicide. Metalaxyl interrupts fungal nucleic acid synthesis and metconazole inhibits sterol biosynthesis.

Restrictions
All labelled crops are registered for commercial application facilities and mobile treaters. Cereal grains (excluding corn) are registered for on-farm use. Do not use treated seed for food, feed or oil processing.

Grazing/Pre-harvest Intervals: Do not graze or harvest for forage/feed for 4 weeks after planting. Re-cropping: Barley, corn, canola, oats, rye, wheat, soybean and sugar beet may be replanted at any time. A 35-day plant back interval for all other crops applies.

Environmental precautions
Toxic to aquatic organisms and non-target terrestrial plants. Do not use in areas where soils are permeable and where the water table is shallow.

Toxicity
Oral LD_{50} (rats) = 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in a cool place, out of direct sunlight. Do not allow to freeze.

NipsIt SUITE Cereals OF Seed Protectant

Insecticide Group 4 Fungicide group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container Size
NipsIt SUITE Cereals OF Seed Protectant (PCP# 31357)	Valent Canada Inc. distributed by Nufarm Agriculture	Clothianidin: 30.7 g/L Metconazole: 4.62 g/L Metalaxyl: 9.24 g/L	Suspension	10 L, 110 L

Crops, insects and diseases controlled, rates

Crops	Insects	Diseases	Rate per 100 kg of seed
Wheat	Wireworms* (suppression)	Early season seed rot/ pre-emergence damping-off caused by *Fusarium* spp. and *Rhizoctonia solani*. Early season seed rot/pre-emergence damping-off, post-emergence damping off, seedling blight and seedling root rot caused by *Pythium* spp. Common root rot caused by *Cochliobolus sativus* (suppression), common bunt (*Tilletia laevis*), loose smut (*Ustilago tritici*)	326 mL

*Under moderate to high wireworm pressure or in situations where control is required, additional NipsIt INSIDE Insecticide may be tank mixed at rates of 17 - 83 mL per 100 kg of seed.

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Registered tank mixes
NipsIt INSIDE: 17 - 83 mL/100 kg seed. INTEGO Solo: 13 - 17 mL/100 kg seed.

Application information
This product is formulated for use on-farm or as a commercial seed treatment product. Do not make any subsequent application of a Group 4 insecticide (i.e., in-furrow, foliar) after treatment with NipsIt SUITE Cereals OF Seed Protectant.

How it works
Clothianidin is a systemic chloronicotinyl insecticide that results in suppression of wireworm feeding. The fungicides metalaxyl and metconazole provide early season protection against seed- and soil-borne diseases.

Environmental precautions
Toxic to bees. Bees can be exposed to product residues in flowers, leaves, pollen and/or nectar as a result of seed treatments. Treated seed is toxic to birds and small mammals. Any spilled or exposed seeds should be incorporated into the soil or otherwise cleaned up from the soil surface. This product is toxic to aquatic organisms. This product demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable and/or the water table depth is shallow.

Restrictions
Do not use treated seed for food, feed or oil processing. Do not graze or feed livestock on treated areas for 4 weeks after planting.

Toxicity
Oral LD_{50} (rats) technical = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in a cool place. Protect from freezing temperatures.

Poncho 600 FS/NipsIt INSIDE 600 Insecticide

Insecticide Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container Size
NipsIt INSIDE 600 Insecticide (PCP# 28975)	Valent Canada Inc. distributed by Nufarm Agriculture	Clothianidin: 600 g/L	Flowable	3.78 L
Poncho 600 FS (PCP# 27453)	BASF Canada	Clothianidin: 60%	Flowable	50 L

Crops, insects controlled and rates
Poncho 600 FS/NipsIt INSIDE 600 Insecticide

Crops	Insects	Rate	Specific comments
Canola/rapeseed	Flea beetle	250 mL/100 kg seed	Use under low to moderate flea beetle pressure.
		333 mL/100 kg seed	For higher level of control under moderate pressure.
		666 mL/100 kg seed	Use under high to extreme high flea beetle pressure.
Corn	Corn rootworm	166.7 mL of product per 80,000 units of seed	The application rate recommended for corn rootworm also provides control of other listed corn pests.
	Corn flea beetle, cutworm (black), seed corn maggot, wireworm, white grub	33.3 - 66.6 mL of product per 80,000 units of seed	If corn rootworm is not a target pest, use lower rates for control of other listed corn pests.

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Poncho 600 FS/NipsIt INSIDE 600 Insecticide (cont'd)

Crops	Insects	Rate	Specific comments
Wheat (NipsIt INSIDE only)	Wireworm	17 mL per 100 kg seed (suppression) 33 - 100 mL per 100 kg seed	Use higher rates on wheat seed to be planted into fields with a history of severe wireworm pressure.
	Aphids	50 mL per 100 kg seed	Provides early season protection against aphid feeding.
Potato (seed piece treatment) (NipsIt INSIDE only)	Wireworm suppression Aphid (including potato, green peach, foxglove, buckthorn aphids), Colorado potato beetle, potato leafhopper, potato flea beetle (overwintered adults and suppression of second generation)	Wireworm suppression: 20.8 mL per 100 kg potato seed pieces. All other registered pests: 10.4 - 20.8 mL per 100 kg potato seed pieces.	Plant seed pieces as soon as possible after cutting and treating. Do not apply any subsequent application of a Group 4 insecticide following NipsIt INSIDE 600 Insecticide as a potato seed piece treatment.

Registered tank mixes

Crops	Insect controlled	Rate per 100 kg seed	Specific comments
Canola/ rapeseed	Flea beetle	Poncho 600 FS: 83 mL + Prosper FL: 1250 mL	For a higher level of control under moderate flea beetle pressure.
		Poncho 600 FS: 417 mL + Prosper FL: 1250 mL	For use under high to extreme flea beetle pressure, where extended control is required.
Wheat (all)	Wireworm	Nipsit SUITE 325 mL/acre + Nipsit INSIDE 17 - 83 mL/acre	Use higher rates of Nipsit INSIDE in extreme pressure situations or in situations where control is required.

Note: When tank mixing, use closed transfer systems only.

Application information

Canola, rapeseed and corn: Poncho 600 FS/NipsIt INSIDE 600 Insecticide is for use in commercially available equipment designed for seed treatment only. Wheat: NipsIt INSIDE 600 Insecticide only. For use in commercial seed treatment facilities and on-farm.

How it works

Clothianidin is a systemic chloronicotinyl insecticide. It protects the seed and developing plant from insect damage.

Environmental precautions

This product is toxic to aquatic invertebrates, wild birds and small mammals. Do not expose treated seeds on soil surface. Any spilled or exposed seeds should be incorporated into the soil or otherwise cleaned up from the soil surface. Do not apply directly to water or to areas where surface water is present. **Leaching:** The use of Poncho 600 FS/NipsIt INSIDE 600 Insecticide in areas where soils are permeable, particularly where water table is shallow, may result in groundwater contamination.

Restrictions

Rape greens and rapeseed grown or harvested from Poncho 600 FS seed treatment seed must not be used for feed or human consumption. Rapeseed grown and harvested is only for industrial uses and cannot be used for edible oil or any other human/feed consumption.

Toxicity

Oral LD_{50} (rats) = technical > 5,000.

Storage

Store in a cool, dry place out of direct sunlight. Do not allow product to freeze.

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Prosper® EverGol® Seed Treatment

Insecticide Group 4 Fungicide Group 4, 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Prosper® EverGol® (PCP# 30363)	Bayer	Clothianidin: 290 g/L Penflufen: 10.7 g/L Trifloxystrobin: 7.15 g/L Metalaxyl: 7.15 g/L	Suspension	3.8 L, 10 L, 100 L, 1000 L

Crops, insects and diseases controlled, rates

Crops	Insects	Diseases	Specific comments
Canola, rapeseed, mustard (oilseed and condiment)	Flea beetle	Seed rot/pre-emergence damping-off and post-emergence damping-off caused by soil-borne *Rhizoctonia solani*, *Fusarium* spp. and *Pythium* spp. Seedling blight and early season root rot caused by soil-borne *Pythium* spp. Seed-borne *Alternaris* spp. Seed-borne blackleg (*Phoma lingam*)	Provides protection from flea beetle feeding up to the 4 leaf stage.

Application information

Prosper EverGol is for use in commercially available equipment designed for seed treatment only. This product is to be used in liquid or slurry treaters. Mix thoroughly before, or use entire container at one time.

How it works

Clothianidin is a systemic chloronicotinyl insecticide. It protects the seed and developing plant from insect damage. The fungicides penflufen, trifloxystrobin and metalaxyl provide early season control of seed-borne blackleg and seed-borne *Alternaria* spp. and provide protection from seed, seedling and soil-borne diseases caused by *Rhizoctonia solani*, *Fusarium* spp. and *Pythium* spp.

Environmental precautions

This product is toxic to aquatic invertebrates, wild birds and wild mammals. Any spilled or exposed seeds should be incorporated into the soil or otherwise cleaned up from the soil surface. Do not apply directly to water or to areas where surface water is present. The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water is shallow.

Restrictions

Do not use rape greens and rapeseed grown or harvested from Prosper EverGol treated seed for feed or human consumption. Rapeseed is only for industrial uses and cannot be used for edible oil or any other human/feed consumption.

Toxicity

Oral LD_{50} (rats) = technical > 5,000.

Storage

Store in a cool, dry place out of direct sunlight. Do not allow prolonged storage in temperatures that exceed 40°C or that go below -10°C.

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Rancona Trio

Fungicide Group 3, 4, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Rancona Trio (PCP# 32668)	UPL AgroSolutions Canada	Ipconazole: 5 g/L Carbathiin: 133.33 g/L Metalaxyl: 13.33 g/L	Suspension	10 L, 115 L

Crops, diseases controlled and rates

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seed
Barley	Seed rot (*Penicillium* spp. and *Aspergillus* spp.), seed rot/pre-emergence damping-off, post-emergence damping off, seedling blight (*Rhizoctonia solani*, *Fusarium* spp., *Pythium* spp.), seed rot and seedling blight (seed and soil-borne *Cochliobolus sativus*), true loose smut, covered smut, false loose smut, leaf stripe (*Pyrenophora graminea*)	Common root rot (*Cochliobolus sativus*), crown and foot rot *Fusarium* spp.	300 mL
Wheat (spring and winter)	Seed rot (*Penicillium* spp. and *Aspergillus* spp.), seed rot/pre-emergence damping-off, post-emergence damping off, seedling blight (*Rhizoctonia solani*, *Fusarium* spp., *Pythium* spp.), seed rot and seedling blight (seed and soil-borne *Cochliobolus sativus*), loose smut, common bunt	Common root rot (*Cochliobolus sativus*), crown and foot rot *Fusarium* spp.	300 mL
Oat	Seed rot (*Penicillium* spp. and *Aspergillus* spp.), seed rot/pre-emergence damping-off, post-emergence damping off, seedling blight (*Rhizoctonia solani*, *Fusarium* spp., *Pythium* spp.), seed rot and seedling blight (seed and soil-borne *Cochliobolus sativus*), loose smut, covered smut	Common root rot (*Cochliobolus sativus*), crown and foot rot *Fusarium* spp.	300 mL
Rye, triticale	Seed rot (*Penicillium* spp. and *Aspergillus* spp.), seed rot/pre-emergence damping-off, post-emergence damping off, seedling blight (*Rhizoctonia solani*, *Fusarium* spp., *Pythium* spp.), seed rot and seedling blight (seed and soil-borne *Cochliobolus sativus*)	Common root rot (*Cochliobolus sativus*), crown and foot rot *Fusarium* spp.	300 mL
Field pea	Seed rot (*Penicillium* spp. and *Aspergillus* spp.), seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight (*Rhizoctonia solani*, *Fusarium* spp., *Pythium* spp.), seedling root rot (*Rhizoctonia solani*)	Seedling root rot (*Fusarium* spp.), early season root rot (*Aphanomyces euteiches*)	500 mL
Dry bean	Seed rot (*Penicillium* spp. and *Aspergillus* spp.), seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight (*Rhizoctonia solani, Fusarium* spp.), seedling root rot (*Rhizoctonia solani*)	Seedling root rot (*Fusarium* spp.)	500 mL
Lentil	Seed rot (*Penicillium* spp. and *Aspergillus* spp.), seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight (*Rhizoctonia solani, Fusarium* spp., *Pythium* spp.), seedborne Ascochyta blight (*Ascochyta lentis*)	Seedling root rot (*Fusarium* spp.), early season root rot (*Aphanomyces euteiches*)	500 mL
Chickpea	Seed rot (*Penicillium* spp. and *Aspergillus* spp.), seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight (*Rhizoctonia solani, Fusarium* spp., *Pythium* spp.), seedborne Ascochyta blight (*Ascochyta rabiei*)	Seedling root rot (*Fusarium* spp.),	500 mL
Soybean	Seed rot (*Penicillium* spp. and *Aspergillus* spp.), seed rot/pre-emergence damping-off, post-emergence damping-off, seedling blight (*Rhizoctonia solani, Fusarium* spp.), seedling root rot (*Rhizoctonia solani*), seed rot (*Phomopsis longicolla*)	Seedling root rot (*Fusarium* spp.), Sudden Death Syndrome (SDS) (*Fusarium virguliforme*)	500 mL

Registered tank mixes

Dry bean: Rancona Trio can be tank-mixed with Belmont 2.7 FS at a rate of 24-89 mL/100 kg of seed for control of seed/seedling diseases caused by *Pythium* spp.

Soybean: Rancona Trio can be mixed with Belmont 2.7 FS at a rate of 24-72 mL/acre for control of seed/seedling

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diseases caused by *Pythium* spp. and control of early season *Phytophthora*.

For other tank mixes ensure ensure compatibility has been verified. When used in a tank mix, follow all use directions and the most restrictive precautions and restrictions on the individual labels.

Application information

Rancona Trio is a ready-to-use formulation. Use only in treating equipment that can accurately control application rate and provide good distribution of the chemical onto the seed.

How it works

Rancona Trio is a broad-spectrum fungicide with systemic properties.

Restrictions

Grazing: For barley, oat, and wheat do not graze or feed livestock in treated areas for 6 weeks after planting. For all other crops, treated areas may be grazed 4 weeks after planting. Do not use treated seed for food, feed or oil processing.

Environmental precautions

Treated seed is toxic to birds and small mammals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface. Do not contaminate irrigation water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (rats) > 5,000 mg/kg. Dermal LD_{50} (rabbit) > 5,000 mg/kg.

Storage

Do not freeze.

Rancona V RS

Fungicide Group 3, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Rancona V RS (PCP# 30217)	UPL AgroSolutions Canada	Carbathiin: 87.5 g/L Ipconazole: 9.38 g/L	Suspension	10 L - 1,000 L

Crops, diseases controlled and rates

Crops	Diseases	Rate per 100 kg seeds	Quantity of seeds treated by 100 L of product
Canola, rapeseed	Seed rot, damping off and seed blight caused by *Rhizoctonia* spp., and *Fusarium* spp. Seed-borne blackleg (*Leptosphaeria maculans*). Suppression of root rot caused by *Rhizoctonia* spp. and *Fusarium* spp.	0.80 L	12,500 kg

Application information

Rancona V RS is a ready-to-use formulation designed for on-farm and commercial treating. Commercial facilities must use closed mix/load equipment. Rancona V RS can be applied with mechanical, slurry or mist-type seed treating equipment.

Application tips

Uniform application to seed is necessary to ensure disease protection.

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Rancona V RS (Cont'd)

Restrictions

Grazing: Do not graze or feed livestock on areas treated with Rancona V RS for 28 days after planting. Do not use seed that has been treated for food, feed or oil processing.

Environmental precautions

Seed that has been treated with Rancona RS is toxic to birds and small animals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store this product away from food or feed. Do not allow this product to freeze.

Raxil®PRO Seed Treatment

Fungicide Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Raxil® PRO (PCP# 30102)	Bayer	Tebuconazole: 3.0 g/L Prothioconazole: 15.4 g/L Metalaxyl: 6.2 g/L	Micro-dispersion	10 L, 58.5 L, 175.5 L, 1000 L

Crops, diseases controlled and rates

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seeds	Bushels treated per 10 L jug
Wheat, rye, triticale	Loose smut, common bunt or stinking smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp. seedling blight caused by seed-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne Fusarium and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp.	Root and crown rot caused by seed- and soil-borne *Fusarium* spp., common root rot caused by seed- and soil-borne C*ochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	325 mL	113*
Barley	True loose smut, covered smut, false loose smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp. seedling blight caused by seed-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne Fusarium and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp. barley leaf stripe	Root and crown rot caused by seed- and soil-borne *Fusarium* spp. common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	325 mL	141**

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Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seeds	Bushels treated per 10 L jug
Oats	Covered smut, loose smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp. Seedling blight caused by seed-borne Fusarium spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne Fusarium and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp.	Root and crown rot caused by seed- and soil-borne *Fusarium* spp., common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	325 mL	200***

*Based on wheat at 27.3 kg/bu (60 lb./bu). **Based on barley at 21.8 kg/bu (48 lb./bu). ***Based on oats at 15.4 kg/bu (34 lb./bu). A 10 L jug treats 3,077 kg of seed.

Registered tank mixes
Raxil PRO may be combined with Stress Shield for control of certain insect pests in wheat, barley and oats.

Application information
Raxil PRO is a ready-to-use formulation designed for commercial or on-farm treating with conventional seed treating equipment. Uniform application to seed is necessary to ensure optimum product performance.

How it works
Raxil PRO is a systemic fungicide that is absorbed into the germinating seed and transported through the growing seedling, providing control of seed and seedling diseases.

Restrictions
Do not use treated seed for food, feed or oil processing.

Environmental precautions
The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Do not expose treated seeds on the soil surface. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned up from the soil surface.

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store product in original container only. Store in a cool, dry place and avoid excessive heat.

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Raxil® PRO SHIELD Seed Treatment

Insecticide Group 4 Fungicide Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Raxil® PRO (PCP# 30102)	Bayer	Tebuconazole: 3 g/L Prothioconazole: 15.4 g/L Metalaxyl: 6.2 g/L	Micro-dispersion	10 L, 175.5 L
Stress Shield 600 (PCP# 30668)		Imidacloprid: 600 g/L		1.5 L, 27 L

Crops, insects and diseases Controlled, rates

Crops	Insects	Diseases	Rate per 100 kg of seed
Wheat	Wireworm: early season protection against crop stand injury	**Controlled**: loose smut, common bunt or stinking smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp., seedling blight caused by seed-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne *Fusarium* and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp. **Suppression**: root and crown rot caused by seed- and soil-borne *Fusarium* spp., common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	Raxil Pro: 325 mL Stress Shield: 50 mL
Barley	Wireworm: early season protection against crop stand injury	**Controlled**: true loose smut, covered smut, false loose smut, seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp., seedling blight caused by seed-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne *Fusarium* and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp., barley leaf stripe **Suppression**: root and crown rot caused by seed- and soil-borne *Fusarium* spp common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	Raxil Pro: 325 mL Stress Shield: 50 mL
Oats	Wireworm: early season protection against crop stand injury	**Controlled**: covered smut, loose smut seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Pythium* spp., seedling blight caused by seed-borne *Fusarium* spp., *Cochliobolus sativus* and soil-borne *Fusarium* spp. and *Pythium* spp. Post-emergent damping-off caused by seed- and soil-borne *Fusarium* and *Cochliobolus sativus*. Seed rot. Pre-emergent damping-off, post-emergent damping-off and seedling blight caused by seed-borne *Aspergillus* spp. **Suppression**: root and crown rot caused by seed- and soil-borne *Fusarium* spp., common root rot caused by seed- and soil-borne *Cochliobolus sativus*, seedling blight caused by seed-borne *Penicillium* spp. and seed rot, pre-emergent damping off and root rot caused by *Rhizoctonia solani*	Raxil Pro: 325 mL Stress Shield: 50 mL

Registered tank mixes

None registered.

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Application information

How to apply: Pour container of Stress Shield into Raxil Pro container and mix thoroughly. Raxil Pro Shield can be used in commercial and on-farm seed treatment equipment that can accurately control application rate and provide good coverage of treated seed.

Application tips

Uniform application to seed is necessary to ensure seed safety and best protection against disease and insects.

How it works

Raxil Pro Shield contains a systemic fungicide that provides control of seed and seedling diseases. Raxil Pro Shield also contains a systemic insecticide that provides protection from damage caused by chewing and sucking insects through contact and systemic activity.

Restrictions

Treated seed must not be used for food, feed or oil processing. **Grazing:** Do not graze or feed livestock on treated areas for 4 weeks after planting.

Environmental precautions

The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow. Toxic to birds and aquatic invertebrates. Imidacloprid is toxic to bees. Do not apply this product directly to water or to areas where surface water is present. Cover or incorporate spilled treated seeds.

Toxicity

Raxil Pro: Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.
Stress Shield: Oral LD_{50} (rats) = > 300 - < 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg

Storage

Do not store in direct sunlight. Do not store above 35°C. Store product in original container.

Senator PSPT

Fungicide Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Senator PSPT (PCP# 14599)	Nippon Soda Company	Thiophanate-methyl: 10%	Dust	10 kg

Crops, diseases controlled and rates

Crops	Diseases	Rate per 100 kg of cut seed
Potato	Verticillium wilt, Fusarium rot, silver scurf (*Helminthosporium solani*), and aids in control of seed piece decay and black leg infections	500 g

Application information

Apply in a convenient container or by dust attachment over belt. Cut pieces should be treated within 6 hours of cutting. If planting is to be delayed more than 1 to 2 days, the treated pieces should be stored for 2 to 3 days in open crates before bagging.

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Senator PSPT (cont'd)

Application tips
Senator PSPT contains no colourant. An appropriate colourant must be added when this product is applied. For optimum control of silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential. Reduced control can be expected in fields where volunteers from the previous year's crop act as a source of infection.

Environmental precautions
By-products from this product are toxic to aquatic organisms. Do not contaminate any body of water or groundwater when disposing of equipment washwater.

Toxicity
Oral LD_{50} (rats) = > 6,000 mg/kg.

Storage
Store in a dry place.

Sharda Meteb 11SC

Fungicide Group 3, 4

Formulation

Product	Company	Active ingredient	Formulation	Container size
Sharda Meteb 11SC (PCP # 34038)	Sharda Crop Chem	Tebuconazole: 5.0 g/L Metalaxyl: 6.6 g/L	Suspension	10 L

Crops, insects and diseases Controlled, rates

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seed
Wheat, rye, triticale	Loose smut (*Ustilago tritici*); common bunt or stinking smut (*Tilletia tritici, T. laevis*); seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp.; seedling blight caused by seed-borne *Fusarium* spp.; Damping-off caused by *Pythium* spp.; seed-borne *Septoria nodorum*	Root and crown rot caused by seed- and soil-borne *Fusarium* spp., common root rot caused by seed- and soil-borne *Cochliobolus sativus;* seed rot and pre-emergent damping-off caused by seed- and soil-borne *Cochliobolus sativus;* seedling blight caused by seed-borne *Cochliobolus sativus*	300 mL
Barley	True loose smut (*Ustilago nuda*); covered smut (*Ustilago hordei*); false loose smut (*Ustilago nigra*); seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp.; seedling blight caused by seed-borne *Fusarium* spp. Damping-off caused by *Pythium* spp.	Root and crown rot caused by seed- and soil-borne *Fusarium* species; common root rot caused by seed- and soil-borne *Cochliobolus sativus;* seed rot and pre-emergent damping-off caused by seed- and soil-borne *Cochliobolus sativus;* seedling blight caused by seed-borne *Cochliobolus sativus*	300 mL
Oats	Covered smut (*Ustilago kolleri*); loose smut (*Ustilago avenae*); seed rot and pre-emergent damping-off caused by seed- and soil-borne *Fusarium* spp.; seedling blight caused by seed-borne *Fusarium* spp.; damping-off caused by *Pythium* spp.	Root and crown rot caused by seed- and soil-borne *Fusarium* species; common root rot caused by seed- and soil-borne *Cochliobolus sativus;* seed rot and pre-emergent damping-off caused by seed- and soil-borne *Cochliobolus sativus;* seedling blight caused by seed-borne *Cochliobolus sativus*	300 mL

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Application information
Sharda Meteb 11ST Fungicide is a ready to use formulation designed for commercial or on-farm treating with conventional seed treating equipment that can accurately control application rates and provide good distribution of the chemical onto the seed in the mixing chamber. Uniform coverage at the correct rate is important for satisfactory results.

How it works
Sharda Metreb 11ST is a systemic fungicide that is absorbed into the germinating seed and transported through the growing seedling, providing control of seed and seedling diseases.

Restrictions
Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting.

Environmental precautions
Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Do not expose treated seeds on the soil surface. Any spilled or exposed seed must be incorporated into the soil or otherwise cleaned up from the soil surface.

Toxicity
Oral LD50(rats) = > 5,050 mg/kg. Dermal LD50 = > 5,050 mg/kg.

Storage
Store in a cool, dry place and avoid excessive heat.

Stress Shield® 600/Sombrero

Insecticide Group 4

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Stress Shield® 600 (PCP# 30668)	Bayer	Imidacloprid: 600 g/L	Suspension	27 L
Sombrero (PCP# 30505)	ADAMA Canada	Imidacloprid: 600 g/L	Flowable	1.54 L

Crops, insects controlled and rates

Crops	Insects	Rate per 100 kg seed	Specific comments
Wheat (durum, spring and winter) Barley Oats	Wireworm	17 - 50 mL	When rate ranges are given, use the higher rate when insect pressure is expected to be high.
Bean includes field bean (dry and coloured)*	Potato leafhopper Wireworm	104 mL	
Soybean	Soybean aphid Bean leaf beetle Seedcorn maggot Wireworm	104 mL	
Field pea*	Pea leaf weevil	104 - 208 mL	
	Wireworm	104 mL	
Faba bean*	Pea leaf weevil Wireworm	104 mL	
Chickpea*, Lentil*	Wireworm	104 mL	

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Stress Shield 600/Sombrero (cont'd)

Crops	Insects	Rate per 100 kg seed	Specific comments
Canola**	Flea beetle (early season control)	667 - 1,333 mL	Dilute with 67 - 133 mL water. A blue colourant must be added when Sombrero is applied to oilseed.
Corn, Field corn for seed production**	Wireworms	21.3 ml / 80,000 seeds	Dilute in sufficient water to achieve uniform coverage on the seed. Ensure seed is adequately coloured. Other polymers and coatings may be required.
Corn, Field corn for seed production**	Corn flea beetle	80 ml / 80,000 seeds	

*Registered only for Stress Shield 600. **Registered only for Sombrero.

Registered tank mixes

Wheat, barley and oats: Stress Shield 600: Raxil T, Raxil MD, RaxilPRO or EverGol Energy. Sombrero: Raxil T, Raxil MD.

Legumes: Stress Shield 600: Trilex AL, Trilex AL Concentrate, Trilex FS, Allegiance, EverGol Energy, EverGol Xtend, Apron Max RFC, Trilex EverGol and Apron Max RTA. Sombrero: Apron Maxx RTA, Apron Maxx RFC.

Application information

For use in commercial and on-farm seed treatment equipment. Check with seed treatment manufacturer for information on which crops on-farm treatments can be made. Mix thoroughly before use or use entire container at one time. All seed must be conspicuously coloured at the time of treatment. Treated seed may reduce seed flow in the seed drill. Recalibration of the seed drill may be required to obtain correct seeding rate before planting. Stress Shield 600/Sombrero can be used as an over-treatment. Prior to and during application, Stress Shield/Sombrero must be thoroughly agitated to ensure uniform mixing of the product. Due to the viscosity of the material, it should be kept above 10°C prior to and during application. Do not apply direct heat to container.

How it works

Stress Shield 600/Sombrero are systemic seed treatment insecticides that provide protection for certain crops from damage caused by listed chewing and sucking insects through contact and systemic activity.

Environmental precautions

Toxic to birds and aquatic organisms. Imidacloprid is toxic to bees. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Restrictions

Do not use treated seed for food, feed or oil processing. **Grazing:** Do not graze or feed livestock on treated areas for 4 weeks after planting.

Toxicity

Oral LD_{50} (rats) = > 300 - < 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool, dry place out of direct sunlight. Stress Shield 600: Do not store above 35°C.
Sombrero: Store between 0°C and 25°C. Carryover of seed treated with Stress Shield is not recommended.

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Teraxxa F4

Insecticide Group 30 Fungicide Group 3, 4 ,7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Teraxxa F4 (PCP# 33667)	BASF Canada	Broflanilide: 16.7 g/L	Suspension concentrate	9.8 L, 120 L, 450 L
		Pyraclostrobin: 16.7 g/L		
		Fluxapyroxad: 8.35 g/L		
		Triticonazole: 16.7 g/L		
		Metalaxyl: 10 g/L		

Crops, diseases controlled and rates

Crops	Diseases controlled	Diseases suppressed	Insects controlled	Rate per 100 kg of seed
Barley	Seed rots/pre-emergent damping-off (*Fusarium* spp., *Rhizoctonia solani*, *Cochliobolus sativus*, *Pythium* spp.); post-emergent damping-off (*Fusarium* spp, *Rhizoctonia solani*, *Pythium* spp.); seedling blight and root rot (*Fusarium* spp., *Rhizoctonia solani*, *Pythium* spp.), true loose smut (*Ustilago nuda*); covered smut (*Ustilago hordei*), false loose smut (*Ustilago nigra*)	Seedling blight and root rot (*Cochliobolus sativus*): Fusarium crown and root rot (*Fusarium* spp.)	Wireworm (all species)	300 mL
Canaryseed, annual canarygrass (grown for human consumption)	Seed rots/pre-emergent damping-off (*Fusarium* spp., *Rhizoctonia solani, Cochliobolus sativus, Pythium* spp.); post-emergent damping-off (*Fusarium* spp., *Rhizoctonia solani, Pythium* spp.); seedling blight and root rot (*Fusarium* spp., *Rhizoctonia solani, Pythium* spp.)			
Oats	Seed rots/pre-emergent damping-off (*Fusarium* spp., *Rhizoctonia solani, Cochliobolus sativus, Pythium* spp.); post-emergent damping-off (*Fusarium* spp., *Rhizoctonia solani, Pythium* spp.); seedling blight and root rot (*Fusarium* spp., *Rhizoctonia solani, Pythium* spp.); loose smut (*Ustilago avenae*); covered smut (*Ustilago kolleri*)			
Wheat (all types: winter, spring and durum), rye, triticale	Seed rots/pre-emergent damping-off (*Fusarium* spp., *Rhizoctonia solani, Cochliobolus sativus, Pythium* spp.); post-emergent damping-off (*Fusarium* spp., *Rhizoctonia solani, Pythium* spp.); seedling blight and root rot (*Fusarium* spp., *Rhizoctonia solani, Pythium* spp.); loose smut (*Ustilago tritici*); common bunt (*Tilletia tritici, T. lavie*)			

Registered tank mixes

None registered.

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Teraxxa F4 (cont'd)

Application information

Apply Teraxxa F4 as a water-based mixture using standard slurry or mist-type seed treatment application equipment. Agitate thoroughly prior to use. When used at the recommended rate of 300 mL/100 kg seed, no additional dyes or dilutions with water are needed unless recommended by the manufacturer of the seed treatment application equipment. If water is added, increase the use rate proportionally to the dilution rate (e.g., add 100 mL of water to 300 mL of Teraxxa F4, then apply 400 mL/100 kg seed).

Teraxxa F4 can be used in commercial treatment facilities and on-farm standard gravity flow or mist type treatment machines. Teraxxa F4 can also be used in "On the Go" air seeder treatment systems.

How it works

Teraxxa F4 insecticide and fungicide seed treatment is a suspension concentrate that protects against damage caused by wireworm and seed and soil borne diseases. The insecticide component, Broflanilide, is a Group 30 class of chemistry that controls wireworms through contact and ingestion. The fungicide components provide systemic activity on seed-borne and soil-borne diseases. The fungicide components are Pyraclostrobin, Triticonazole, Metalaxyl and Fluxapyroxad. Pyraclostrobin is a strobilurin fungicide that provides systemic broad-spectrum activity against seed- and soil-borne diseases. Triticonazole is a triazole fungicide that provides systemic broad-spectrum protection against seed- and soil-borne diseases. Metalaxyl is a phenylamide fungicide with systemic activity against seed and seedling diseases caused by oomycete fungi. Fluxapyroxad is a carboximide fungicide that provides systemic broad-spectrum protection against seed- and soil-borne diseases.

Restrictions

Labelling: Treated seed (bulked or bagged) must be labelled as follows: "Keep out of reach of children and animals. Store away from feed and food stuff. DO NOT use for food, feed or oil processing. This seed is treated with Teraxxa F4 containing broflanilide, pyraclostrobin, fluxapyroxad, triticonazole and metalaxyl.

Use only closed cab planting equipment when planting seeds treated with Teraxxa F4. During handling and planting treated seeds, wear coveralls over a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes. Wear a NIOSH-approved N95 (minimum) filtering facepiece respirator (dust mask) that is properly fit tested when transferring treated seed to the planter/seeder.

Broflanilide is toxic to bees. Dust generated during planting of treated seed may be harmful to bees and other pollinators. To help minimize the dust generated during planting, refer to the "Pollinator Protection and Responsible Use of Treated Seed- Best Management Practices" on the Health Canada webpage on pollinator protection at *www.canada.ca/pollinators*. Do not load or clean planting equipment near bee colonies, and avoid places where bees may be foraging, such as flowering crops or weeds. When turning on the planter avoid engaging the system where emitted dust may contact honey bee colonies. Spilled or exposed seeds and dust must be incorporated into the soil or cleaned up from the soil surface."

Re-cropping: Immediate plant-back is permitted for all labelled crops. A plant-back interval of 30 days is required for all crops not on the label.

Environmental precautions

Toxic to bees. Toxic to aquatic organisms. This product demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this product in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Toxicity

Oral LD_{50} (rats) = >2,000 mg/kg. Dermal LD_{50} (rats) = >5,000 mg/kg.

Storage

Prevent from freezing; however, in the instance that the product freezes, allow to thaw at room temperature for 24 hours and agitate well prior to use. Store in original tightly closed container in a cool, dry, well-ventilated area without floor drain. To prevent contamination, store this product away from food and feed.

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Trilex® EverGol® Fungicide Seed Treatment

Fungicide group 4, 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Trilex Component A (PCP# 30644)	Bayer	Penflufen: 154 g/L Trifloxystrobin: 154 g/L	Liquid based water formulation	1.5 L, 6.49 L
Trilex Component B (PCP# 30645)		Metalaxyl: 317 g/L	Suspension	0.96 L, 4.15 L

Crops, diseases controlled and rates

Crops	Diseases	Rate per 100 kg of seed
Bean (succulent, snap, dry)	Seed decay/pre-emergence damping-off and post-emergence damping-off caused by *Rhizoctonia solani*, *Fusarium* spp., *Pythium* spp.	Trilex Component A 25 mL Trilex Component B 16 mL
Chickpea, pea (field, dry)	Seed decay/pre-emergence damping-off and post-emergence damping-off caused by *Rhizoctonia solani*, *Fusarium* spp., *Pythium* spp. Suppression of seed-borne ascochyta blight caused by *Ascochyta* spp.	
Lentil	Seed decay/pre-emergence damping-off and post-emergence damping-off caused by *Rhizoctonia solani*, *Fusarium* spp., *Pythium* spp. Seed rot/pre-emergence damping-off, post-emergence damping-off and seedling blight caused by *Botrytis cinerea* (seed-borne) Suppression of seed-borne ascochyta blight caused by *Ascochyta* spp.	

Application information

Trilex EverGol is a concentrated suspension, and it is recommended to dilute with water just prior to application to ensure uniform coverage on the seed. Uniform application on seed will ensure seed safety and disease protection. Allow seeds to dry before bagging, storing or seeding.

Compatibility with inoculants: Please check with inoculant manufacturers prior to use.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting. Treated seed must not be used for food, feed or oil processing. **Re-cropping:** Registered crops for Trilex EverGol as well as canola, mustard, rapeseed, corn, legumes and cereal grains may be re-planted at any time. For all other crops, do not plant back within 30 days of seeding with Trilex EverGol treated seed.

Environmental precautions

Trilex EverGol is toxic to aquatic organisms. Dispose of all excess treated seed. Leftover treated seed may be double-sown around the headland or buried away from water sources in accordance with local requirements. **Leaching**: The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or depth to the water table is shallow.

Toxicity

Oral LD_{50} (rats) = 5,000 mg/kg. Dermal LD_{50} (rabbit) = 5,000 mg/kg.

Storage

Store product in original container. Store in a cool, dry place and avoid excessive heat.

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Trilex® EverGol® SHIELD Fungicide and Insecticide

Insecticide Group 4 Fungicide Group 4, 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Trilex® Component A (PCP# 30644)	Bayer	Penflufen: 154 g/L Trifloxystrobin: 154 g/L	Suspension	1.5 L
Trilex® Component B (PCP# 30645)		Metalaxyl: 310 g/L		0.96 L
Stress Shield® 600 (PCP# 30668)		Imidacloprid: 600 g/L		6.25 L

Crops, Iisects and diseases controlled, rates

Crops	Insects	Diseases	Rate per 100 kg of seed
Faba bean	Pea leaf weevil, potato leafhopper, wireworm	Seed decay/pre-emergence damping-off and post-emergence damping-off caused by *Rhizoctonia solani, Fusarium* spp., and *Pythium* spp. Seed decay/pre-emergence damping-off, post-emergence damping-off and seedling blight caused by seed-borne *Botrytis cinerea* Suppression of seed-borne ascochyta blight caused by *Ascochyta* spp.	Trilex Component A 25 mL Trilex Component B 16 mL Stress Shield 104 mL
Dry bean	Potato leafhopper, wireworm	Seed decay/pre-emergence damping-off and post-emergence damping-off caused by *Rhizoctonia solani, Fusarium* spp., and *Pythium* spp. Seed decay/pre-emergence damping-off, post-emergence damping-off and seedling blight caused by seed-borne *Botrytis cinerea* Suppression of seed-borne ascochyta blight caused by *Ascochyta* spp.	Trilex Component A 25 mL Trilex Component B 16 mL Stress Shield 104 mL
Chickpea	Wireworm	Seed decay/pre-emergence damping-off and post-emergence damping-off caused by *Rhizoctonia solani, Fusarium* spp., and *Pythium* spp. Seed decay/pre-emergence damping-off, post-emergence damping-off and seedling blight caused by seed-borne *Botrytis cinerea* Suppression of seed-borne ascochyta blight caused by *Ascochyta* spp.	Trilex Component A 25 mL Trilex Component B 16 mL Stress Shield 104 mL
Field pea	Pea leaf weevil, wireworm	Seed decay/pre-emergence damping-off and post-emergence damping-off caused by *Rhizoctonia solani, Fusarium* spp., and *Pythium* spp. Seed decay/pre-emergence damping-off, post-emergence damping-off and seedling blight caused by seed-borne *Botrytis cinerea* Suppression of seed-borne ascochyta blight caused by *Ascochyta* spp.	Trilex Component A 25 mL Trilex Component B 16 mL Stress Shield 104 - 208 mL
Lentil	Wireworm	Seed decay/pre-emergence damping-off and post-emergence damping-off caused by *Rhizoctonia solani, Fusarium* spp., and *Pythium* spp. Seed decay/pre-emergence damping-off, post-emergence damping-off and seedling blight caused by seed-borne *Botrytis cinerea* Suppression of seed-borne ascochyta blight caused by *Ascochyta* spp.	Trilex Component A 25 mL Trilex Component B 16 mL Stress Shield 104 mL

Application information

Trilex EverGol SHIELD is a concentrated suspension, and it is recommended to dilute with water just prior to application. Uniform application on seed will ensure seed safety and disease protection. For use in commercial and on-farm seed treatment equipment. All seed must be conspicuously coloured at the time of treatment. Treated seed may reduce seed flow in the seed drill. Recalibration of the seed drill may be required to obtain correct seeding rate before planting. Prior to and during application, Stress Shield must be thoroughly agitated to ensure uniform mixing of the product. Due to the viscosity of the material, it should be kept above 10°C prior to and during application. Do not apply direct heat to container. Allow seeds to dry before bagging, storing or seeding.

Compatibility with inoculants: Please check with inoculant manufacturers prior to use.

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Restrictions

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting. Treated seed must not be used for food, feed or oil processing. **Re-cropping:** Registered crops for Trilex EverGol SHIELD as well as canola, mustard, rapeseed, corn, legumes and cereal grains may be re-planted at any time. For all other crops, do not plant back within 30 days of seeding with Trilex EverGol SHIELD treated seed.

Environmental precautions

Trilex EverGol SHIELD is toxic to birds and aquatic organisms. Dispose of all excess treated seed. Leftover treated seed may be double-sown around the headland or buried away from water. Imidacloprid is toxic to bees. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Leaching:** The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or depth to the water table is shallow.

Toxicity

Trilex EverGol: Oral LD_{50} (rats) = 5,000 mg/kg. Dermal LD_{50} (rabbit) = 5,000 mg/kg.

Stress Shield: Oral LD_{50} (rats) = > 300 - < 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store product in original containers. Store in a cool, dry place and avoid excessive heat. Stress Shield 600: Do not store above 35°C.

Tuberseal PSPT/Potato ST 16/PSPT 16%/ Solan MZ

Fungicide Group M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Potato ST 16 (PCP# 24734)	Wilbur-Ellis Company	Mancozeb: 16%	Dust (with alderbark)	20 kg
PSPT 16% (PCP# 24734.01)	Loveland Products Canada	Mancozeb: 16%	Dust	20 kg
Tuberseal (PCP# 17042)	Belchim Crop Protection Canada	Mancozeb: 16%	Dust (bark)	20 kg
Solan MZ (PCP# 29377)		Mancozeb: 16%	Dust (no bark)	20 kg

Crops, diseases controlled and rates

Crop	Diseases	Rate per 100 kg seed
Potato seed pieces	Fusarium seed piece decay	500 g

Registered tank mixes

None registered.

Application information

Potato seed pieces: Thoroughly coat the surface of whole or cut seed pieces with dust. If treated whole seed is cut, make a second application to protect the cut surfaces. Plant as soon as possible after treating. However, if planting of cut seed is delayed beyond 2 days after treating, seed should be air dried before bagging or loose piling.

Environmental precautions

Do not contaminate food or any body of water.

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Tuberseal PSPT/Potato ST 16/PSPT 16%/ Solan MZ (cont'd)

Toxicity
Oral LD_{50} (rats) = > 4,500 mg/kg. Dermal LD_{50} (rabbit) = > 5,000 mg/kg.

Storage
Store product in a cool, dry, ventilated place.

Vercoras

Insecticide Group (4) fungicide Group (4,7,11)

Available to commercial seed treaters only

Formulation

Product	Company	Active ingredient	Formulation	Container size
Vercoras F3 (PCP # 33937) **Vercoras XC (PCP # 33938)** **Poncho 600 FS (PCP # 27453)**	BASF	Pyraclostrobin: 16.7 g/L Fluxapyroxad: 16.7 g/L Metalaxyl: 13.3 g/L Fluopyram: 600 g/L Clothianidin: 600 g/L	Suspension	

Crops, diseases controlled and rates

Crop	Diseases controlled	Insects controlled	Rate per 100 kg seed
Canola	Seed- and air-borne* blackleg (*Leptosphaeria maculans*), seed rot, seedling blight and root rot caused by soil-borne *Fusarium* spp., seed rot, seedling blight and root rot caused by soil-borne *Rhizoctonia solani*, seed rot and seedling blight caused by soilborne *Pythium* spp., seed-and soil-borne alternaria spot (*Alternaria* spp.)	Flea beetles	Vercoras F3: 600 mL Vercoras XC: 125 mL Poncho® 600 FS: 666 mL

*Residue/soil-borne blackleg

Application information
For use in commercial seed treatment facilities with closed transfer including closed mixing, loading, calibrating and closed treatment equipment only.

How it Works
The active ingredient pyraclostrobin is a strobilurin fungicide with broad-spectrum contact and systemic activity. Fluxapyroxad is a carboxamide fungicide that provides systemic broad-spectrum protection. Metalaxyl is an acylalanines fungicide with systemic activity. Fluopyram is a carboxamide fungicide that provides protection against airborne blackleg during the critical early season infection period. Clothianidin is a systemic chloronicotinyl insecticide.

Restrictions
Do not use treated seed for food, feed or oil processing. When planting treated seeds, a closed cab planter is required. All workers outside the closed cab must wear long-sleeved shirt and long pants, coveralls, chemical-resistant gloves, shoes plus socks and a respirator. Do not make any subsequent application of a Group 4 insecticide (i.e., in-furrow or foliar application). **Grazing:** Do not graze or feed livestock on treated area for four weeks after planting. **Re-cropping:** Do not replant to alfalfa for 14 days after application. Corn, canola and rapeseed may be replanted at any time. A one-year plant back interval is required for leafy, root and tuber vegetables. A 30-day plant back interval on cereal grains, grasses, non-grass animal feeds and soybeans and dried beans is required.

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Environmental precautions

Toxic to aquatic organisms, non-target terrestrial plants and small wild animals. Treated seed is toxic to small wild mammals. Ensure proper soil incorporation of the seeds. Do not feed treated seed to, or otherwise expose to, wildlife or domestic birds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion. Ensure proper disposal of any surplus treated seed not intended for later planting. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds or any body of water with the chemical, used containers, treated seed or bags that have held treated seed. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity

Vercoras F3: Oral LD50 (rats) = > 2,000 mg/kg. Dermal LD50 > 5,000 mg/kg. **Vercoras XC:** Oral LD50 (rats) = > 2,000 mg/kg. Dermal LD50 > 2,000 mg/kg. **Poncho 600FS:** Oral LD50 (rats) = > 2,000 mg/kg. Dermal LD50 > 4,000 mg/kg.

Storage

Store in cool, dry area. Do not store in direct sunlight. Do not allow prolonged storage in temperatures that exceed 40°C or in temperatures that fall below -10°C. Store this product away from food or feed.

Vibrance Maxx

Fungicide Group 4, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Apron Maxx RTA (PCP# 27577)	Syngenta	Fludioxonil: 0.73% Metalaxyl-M: 1.1%	Liquid suspension	115 L + 3.33 L 450 L + 4 x 3.33 L
Vibrance 500FS (PCP# 30438)		Sedaxane: 500 g/L		

Crops, diseases controlled and rates

Crops	Diseases	Rate per 100 kg seed
Chickpea	Seed rot, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed rot and seedling blight caused by seed-borne *Botrytis* spp. Seedling blight caused by *Fusarium* spp. and *Pythium* spp. Seed-borne ascochyta blight caused by *Ascochyta rabiei* Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	325 mL (Apron Maxx) + 10 mL (Vibrance)
Dry bean	Damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seeedling blight caused by *Pythium* spp. Anthracnose caused by seed-borne *Colletotrichum* spp. Seed decay, seedling blight and damping-off caused by *Rhizoctonia* solani	
Lentil	Seed rot, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed rot and seedling blight caused by seed-borne *Botrytis* spp. Seedling root rot caused by *Fusarium* spp. Seed-borne ascochyta blight caused by *Ascochyta lentis* Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	

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Vibrance Maxx (cont'd)

Crops	Diseases	Rate per 100 kg seed
Pea (field and succulent)	Seed rot, seedling blight, pre-emergence and post-emergence damping-off caused by *Fusarium* spp., *Rhizoctonia* spp. and *Pythium* spp. Seed-borne aschochyta blight and foot rot caused by *Ascochyta pinodes* Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	325 mL (Apron Maxx) + 10 mL (Vibrance)
Soybean	Damping-off and seed rots caused by *Pythium* spp., *Fusarium* spp. and *Rhizoctonia* spp. Seedling blight caused by *Fusarium* spp. and *Pythium* spp. Seedling root rot caused by *Fusarium* spp. Seed rot and seedling blight caused by seed-borne *Phomopsis* spp. Early season root rot caused by *Phytophthora megasperma* var. *sojae.* Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	
Faba bean	Seed rot/pre-emergence damping-off, post-emergence damping-off and seedling blight caused by *Fusarium* spp., *Pythium* spp. and *Rhizoctonia* spp. Seed decay, seedling blight and damping-off caused by *Rhizoctonia solani*	

Registered tank mixes

None registered. Vibrance Maxx is a co-pack of Vibrance 500 FS and Apron Maxx RTA.

Application information

Vibrance Maxx is a ready-to-apply seed treatment for use in commercial seed treatment plants and for on-farm treatment. The equipment must provide uniform coverage on the seed. Allow the seed to dry before bagging, storing or seeding.

Seed treatment and inoculants

Vibrance Maxx can be used with some Rhizobium-based inoculants. Contact inoculant manufacturer for proper recommendations. Treated seed may not flow at the same rates through seeding equipment as untreated seed. With rough coated seed, the addition of water will increase coverage; contact Syngenta for more information.

How it works

Vibrance Maxx contains 3 active ingredients. Fludioxonil is a phenylpyrrole fungicide with contact activity. Metalaxyl-M is an acylalanine fungicide with systemic activity against certain fungal diseases. Sedaxane is an SDHI fungicide with systemic properties.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 60 days after planting. **Re-cropping:** Do not plant any crop other than soybean, bean, chickpea, lentil, lupin, faba bean and pea within 60 days to fields in which treated seeds were planted.

Environmental precautions

Vibrance Maxx is toxic to aquatic organisms. Any spilled or exposed seeds must be incorporated into the soil or cleaned up from the soil surface.

Toxicity

Apron Maxx RTA: Oral LD_{50} (rats) = 5,050 mg/kg. Dermal: LD_{50} (rabbit) 2,020 mg/kg.
Vibrance 500FS: Oral LD_{50} (rats) = 2,975 mg/kg. Dermal: LD_{50} (rabbit) > 5,050 mg/kg.

Storage

Heated storage required. Do not store Vibrance Maxx above 30°C. Store product in original container.

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Vibrance Quattro

Fungicide Group 3, 4, 7, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Vibrance Quattro (PCP# 31408)	Syngenta	Difenoconazole: 36.8 g/L Sedaxane: 15.4 g/L Metalaxyl-M: 9.2 g/L Fludioxonil: 7.6 g/L	Liquid suspension	10 L, 115 L, 450 L

Crops, diseases controlled and rates

Crops	Diseases controlled	Diseases suppressed[1]	Rate per 100 kg seed
Barley	Seed rots caused by *Fusarium, Pythium, Rhizoctonia, Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp., seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Covered smut (*Ustilago hordei)*, false loose smut (*Ustilago nigra*), true loose smut (*Ustilago nuda*)	Common root rot, (*Cochliobolus sativus*), Fusarium crown and foot rot (*Fusarium* spp.), take-all (*Gaeumannomyces graminis*)	325 mL
Oats	Seed rots caused by *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Covered smut (*Ustilago hordei*) Loose smut (*Ustilago avenae*)	Common root rot (*Cochliobolus* spp.)	325 mL
Rye	Seed rots caused by *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Common bunt (*Tilletia tritici*)[2] Dwarf bunt (*Tilletia controversa*)[2]	Common root rot, (*Cochliobolus sativus*), Fusarium crown and foot rot (*Fusarium* spp.), take-all (*Gaeumannomyces graminis*)	325 mL
Triticale	Seed rots caused by *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Loose smut (*Ustilago tritici*)	Common root rot (*Cochliobolus sativus*), Fusarium crown and foot rot (*Fusarium* spp.), take-all (*Gaeumannomyces graminis*)	325 mL
Wheat, spring	Seed rots caused by *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Common bunt (*Tilletia tritici*)[2] Loose smut (*Ustilago tritici*)	Common root rot, (*Cochliobolus sativus*), Fusarium crown and foot rot (*Fusarium* spp.), take-all (*Gaeumannomyces graminis*)	325 mL

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Vibrance Quattro (cont'd)

Crops	Diseases controlled	Diseases suppressed[1]	Rate per 100 kg seed
Wheat, winter	Seed rots caused by *Fusarium*, *Pythium*, *Rhizoctonia*, *Penicillium* and *Aspergillus* spp. Seedling blight, root rot and damping-off caused by seed- and soil-borne *Fusarium* spp. or *Rhizoctonia* spp. Seedling blight, root rot and damping-off caused by soil-borne *Pythium* spp. Common bunt (*Tilletia tritici*)[2] Dwarf bunt (*Tilletia controversa*)[2] Loose smut (*Ustilago tritici*)	Common root rot (*Cochliobolus sativus*), Fusarium crown and foot rot (*Fusarium* spp.), take-all (*Gaeumannomyces graminis*)	325 mL

Note:
[1]Suppression means consistent control at a level that is not optimal but is still of commercial benefit.
[2]Controls both seed- and soil-borne common bunt.

Registered tank mixes

For protection from various insects on registered crops, Vibrance Quattro may be mixed with Cruiser 5FS Seed Treatment. This tank mix option is only valid for those crops common to the registered labels of Vibrance Quattro and Cruiser 5FS Seed Treatment Insecticide.

Application information

Vibrance Quattro is for use on-farm and can also be applied by commercial seed treaters (facilities and mobile treaters) using closed system transfer. Apply Vibrance Quattro utilizing seed treatment equipment that provides uniform seed coverage. Depending on seed size, Vibrance Quattro may be applied as a ready-to-apply application or water may be added to form slurry for more uniform coverage. Allow the seed to dry before bagging or storing into bulk containers. Depending on planting equipment, seed treated with Vibrance Quattro may not flow through planting equipment at the same rate as untreated seed. Recalibrate this equipment before planting treated seed.

How it works

Vibrance Quattro is a combination of the fungicides difenoconazole, metalaxyl-M and S-isomer, sedaxane and fludioxonil, which control or suppress certain seed- and/or soil-borne diseases of cereal crops as listed.

Restrictions

Treated seed must not be used for food, feed or oil processing. **Grazing:** Do not graze or feed livestock on treated areas for 45 days after planting. **Re-cropping:** Do not plant any crop other than cereals within 60 days to fields in which seeds treated with Vibrance Quattro were planted.

Environmental precautions

Toxic to aquatic organisms. Treated seed is toxic to birds and small wild mammals. Any spilled or exposed seeds must be incorporated into the soil or otherwise cleaned up from the soil surface.

Toxicity

Oral LD_{50} (rats) = > 5,050 mg/kg. Dermal LD_{50} (rats) = > 2,020 mg/kg.

Storage

Heated storage required.

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Vibrance Ultra Potato

Group 3, 7, 40

Formulation

Product	Company	Active ingredient	Formulation	Container size
Vibrance Ultra Potato (PCP# 33171)	Syngenta	Sedaxane: 77.2 g/L Difenoconazole: 77.2 g/L Mandipropamid: 154.3 g/L	Suspension	4.8 L + 0.8 L (dye)

Crops, diseases controlled and rates

Crops	Diseases controlled	Rate	Specific Comments
Potato	Seed-borne silver scurf *(Helminthosporium solani)*, fusarium dry rot (*Fusarium* spp.), seed-borne black scurf, stem and stolon canker (*Rhizoctonia solani*) Preventative control of seed-borne late blight (*Phytophthora infestans*) Suppression of pink rot (*Phytophthora erythroseptica*)	Vibrance Ultra Potato: 32 mL/100 kg of seed Dye*: 5.3 mL/100 kg of seed	For control of Colorado potato beetle, aphids and potato leafhopper, Vibrance Ultra Potato can be tank mixed with Actara 240SC insecticide. For control of Colorado potato beetle, Vibrance Ultra Potato can be tank mixed with Fortenza.

*Dye may or may not be added at the applicator's discretion.

Application information

How to apply: Apply using equipment that ensures uniform and thorough coverage of each seed piece. Cut pieces should be treated immediately after cutting. Treated seed pieces should be planted in soil above 7°C with adequate soil moisture required for planting. If cut seed needs to be stored or held for a few days, make sure that there is adequate cool air (15.5°C) movement through the pile of cut seed potatoes at relative humidity of 1 to 2. Cut and treated seed should not be piled above 1.8 metres in height.

How it works

Vibrance Ultra Potato is a systemic seed treatment. It is to be used as an integral part of a potato disease management strategy.

Restrictions

Do not use treated seed pieces for food or feed purposes. Do not apply more than 242 g mandipropamid/acre/year. Refer to the chart on the Revus label on the maximum number of foliar applications allowed following the use of Vibrance Ultra Potato Fungicide as a potato seed piece treatment.

Environmental precautions

Vibrance Ultra Potato is toxic to fish and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. Do not contaminate water by cleaning of equipment or disposal of equipment wash waters.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Ideal storage temperature is above freezing and below 30°C. If the product should freeze, bring the product back to room temperature and ensure the contents are mixed well prior to application. Store in a cool, dry place.

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Vitaflo 280/Vitaflo SP Fungicide/ Loveland Vitaflo

Fungicide Group 7, M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Vitaflo 280 (PCP# 11423)	UPL AgroSolutions Canada	Carbathiin: 15.59% Thiram: 13.25%	Liquid suspension	10 L, 200 L
Vitaflo SP Fungicide (PCP# 30381)	IPCO		Liquid suspension	10 L, 200 L, 1000 L
Loveland Vitaflo (PCP# 30380)	Loveland Canada Products		Liquid suspension	10 L, 200 L

Crops, diseases controlled and rates

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seed
Barley*	Covered and true loose smut, false loose smut, leaf stripe, seed rot and seedling blight caused by *Cochliobolus sativus*, *Fusarium* spp., *Pythium* spp., *Penicillium* spp., *Aspergillus* spp. and *Alternaria* spp.	Net blotch, Fusarium root rot, common root rot	230 - 330 mL
Wheat*	Loose smut, stinking smut (common bunt), seed-borne dwarf bunt, seed rot, seedling blight caused by *Cochliobolus sativus*, *Fusarium* spp., *Pythium* spp., *Aspergillus*, *Penicillium* and *Alternaria* spp., seed-borne Septoria	Root rot caused by *Cochliobolus sativus* and *Fusarium* spp.	230 - 330 mL
Oats	Covered smut, loose smut, seed rot and seedling blight caused by *Pythium* spp., *Penicillium* spp., *Aspergillus* spp., *Alternaria* spp. and *Fusarium* spp.	Root rot caused by *Cochliobolus sativus*	330 mL
Rye*	Damping-off, seedling blight and seed decay, stem smut, seed rot and seedling blight caused by *Fusarium* spp., *Cochliobolus sativus*, *Pythium* spp., *Penicillium* spp., *Aspergillus* spp. and *Alternaria* spp.	Root rot caused by *Fusarium* spp. and *Cochliobolus sativus*	230 - 330 mL
Triticale	Damping-off, seedling blight and seed decay		200 mL
Corn (field and sweet)	Damping-off, seed decay		280 mL
	Corn head smut***		560 - 750 mL
Common dry bean, snap dry bean	Early season seed rot, root rot and seedling blight caused by *Rhizoctonia solani*, seed-borne Anthracnose (*Colletotrichum lindemuthianum*)		260 mL
Lentil	Early season root rot, seed rot and seedling blight caused by *Botrytis cinerea*, *Fusarium*, *Pythium* spp. and *Rhizoctonia solani*		330 mL
**Pea ** **	Seed rot and seedling blight caused by *Mycosphaerella* (Ascochyta) *Fusarium* spp. and *Rhizoctonia solani* and *Pythium*		260 - 330 mL
Soybean	Seed rot and seedling blight caused by *Phomopsis* spp., *Rhizoctonia solani* and *Fusarium* spp.		260 mL

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Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seed
Flax (including edible oil flax)	Seed rot, root rot, seedling blight caused by *Rhizoctonia solani* and *Fusarium*		525 mL

*The 230 mL rate will give partial control of true loose smut in wheat and barley and stem smut in rye. Use 330 mL rate for the control of seed-borne Septoria on wheat and seed rot and seedling blight caused by *Fusarium* spp., *Cochliobolus sativus*, *Pythium* spp., *Penicillium* spp., *Aspergillus* spp, *Alternaria*; also suppression of root rot caused by *Cochliobolus sativus* on cereals (wheat, barley, oats and rye). Use 330 mL/100 kg of seed in fields known to be infested with dwarf bunt (wheat). **Use a 260 mL rate for control of *Rhizoctonia solani* and *Fusarium* spp. Use a 330 mL rate for control of *Mycosphaerella pinodes* (Ascochyta). ***Avoid planting corn under cold, wet conditions. Stress conditions during the first few weeks after planting may increase the incidence of head smut. Will not control soil-borne head smut.

Bushels treated

Container size	Barley*	Oats**	Wheat***	Lentil/pea***
10 L	202 (low rate); 139 (high rate)	197	161 (low rate); 111 (high rate	111
200 L drum	3,985 (low rate); 2,778 (high rate)	3,921	3,190 (low rate); 2,222 (high rate)	2,222

*Based on 48 lb./bu. **Based on oats at 34 lb./bu. ***Based on wheat at 60 lb./bu.

Application tips

Treat only clean seed of known quality that is free of debris and dust. Uniform coverage is critical to obtain optimum results; uneven seed coverage may not give the desired level of disease control. Consult manufacturer's label or recommendations with regard to the use of Vitaflo 280/Vitaflo SP/Loveland Vitaflo and rhizobia inoculants.

How it works

Thiram is a fungicide that controls diseases carried on the seed. Carbathiin is a systemic fungicide that penetrates the seed coat to control diseases inside the seed and seedling.

Restrictions

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting except for the following crops. Soybean – do not graze or feed livestock on forage and hay on treated areas. Dry bean – do not graze or feed on bean forage for 60 days after planting. Barley, oats, wheat – do not graze or feed on treated area for 6 weeks after planting. Do not use treated seed for food, feed or oil processing.

Environmental precautions

Do not contaminate ponds, lakes or streams.

Toxicity

Oral LD_{50} (rats) = 4,587 mg/kg. Dermal LD_{50} (rat) = > 2,000 mg/kg.

Storage

Do not store Vitaflo 280/Vitaflo SP/Loveland Vitaflo at temperatures above 35°C. These products will not freeze solid even in winter temperatures. If containers have been in storage for several months, some settling may occur and containers may require agitation.

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Zeltera Pulse

Fungicide Group 4, 7, 11, 22

Formulation

Product	Company	Active ingredient	Formulation	Container size
Intego Pulse (PCP # 34011)	Valent Canada Inc. distributed by Nufarm Agriculture	Ethaboxam: 24.9 g/L Mandestrobin: 33.2 g/L Metalaxyl: 13.3 g/L	Suspension concentrate	9.8 L
Zeltera Fungicide (PCP # 33820)	Valent Canada Inc. distributed by Nufarm Agriculture	Inpyrfluxam 381 g/L	Suspension concentrate	0.407 L

Crops, diseases controlled and rates

Crops	Diseases controlled	Diseases suppressed	Rate per 100 kg of seed
Lentil **Field Pea** **Chickpea** **Dry Bean** **Faba Bean**	Seed rots, seedling blight and seedling root rot caused by *Rhizoctonia solani* and *Fusarium* spp.; seed rot/pre-emergence damping-off caused by *Pythium* spp.; seed decay/pre-emergence damping-off, postemergence damping-off and seedling blight (*Rhizoctonia solani*)	Seed rots, seedling blight and seedling root rot caused by *Phomopsis longicolla*; suppression of root rot (*Rhizoctonia solani*); early season root rot caused by *Phytophthora sojae;* early season root rot caused by *Aphanomyces euteiches*	Intego Pulse: 300 mL Zeltera Fungicide: 13 mL
Soybean	Seed rots, seedling blight and seedling root rot caused by *Rhizoctonia solani* and *Fusarium* spp.; seed rot/pre-emergence damping-off caused by *Pythium* spp.; seed decay/pre-emergence damping-off, postemergence damping-off, and seedling blight (*Rhizoctonia solani*)Sudden Death Syndrome (*Fusarium virguliforme*)	Seed rots, seedling blight and seedling root rot caused by *Phomopsis longicolla;* early season root rot caused by *Phytophthora sojae;* early season root rot caused by *Aphanomyces euteiches*	Intego Pulse: 300 mL Zeltera Fungicide: 13 mL

Application tips

Pour the Zeltera Fungicide (0.407L) jug into Intego Pulse (9.8L) jug, shake well, then start treating a total rate of 313mls / 100kg seed. All labelled crops are registered for commercial application facilities and mobile treaters. For all labelled seeds, commercial seed treatment (facilities and mobile treaters with closed transfer, including closed mixing, loading, calibrating, and closed treatment equipment only) is permitted. All labelled crops for on-farm treatment (open transfer, including open mixing, loading, calibrating and open treatment equipment) is permitted.

How it works

Intego Pulse Fungicide contains the active ingredients ethaboxam, mandestrobin and metalaxyl. Ethaboxam is a Group 22 fungicide; it's mode of action is the inhibition of cell division. Mandestrobin belongs to the strobilurin or Quinone Outside Inhibitors (QoI) class Group 11 of fungicides. Metalaxyl is a member of the acylalanine chemical Group 4 and interrupts fungal nucleic acid synthesis. The active ingredient in Zeltera Fungicide, inpyrfluxam, belongs to Group 7, the succinate dehydrogenase inhibitor (SDHI) group of fungicides and acts by inhibiting succinate dehydrogenase, a key enzyme in the fungal respiration chain.

Restrictions

Do not use treated seed for food, feed, or oil processing. **Grazing:** Do not graze or feed forage and hay of legume vegetables (including pea vines) to livestock.

Environmental precautions

This product demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this product in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

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Toxicity

Intego Pulse: Oral LD50 (rats) = >5000 mg/kg. Dermal LD50 (rabbits) = >5000 mg/kg. **Zeltera Fungicide:** Oral LD50 (rats) = 550mg/kg. Dermal LD50 (rabbits) = >5000 mg/kg.

Storage

Store this product away from food or feed. Keep pesticide in its original container. Store in a cool place. Do not store in direct sunlight. Protect from freezing temperatures.

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Seed treatment selector chart

Cereals

Products	Allegiance/Belmont	Cruiser 5FS	Cruiser Vibrance Quattro	Dividend Extreme/Interest Forte	Insure Cereal FX4	INTEGO Solo	Lumivia CPL	METLOCK CT	Nipslt INSIDE 600 Insecticide	Nipslt SUITE Cerelas OF Seed Protectant	Cover 2	Rancona Trio	Raxil PRO	Raxil Pro Shield	Sharda Meteb 11SC	Stress Shield 600/Sombrero	Teraxxa F4	Vibrance Quattro	Vitaflo 280/Vitaflo SP/Loveland Vitaflo
Barley																			
Diseases																			
Common root rot			S	S	S			S			S	S	S	S	S		S	S	S
Seed rot	C		C	C	C	C		C			C	C	C	C	C		C	C	C
Seedling blight	C		C	C	C			C			C	C	C	C	C		C	C	C
Pythium damping off			C	C	C	C		C			C	C	C	C	C		C	C	
Fusarium crown and root rot			S	S	S						S	S	S	S			C	S	
Covered smut			C	C	C			C			C	C	C	C	C		C	C	C
False loose smut			C	C	C						C	C	C	C	C		C	C	C
True loose smut			C		C			C			C	C	C	C	C		C	C	C
Leaf stripe											C	C	C	C					C
Net blotch																			S
Seed-borne *Septoria*				C															
Take all			S	S														S	
Insects																			
Wireworms		S	S				S							S		S	C		
Cutworm, armyworm							C												
Wheat (including Durum)																			
Diseases																			
Common root rot			S	S	S			S			S	S	S	S	S		S	S	S
Seed rot	C		C	C	C	C		C		C	C	C	C	C	C		C	C	C
Seedling blight	C		C	C	C			C		C	C	C	C	C	C		C	C	C
Pythium damping off			C	C	C	C		C		C	C	C	C	C	C		C	C	
Fusarium crown and root rot			S	S	S						S	S	S	S	S		S	S	
Loose smut			C	C	C			C		C	C	C	C	C	C		C	C	C
Common bunt			C	C	C			C		C	C	C	C	C	C		C	C	C
Seed-borne *Septoria*															C				C
Take all			S															S	

C = Control, S = Suppression

(continued)

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Seed treatment selector chart

Cereals (*continued*)

Products	Allegiance/Belmont	Cruiser 5FS	Cruiser Vibrance Quattro	Dividend Extreme/Interest Forte	Insure Cereal FX4	INTEGO Solo	Lumivia CPL	METLOCK CT	NipsIt INSIDE 600 Insecticide	NipsIt SUITE OF Seed Protectant	Cover 2	Rancona Trio	Raxil PRO	Raxil Pro Shield	Sharda Meteb 11SC	Stress Shield 600/Sombrero	Teraxxa F4	Vibrance Quattro	Vitaflo 280/Vitaflo SP/Loveland Vitaflo
Insects																			
Wireworms		S	S				S		S	S				S		S	C		
Cutworm, armyworm							C												
Oats																			
Diseases																			
Common root rot			S	S	S			S			S	S	S	S	S		S	S	S
Seed rot	C		C	C	C	C		C			C	C	C	C	C		C	C	C
Seedling blight	C		C	C	C			C			C	C	C	C	C		C	C	C
Pythium damping off			C	C	C	C		C			C	C	C	C	C		C	C	
Fusarium crown and root rot					S						S	S	S	S	S		S		
Loose smut			C	C	C						C	C	C	C	C		C	C	C
Covered smut			C	C	C						C	C	C	C	C		C	C	C
Seed-borne septoria																			
Insects																			
Wireworm			S				S							S		S	C		
Cutworm, armyworm							C												
Rye																			
Diseases																			
Common root rot				S	S			S			S	S	S		S		S	S	S
Seed rot	C			C	C	C		C			C	C	C		C		C	C	C
Seedling blight	C			C	C			C			C	C	C		C		C	C	C
Pythium damping off				C	C	C		C			C	C	C		C		C	C	C
Fusarium crown and root rot				S	S						S	S	S		S		S	S	
Stem smut																			C
Common bunt				C	C										C		C	C	
Seed-borne *Septoria*															C				
Insects																			
Wireworm							S										C		
Cutworm, armyworm							C												

C = Control, S = Suppression

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Seed treatment selector chart

Oilseed crops

Products	Allegiance/Belmont 2.7 FS	Buteo	Fortenza	Helix Vibrance	Insure Pulse	INTEGO Solo	Lumiderm	Poncho 600 FS	Prosper EverGol	Rancona V RS	Stress Shield 600/Sombrero	Vercoras	Vitaflo 280/Vitaflo SP/Viterra Vitaflo
Canola													
Diseases													
Seed and seedling rot/blight	C			C					C	C		C	
Pythium seed rot/damping off				C		C			C			C	
Seed-borne blackleg				C					C	C		C	
Seed-borne *Alternaria*				C					C			C	
Insects													
Cutworms			C				C						
Flea beetle (early season control)		C	C	C			C	C	C		C	C	
Mustard													
Diseases													
Seed and seedling rot/blight				C					C				
Pythium seed rot/damping off				C		C			C				
Seed-borne blackleg				C					C				
Seed-borne *Alternaria*				C					C				
Insects													
Cutworms			C				C						
Flea beetle (early season control)			C	C			C		C				
Flax													
Diseases													
Seed rot/seedling blight					C	C							C
Sunflower													
Diseases													
Seed and seedling rot/blight	C												

C = Control, S = Suppression

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Seed treatment selector chart

Corn

Products	INTEGO Solo	Poncho	Sombrero	Vitaflo 280/Vitaflo SP/Viterra Vitaflo
Diseases				
Seed rot	C			C
Root rot				
Seedling blight				
Head smut				C
Pythium damping off	C			C
Insects				
Seed corn maggot		C		
Wireworm		C	C	
Black cutworm		C		
Corn flea beetle		C	C	
White grubs		C		

Forages

(Grasses and legumes – alfalfa, bird's-foot trefoil, clover, vetch)

Products	Allegiance / Belmont 2.7 FS
Diseases	
Seed and seedling rot/blight	C

Potato

Products	Cruiser Maxx Potato Extreme	Emesto Silver	Fortenza	Maxim D/Maxim MZ PSP	Mertect SC	Nipsit INSIDE 600	Potato ST 16/Tuberseal/Solan MZ	Senator PSPT	Vibrance Ultra Potato
Diseases									
Blackleg								C	
Black scurf	S	C		C					C
Common scab									
Fusarium dry rot (storage)	C	C		C	C			C	C
Fusarium seed piece decay							C	C	
Silver scurf	C	C		C				C	C
Verticillium wilt								C	
Insects									
Colorado potato beetle	C		C			C			
Potato flea beetle						C			
Potato leafhopper	C					C			
Aphids	C					C			
Wireworm						S			

C = Control, S = Suppression

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Seed treatment selector chart

Pulse crops

Products	Allegiance / Belmont 2.7 FS	Apron Advance	Apron Maxx RTA	Crown	Cruiser 5FS	Cruiser Maxx Vibrance Beans	INTEGO Solo	Insure Pulse	Lumivinia CPL	Rancona Trio	Stress Shield 600	Trilex EverGol	Trilex EverGol SHIELD	Vitaflo 280	Vibrance Maxx	Zeltera Pulse
Beans																
Diseases																
Seed and seedling rot/blight			C			C		C		C		C	C	C	C	C
Pythium seed rot/damping off			C			C	C	C				C	C		C	C
Seed-borne *anthracnose*			C												C	
Seed borne ascochyta								C					S			
Insects																
Root maggots																
Seed corn maggots						C										
Wireworms					S	S			S		S		S			
Potato leafhopper											S		S			
Cutworm, armyworm									C							
Pea																
Diseases																
Seed and seedling rot/blight	C		C					C				C	C	C	C	C
Pythium seed rot/damping off			C				C	C				C	C	C	C	C
Seed-borne *ascochyta*			C					C				S	S		C	
Insects																
Seed corn maggots																
Wireworms					S				S		S		S			
Pea leaf weevil					C						S		C			
Cutworm, armyworm									C							
Lentil and chickpea																
Diseases																
Seed and seedling rot/blight	C**	C	C	C				C		C		C	C	C*	C	C
Pythium seed rot/damping off	C*	C	C				C	C		C		C	C	C*	C	C
Botrytis seed rot and seedling blight		C	C	C								C*	C		C	
Seed-borne *ascochyta*		C	C	C				C		C		C	S		C	
Insects																
Wireworms					S				S		S		S			
Cutworm, armyworm									C							

C = Control, S = Suppression, * Lentil only, ** Chickpea ony.

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Active ingredient names for registered products can be found in the *Fungicide group classification by mode of action* table starting on page 674

Foliar fungicide index

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Product registrations (cont'd)

Chemical control of plant diseases in Alberta

Introduction

Plants, like other living organisms, are attacked by many diseases that are caused by fungi, bacteria, viruses, mycoplasmas and nematodes. The management of plant diseases is based on 4 general parameters:

- **Exclusion (quarantine):** A disease organism or diseased plant material is prevented from entering a country or disease-free area where the disease could become established.
- **Protection:** Includes management practices that can be used to protect plants from disease organisms. Examples include proper sanitation, chemical controls, adequate soil nutrient levels and good soil drainage.
- **Eradication:** Involves the use of crop rotations or the application of chemicals such as fungicides to control plant disease.
- **Plant breeding:** Results in the development of crop plants that have partial or complete resistance to a specific disease or range of infectious diseases.

Chemical control of disease

In Alberta, fungal diseases of some field crops may be subject to direct chemical control by fungicides. At present, foliar fungicides are registered for a number of significant foliar diseases including the following: Sclerotinia white mould, alternaria black spot and blackleg control in canola, cereal leaf diseases, foliar diseases of potato and pulse crops.

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Fungicide group classification by mode of action					
Chemical family	**Active ingredients**	**Found in**			
Group 1	**Inhibition of tublin formation.**				
Benzimidazole	thiophanate-methyl	Cercobin	Senator 50 SC	Senator PSPT	
Group 3	**Demethylation inhibitors**				
Triazoles (includes conazoles)	difenoconazole	Aprovia Top	Quadris Top	Stadium	
	propiconazole	Blanket AP Bumper 418 EC Miravis Ace Cerefit	Miravis Neo 300 SE Modo Pivot 418 EC	Princeton Fungicide Propi Super 25 EC Quilt	Sharda Fungtion SC Tilt 250E Topnotch Trivapro
	prothioconazole	Delaro 325 SC Holdfast Proline 480 SC	Proline Gold Prosaro PRO	Shalimar Soratel	StarPro Tilmor 240 EC
	tebuconazole	Advantage Tebuconazole 250 Folicur 250 EW FBN Tebuconazole 250	Custodia Hornet 432 F Orius 430 SC Palliser	Prosaro PRO Shalimar StarPro Tebbie	Tilmor 240 EC Toledo 250 EW Tornado Tornado Pro
	metconazole	Caramba	Quash SC	Twinline	
	flutriafol	Fullback 125 SC			
	mefentrifluconazole	Cevya	Sphaerex		
	tetraconazole	Roxar	Zolera FX		
Group 7	**Succinate dehydrogenase. Inhibits mitochondrial function**				
Pyridinyl-ethyl-benzamide	fluopyram	Luna Tranquility	Proline Gold	Prosaro PRO	Velum Prime
Carboxamides	boscalid	Lance AG	Lance WDG		
	fluxapyroxad	Sercadis	Priaxor		
	penthiopyrad	Fontelis			
	benzovindiflupyr	Aprovia Top	Elatus	Trivapro	
	pydiflumetofen	Miravis Ace	Miravis Neo 300 SE	Miravis Bold	Miravis Duo
Group 9					
Pyrimidine	pyrimethanil	Luna Tranquility	Scala		
Group 11	**Strobilurin type action and resistance. Inhibit mitochondrial respiration**				
Oxazole	famoxadone	Tanos 50 DF			
Strobilurin	azoxystrobin	Azoshy 250 SC Blanket AP Custodia Elatus	Miravis Neo 300 SE Quadris	Quadris Top Quasi Quilt Sharda Fungtion SC	Stadium Topnotch Trivapro
	fenamidone	Reason 500 SC			
	pyraclostrobin	Headline EC Lance AG	Preach Priaxor	Twinline Spade	Sphaerex Tornado Pro
	trifloxystrobin	Delaro 325 SC			
	picoxystrobin	Acapela	Cerefit		
	fluoxastrobin	Evito	Zolera FX		

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Fungicide group classification by mode of action					
Chemical family	**Active ingredients**	**Found in**			
Group 12					
Phenylpyroles	fludioxonil	Stadium			
Group 21					
Imidazole	cyazofamid	Ranman 400 SC			
Group 22					
	zoxamide	Gavel 75 DF			
Group 27					
Acetimide	cymoxanil	Curzate	Tanos 50 DF		
Group 29					
Pyridine	fluazinum	Allegro 500F			
Group 33					
Phosphonates	sodium, potassium, ammonium phosphites	Phostrol			
Group 40					
Amide fungicide	mandipropamid	Revus			
Morpholine	dimethomorph	Forum			
Mandelic acid amides	mandipropamid	Orondis Ultra			
Group 45					
QxI fungicide (Quinone x Inhibitor)	ametoctradin	Zampro			
Group M	**Multi-site activity**				
Chloronitrile	chlorothalonil	Bravo 500 Bravo ZN	Echo 720	Echo NP	Echo 90 WSP
Dithiocarbamates	mancozeb	Dithane DG 75 Gavel 75 DF	Manzate Pro-stick	Manzate Max	Penncozeb 75DF Raincoat/ Penncozeb 80WP
Inorganic	copper	Copper 53W	Copper Spray	Cueva	
	copper hydroxide	Coppercide WP	Coppercide XLR	Kocide 2000	Parasol WG
Phthalimide	sulfur	Kumulus DF			

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Acapela

Group 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Acapela (PCP# 30470)	Corteva Agriscience	Picoxystrobin: 250 g/L	Suspension	9.6 L, 115.2 L

Crops, diseases, controlled, rates and timing

Crops	Diseases	Rate per acre	Staging and specific comments
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	325 - 486 mL	Apply at 20 - 50% bloom prior to disease development. Under high disease pressure, make a second application, from a different fungicide group, 7 - 14 days later. Use the higher rate or shorter interval when disease pressure is high. A second application of this product can only be carried out if both applications are at the lowest rate and sprays are not sequential.
Dry legumes (chickpea, field pea, lentil, broad bean (includes faba bean), dry bean*)	Ascochyta blight (*Ascochyta lentis*) in lentil, Asian soybean rust (*Phakospora pachyrhizi*), Anthracnose (*Colleotrichum truncatum*) in lentil, Anthracnose (*Colletotrichum lindemuthianum*) in dry bean. Suppresssion of Mycosphaerella blight (*Mycosphaerella pinodes*) in field pea	240 - 350 mL	Begin applications prior to disease development and continue on a 7 - 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Suppression of Sclerotinia rot/white mould (*Sclerotinia sclerotiorum*)	350 mL	Make initial preventive application at beginning of bloom and follow with second application 7 - 10 days later at full bloom.
Flax	Pasmo (*Septoria linicola, Mycosphaerella linicola*)	240 - 355 mL	Begin application prior to disease development or 7 - 10 days after flowering begins (approximately 20% bloom) and continue on a 7 - 10 day interval. If disease pressure is high, use the higher rate and shorter interval.
Wheat	Leaf rust (*Puccinia recondita*), septoria leaf blotch (*Septoria tritici*), powdery mildew (*Erysiphe graminis*), tan spot (*Pyrenophora tritici-repentis*), stripe rust (*Puccinia striiformis*)	175 - 350 mL	Begin applications prior to disease development and continue on a 7 - 14 day interval. Use higher rate and shorter interval when disease pressure is high. Apply at Feekes 9 (flag leaf emerged). Do not apply after flowering starts (Feekes 10.5).
Barley	Septoria leaf blotch (*Septoria tritici*), powdery mildew, (*Erysiphe graminis*), stripe rust (*Puccinia striiformis*), net blotch (*Pyrenophora teres*), scald (*Rhynochosporium secalis*)		
Oat	Powdery mildew (*Erysiphe graminis),* stripe rust *(Puccinia striiformis),* crown rust *(Puccinia coronate f. sp. Avenae)*		
Rye, triticale	Leaf rust (*Puccinia recondita*), septoria leaf blotch (*Septoria tritici*), powdery mildew (*Erysiphe graminis*), stripe rust (*Puccinia striiformis*), scald (*Rhynochosporium secalis*)		
Corn (field corn, sweet corn, seed popcorn)	Northern corn leaf blight (*Setopsphaeria turcica, Exserohilum turcicum*)	215 - 325 mL	Begin applications prior to disease development and continue on a 7 - 14 day interval. Use higher rate and shorter interval when disease pressure is high.

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Crops	Diseases	Rate per acre	Staging and specific comments
Soybean	Asian soybean rust (*Phakospora pachyrhizi*), brown spot (*Septoria glycines*), frogeye leafspot (*Cercospora sojina*)	175 - 350 mL	Begin applications prior to disease development and continue on a 7 - 14 day interval. Use higher rate and shorter interval when disease pressure is high.
	Suppression of Sclerotinia stem rot/white mould (*Sclerotinia sclerotiorum*)	350 mL	Make initial preventive application at 100% bloom (1 flower blooming on all plants) and follow with second application 7 - 10 days later at full bloom.
Sunflower	Control: Alternaria leaf spot (*Alternaria helianthi*), stem canker (*Diaporthe helianthi*), black stem (*Leptoshphaeria lindquistii*).	240 - 350 mL	Begin applications prior to disease development and continue on a 7 - 10 day interval. Use a higher rate and shorter interval when disease pressure is high.
	Suppression: Sclerotinia head and stem rot (*Sclerotinia sclerotiorum*)	325 - 400 mL	
Alfalfa	Common leaf spot (*Pseudopeziza medicaginis*), stemphylium leaf spot (*Stemphylium botryosum*)	178 - 365 mL	Begin applications in the spring at green-up and once 1 - 3 new leaves have grown after each cutting. Initiate applications prior to disease development and no later than 14-days prior to cutting. Use higher rate and shorter interval when disease pressure is high.
Grass grown for seed	Yellow rust (*Puccinia striiformis* f. sp. *poae*)	178 - 365 mL	Begin applications prior to disease development and continue on a 7 - 14-day interval. Use higher rate and shorter interval when disease pressure is high.

*See label for registered bean and pea types.

Registered tank mixes
Travallas herbicide.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 45 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips
Use sufficient water to ensure thorough coverage of plants.

How it works
The active ingredient picoxystrobin is a broad spectrum strobilurin fungicide that has curative and locally systemic activity.

Restrictions
Maximum number of applications: Dry legumes, canola – make no more than 1 application before switching to a fungicide with a different mode of action; maximum season use rate 700 mL/acre. Cereal grains, soybean – make no more than 2 applications before switching to a fungicide with a different mode of action; maximum season use rate 1100 mL/acre. Corn, alfalfa, grass (for seed production) – make no more than 2 applications before switching to a fungicide with a different mode of action; maximum season use rate for field, seed or popcorn is mL/acre and sweet corn is 1,400 mL/acre.
Pre-harvest intervals: Canola – 28 days. Dry legumes and soybean – 14 days. Cereal grains – 45 days (7 days for forage, 14 days for hay). Corn – 7 days. Alfalfa for seed, forage or cut hay – 14 days. **Rainfall:** Rainfast 30 minutes after application. **Re-cropping:** Crops that are on the product label may be re-planted immediately after harvest. All other crops – 10 months following last application of picoxystrobin. **Re-entry interval:** 12 hours.

Environmental precautions
Observe prescribed buffer zones. Minimize off-target drift to reduce the effects on beneficial insects at the field boundary. Do not apply to areas prone to runoff, and delay spraying if heavy rainfall is forecast.

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Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store product in original container only, away from other pesticides, fertilizer, food or feed.

Allegro 500 F

Group 29

Formulation

Product	Company	Active ingredient	Formulation	Container size
Allegro 500 F (PCP# 27517)	Syngenta	Fluazinam: 40.0%	Liquid	10 L

Crops, diseases controlled, rates and staging

Crops	Diseases	Rate per acre	Staging and specific comments
Dry shelled bean[1]	White mould (*Sclerotinia sclerotiorum*)	0.24 - 0.4 L	Begin application when plants are at early to mid bloom (10 - 50% bloom) and make 1 more application 7 - 10 days later. Under conditions favourable for severe disease development, use the higher rate.
Potato	Late blight (*Phytophthora infestans*)	0.16 L	Begin applications when the plants are 15 - 20 cm tall or when conditions favour disease development. Repeat application at intervals of 7 - 10 days. Do not apply more than the maximum seasonal use rate of 1.6 L/acre during each growing season. Do not make more than 3 sequential applications per season before alternating to a fungicide with a different mode of action.
Potato	White mould (*Sclerotinia sclerotiorum*)	0.16 - 0.24 L	Begin applications at full bloom. Repeat applications at 7 - 10 day intervals. When white mould pressure is low to moderate, use 160 mL/acre. When conditions favour moderate to high white mould pressure, increase the rate to 240 mL/acre. Do not make more than 3 sequential applications.
Soybean	White mould (*Sclerotinia sclerotiorum*)	0.35 - 0.47 L	Begin application at the R1 (early bloom) to R2 (full bloom) stage. If necessary apply again 10 - 14 days later at early pod formation (R3). When disease pressure is low, use 0.36 L/acre rate. For conditions favouring moderate or high disease pressure use 0.47 L/acre. Do not apply after the R3 stage. Do not exceed 2 applications per year.

[1] Registered under User Requested Minor Use Label Expansion program.

Registered tank mixes
None registered.

Application information
How to apply: Ground and aerial application. Do not apply to soybean by air.
Water volume: Ground – 80 - 240 L/acre. Aerial – 20 L/acre minimum.

Application tips
Optimum disease control is achieved when timing of application is based on environmental factors that favour disease development. For potato, do not exceed 10 applications each growing season. For edible bean and soybean, do not exceed 2 applications each growing season.

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How it works
Fluazinam is a pyridinamine fungicide with protective (contact) activity.

Restrictions:
Pre-harvest intervals: Dry shelled bean – 30 days. Potato – 14 days. Soybean – do not apply after the R3 stage. **Re-cropping:** Areas treated with Allegro 500 F may be replanted with potato and dry shelled bean as soon as practical after the last application. Other root crops and leafy vegetables can be planted 30 days after the last application. All other crops can be planted 70 days after the last application. **Re-entry interval:** 24 hours.

Environmental precautions
Allegro is toxic to aquatic organisms, non-target terrestrial plants and wild mammals. Observe buffer zones specified on the product label.

Toxicity
Oral LD_{50} (rats) = >5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Heated storage required. Store in a dry storage area separate from feed, fertilizer or food.

Aprovia top

Group 3,7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Aprovia top (PCP# 31526)	Syngenta	Benzovindiflupyr: 78 g/L Difenoconazole: 117 g/L	Emulsifiable concentrate	3.78 L

Crops, diseases controlled, rates and staging

Crops	Diseases	Rate per acre	Staging and specific comments
Potato	Early blight (*Alternaria solani*) Suppression of brown spot (*Alternaria alternata*)	260 - 390 mL	Begin applications prior to disease development and continue throughout the season on a 7 - 14 day interval. Do not make more than 2 consecutive applications before switching to a fungicide with a different mode of action. If disease pressure is high, use the highest rate and shortest interval.

Registered tank mixes
Consult manufacturer for supported tank mixes.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 60 L/acre minimum is recommended for most crops. Aerial applications – 18 L/acre is recommended.

Application tips
For best results, sufficient water volume must be used to provide thorough coverage.

How it works
Aprovia Top fungicide combines difenocazole with solatenol, a new, longer lasting SDHI. Solatenol metabolizes slowly in the plant for long residual protection against target diseases. Both actives have translaminar activity, providing protection inside the plants and on both sides of the leaf.

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Restrictions

Potato: Do not make more than 2 applications by air (for a total of 0.78 L/acre/season) OR do not make more than 4 applications by ground (for a total of 1.6 L/acre/season). For potato, if applications are made by 1 method (ground or air), all consecutive applications must be made by the same method. It is not acceptable to mix aerial and ground applications in the same calendar year. **Rainfall:** Avoid application when heavy rain is forecast. **Pre-harvest interval:** Potato – 14 days. **Re-cropping:** Registered crops – zero days. Do not apply to cereals and corn for 60 days after application. Do not apply to any other crops intended for food or feed for 180 days after application.

Environmental precautions

Toxic to aquatic organisms, non-terrestrial plants and certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application sites. Benzovindiflupyr and difenoconazole are persistent and may carry over. It is recommended that any products containing these active ingredients not be used in areas treated with this product during the previous season.

Toxicity

Oral LD_{50} (rats) = 1,750 mg/kg. Dermal LD_{50} (rats) > 5,000 mg/kg.

Storage

Keep in original container. Store in a cool, dry, well ventilated area.

Bravo 500/Bravo ZN/Echo 720/ Echo 90 WSP/Echo NP

Group M5

Formulation

Product	Company	Active ingredient	Formulation	Container size
Bravo 500 (PCP# 15723)	Syngenta	Chlorothalonil: 500 g/L	Suspension	10 L, 450 L
Bravo ZN (PCP# 28900)	Syngenta	Chlorothalonil: 500 g/L	Suspension	10 L, 450 L
Echo 720 (PCP# 29355)	Sipcam Agro/UAP Canada	Chlorothalonil: 720 g/L	Suspension	450 L
Echo 90 WSP (PCP# 33519)	Sipcam Agro/UAP Canada	Chlorothalonil: 90%	Dry flowable	500 g
Echo NP (PCP# 33479)	Sipcam Agro/UAP Canada	Chlorothalonil: 720 g/L	Suspension	9.46 L

Crops, diseases controlled, rates and staging

For Bravo ZN, Bravo 500 and Echo 720.

Crops	Diseases controlled	Rate per acre			Staging and specific comments
		Bravo ZN	Bravo 500	Echo 720	
Corn (sweet)	Common rust (*Puccinia sorghi*)	1.29 L	1.29 L	0.89 L	Apply when symptoms are first noticed and repeat again 10 - 14 days later. Do not make more than 2 applications per season.
Chickpea	Ascochyta blight (*Ascochyta rabiei*)	1.2 - 1.6 L in first application and 0.8 - 1.2 L in subsequent applications	1.2 - 1.6 L in first application and 0.8 - 1.2 L in subsequent applications	0.85 - 1.13 Lfor first application and 0.56 - 0.85 L in subsequent application	Make first application at very early flowering and remaining application 10 days later. Do not make more than 2 applications per season.

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Crops	Diseases controlled	Rate per acre			Staging and specific comments
		Bravo ZN	Bravo 500	Echo 720	
Dry pea	Ascochyta blight (*Mycospharella pinodes*)	0.8 - 1.2 L	0.8 - 1.2 L	0.56 - 0.85 L	Apply beginning at early flowering. Make a second application at early pod set, approximately 10 days later. Always apply the higher rate when conditions are favourable for disease. Do not make more than 2 applications per season.
Lentil	Ascochyta blight (*Ascochyta lentis)* Anthracnose (*Colletotrichum truncatum*)	0.8 - 1.6 L	0.8 - 1.6 L	0.56 - 1.13 L	Apply beginning at pre-flowering prior to row closure. Make a second application 10 - 14 days later (during bloom period). Do not make more than 2 applications per season.
Potato	Late blight *(Phytophthora infestans*)	0.48 - 1.0 L	0.48 - 1.0 L	0.32 - 0.69 L	Begin applications when plants are 15 - 20 cm high, or when disease threatens. Repeat applications as necessary to maintain disease control. Under severe disease conditions, use the higher rates at 7-day intervals. Do not make more than 3 applications per season.
	Early blight, (*Alternaria solani*), botrytis vine rot (*Botrytis cinerea*)	0.64 - 1.0 L (early blight only)	0.64 - 1.0 L	0.45 L	
Wheat	Septoria leafspot, septoria glume blotch (*Septoria* sp.) and tan spot (*Pyrenophora tritici-repentis*)	0.6 - 1.0 L	0.6 - 1.0 L	0.4 - 0.73 L	Apply at flag leaf emergence and repeat 10 - 14 days later when head is visible. Do not make more than 2 applications per season.
	Fusarium head blight (scab) (suppression) (*Fusarium* sp.)	0.8 - 1.0 L	0.8 - 1.0 L	0.4 - 0.73 L	Apply at early flowering. For best results make application prior to conditions that favour infection (before flowering has started in the majority of tillers and wet weather is due). Do not make more than 2 applications per season.

*NR = Not registered.

Crops, diseases controlled, rates and staging

Echo 90 WSP and Echo NP.

Crops	Diseases controlled			Staging and specific comments
		Echo 90 WSP	Echo NP	
Corn (sweet)	Common rust (*Puccinia sorghi*)	0.73 kg	0.89 L	Apply when symptoms are first noticed and repeat again 10 - 14 days later. Do not make more than 2 applications per season.
Chickpea	Ascochyta blight (*Ascochyta rabiei*)	0.68 - 0.89 kg for first application and 0.44 - 0.69 kg in all other applications	0.85 - 1.13 L kg for first application and 0.56 - 0.85 L in all other applications	Make first application at very early flowering and remaining application 10 days later. Do not make more than 2 applications per season.
Dry pea	Ascochyta blight (*Mycospharella pinodes*)	0.44 - 0.89 kg	0.56 - 0.85 L	Apply beginning at early flowering. Make a second application at early pod set, approximately 10 days later. Always apply the higher rate when conditions are favourable for disease. Do not make more than 2 applications per season.

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Crops	Diseases controlled	Echo 90 WSP	Echo NP	Staging and specific comments
Lentil	Ascochyta blight (*Ascochyta lentis)* Anthracnose (*Colletotrichum truncatum*)	0.44 - 0.89 kg	0.56 - 1.13 L	Apply beginning at pre-flowering prior to row closure. Make a second application 10 - 14 days later (during bloom period). Do not make more than 2 applications per season.
Potato	Late blight *(Phytophthora infestans*)	0.28 - 0.52 kg	NR*	Begin applications when plants are 15 - 20 cm high, or when disease threatens. Repeat applications as necessary to maintain disease control. Under severe disease conditions, use the higher rates at 7-day intervals. Do not make more than 3 applications per season.
	Early blight, (*Alternaria solani*), botrytis vine rot (*Botrytis cinerea*)	0.36 - 0.52 kg	NR*	
Wheat	Septoria leafspot, septoria glume blotch (*Septoria* sp.) and tan spot (*Pyrenophora tritici-repentis*)	0.32 - 0.56 kg	0.4 - 0.73 L	Apply at flag leaf emergence and repeat 10 - 14 days later when head is visible. Do not make more than 2 applications per season.
	Fusarium head blight (scab) (suppression) (*Fusarium* sp.)	0.44 - 0.56 kg	0.4 - 0.73 L	Apply at early flowering. For best results make application prior to conditions that favour infection (before flowering has started in the majority of tillers and wet weather is due). Do not make more than 2 applications per season.

*NR = Not registered.

Registered tank mixes

For Bravo 500 only.

Product	Tank mix partner	Tank mix rate	Additional diseases controlled	Additional diseases suppressed	Specific comments
In potato only					
Bravo 500	Quadris Flowable	Bravo 500 at 0.8 L/acre PLUS Quadris Flowable at 0.202 L/acre	Early blight (*Alternaria solani*)		Apply on a 7 - 14 day interval, starting prior to disease development. Do not exceed more than 3 applications per season. Do not apply to potato plants later than 2 days before harvest.
Bravo 500 or Bravo ZN	Ridomil Gold 480EC or Ridomil Gold 480SL	Bravo 500/Bravo ZN at 0.8 L/acre PLUS Ridomil Gold at 0.08 L/ acre	Late blight (*Phytophthora infestans*), early blight (*Alternaria solani*), botrytis vine rot (*Botrytis cinerea*)	Pythium leak (*Phythium spp.*) and Pink rot (*Phytophthora erythorseptica*)	Apply at 14 day intervals, starting prior to disease development. Apply a registered contact fungicide at 7 day intervsls after the application of this tank mix. Do not exceed 3 applications per season. Pre-harvest interval: 14 days.

Application Information

How to apply: Ground and aerial application. **Water volume:** Ground – 90 - 650 L/acre for diluted sprays and 20 - 40 L/acre for concentrated sprays. Aerial – 20 - 40 L/acre.

Application tips

Thorough coverage is essential for disease control.

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How it works

Chlorothalonil is a multi-site preventive fungicide that begins to work on contact to protect plant foliage from disease infection.

Restrictions

Rainfall: Bravo 500, Bravo ZN, Echo 720 and Echo 90DF are rainfast once the spray solution has dried on the plant surface approximately 30 minutes. **Pre-harvest intervals** (days): Sweet corn (14), lentil (48), field pea (32), potato (1), wheat (30). Chickpeas: Bravo 500, Bravo ZN: 14 days; Echo 720, Echo 90 DF: 48 days. **Grazing:** Do not feed the hay from treated crop to livestock. Do not allow grazing of treated crop. **Re-entry interval:** 48 hours.

Environmental precautions

Bravo 500, Bravo ZN, Echo 720, Echo 90 WSP and Echo NP and Bravo ZN are toxic to fish, aquatic invertebrates and marine and/or estuarine organisms. Runoff from treated areas may be hazardous to aquatic organisms in neighbouring areas. Do not apply when weather conditions favour drift from areas being treated. Observe a buffer zone of 100 metres for aerial applications and 15 metres for ground applications to protect aquatic habitats.

Toxicity

Oral LD_{50} (rats) = 3260 mg/kg. Dermal LD_{50} (rats) = > 2020 mg/kg.

Storage

Heated storage not required. Store in a cool, dry place away from feed or food.

Caramba

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Caramba (PCP# 29767)	BASF Canada	Metconazole: 90 g/L	Emulsifiable concentrate	8.1 L, 128 L, 400 L

Crops, diseases controlled, rates and staging

Crops	Diseases	Rate per acre	Staging and specific comments
Wheat (including winter and durum)	Leaf rust, (*Puccinia recondita*) tan spot (*Pyrenphora tritici-repentis*), Septoria leaf spot (*Septoria sp.*), stripe rust (*Puccinia striiformis*), stem rust (*Puccinia graminis*), powdery mildew (*Erysiphe graminis*), Septoria glume blotch *(Stagonospora nodorum)*, suppression of spot blotch (*Cochliobolus sativius*)	202 - 283 mL	Prior to disease development or at onset of disease.
	Suppression of Fusarium head blight (*Fusarium graminearium*) and control of all leaf diseases controlled by lower application rates	405 mL	For suppression, apply Caramba when crop is at 20% flowering using sprayer nozzles configured to provide excellent coverage of the cereal head.
Barley	Net blotch, (*Pyrenophors teres*), scald (*Rhynchosporium secalis*), leaf rust (*Puccinia recondita*), stripe rust (*Puccinia striiformis*), powdery mildew (*Erysiphe graminis*), suppression of spot blotch (*Cochliobolus sativius*)	202 - 283 mL	Apply prior to disease development or at onset of disease.
	Suppression of Fusarium head blight (*Fusarium graminearium*) and control of all leaf diseases controlled by lower application rates.	405 mL	Apply between full head emergence and up to 3 days after full emergence of main stem heads.

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Crops	Diseases	Rate per acre	Staging and specific comments
Oats	Crown rust, (*Puccinia coronate*), Septoria leaf blotch (*Septoria avenae*)	202 - 283 mL	Apply prior to disease development or at onset of disease.
	Suppression of Fusarium head blight (*Fusarium graminearium*) and control of all leaf diseases controlled by lower application rates.	405 mL	For suppression, apply Caramba when crop is at 20% flowering using sprayer nozzles configured to provide excellent coverage of the cereal head.
Rye	Leaf rust (*Puccinia recondita*), stripe rust (*Puccinia striiformis*), powdery mildew (*Erysiphe graminis*)	202 - 283 mL	Apply prior to disease development or at onset of disease.
	Suppression of Fusarium head blight (*Fusarium graminearium*) and control of all leaf diseases controlled by lower application rates.	405 mL	For optimal suppression, apply Caramba within the time period when at least 75% of the heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower.
Triticale	Leaf rust (*Puccinia recondita*), tan spot (*Pyrenphora tritici-repentis*), Septoria leaf spot (*Septoria* sp.), stripe rust (*Puccinia striiformis*), stem rust (*Puccinia graminis*), powdery mildew (*Erysiphe graminis f. sp. tritici*), Septoria glume blotch *(Stagonospora nodorum)*, suppression of spot blotch (*Cochliobolus sativius*)	202 - 283 mL	Apply prior to disease development or at onset of disease.
Soybean	Asian soybean rust (*Phakospora pachyrhizi*)	283 mL	Initial application between early flowering and pod set or prior to disease development.
Sugar beet	Cercospora leaf spot (*Cercospora beticola*)	405 - 506 mL	Apply prior to disease development or at onset of disease.
Corn (field corn, popcorn, sweet corn, seed production corn)	Suppression of Fusarium and Gibberella ear rots (*Fusarium graminearum and Gibberella zeae*)	405 mL	For suppression of Fusarium and Gibberella ear rots, apply when the crop is between silking (GS 63) and silk browning (GS 67). Do not make more than 1 application per season.

Registered tank mixes

None registered.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre. Aerial – 20 L/acre.

Application tips

Leaf diseases: Thorough coverage is essential to protect target plants from disease development. **Fusarium head blight:** Timing of application and thorough head coverage is critical for optimum suppression of Fusarium head blight.

How it works

The active ingredient metconazole is a broad spectrum sterol biosynthesis inhibitor fungicide. Caramba is best utilized as a preventive application when environmental conditions are favourable for disease development.

Restrictions

Pre-harvest intervals: Wheat, barley, oats and rye – 30 days. Field corn, popcorn – 20 days Sweet corn – 7 days for mechanical harvesting, 18 days for hand harvesting. Soybean – 30 days. Sugar beet – 14 days. **Re-cropping:** A plant-back interval of 35 days is required for all crops not listed on the label. **Re-entry interval:** Corn – hand harvested corn has a re-entry interval (REI) of 18 days, hand set irrigation 3 days, and all other activities 12 hours. For all other registered crops, REI is 12 hours. **Rainfall:** Rainfast in 1 hour. Avoid application if heavy rain is forecast. **Grazing:** All crops can be grazed or fed to livestock.

Environmental precautions

Toxic to aquatic organisms, non-target terrestrial plants and small wild animals. Avoid runoff from treated areas into aquatic areas.

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Toxicity
Oral LD_{50} (female rats) = 2,102 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage
Store in original container. Protect from freezing.

Cercobin

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cercobin (PCP# 32093)	Nippon Soda Company distributed by Belchim Crop Protection Canada	Thiophanate-methyl: 500 g/L	Suspension concentrate	10 L

Crops, disease controlled, rates and staging

Crops	Disease	Rate per acre	Staging and specific comments
White beans	White mould *(Sclerotinia sclerotiorum)*	1 - 1.27 L/acre	Begin applications when conditions favouring disease development exist. If disease conditions persist, a second application may be applied. Minimum of 7 days between first and second application.

Application information
How to apply: Ground and aerial applications. **Water volume:** Ground – 405 L/acre. Aerial – 20 - 25 L/acre.

Application tips
Spray coverage is essential. Ensure thorough coverage of all parts of the plant.

How it works
Cercobin is a broad-spectrum fungicide with systemic activity that creates a barrier against white mould, protecting current and new growth from infection.

Restrictions
Pre-harvest interval: 21 days. **Grazing:** Do not feed or allow livestock to graze on treated crops.

Maximum seasonal rate: 2.5 L/acre.

Environmental precautions
Do not apply to any body of water. Avoid spray drift onto any body of water or non-target areas.

Toxicity
Acute oral LD_{50} (rats) = 1,000 mg/kg. Dermal LD_{50} (rats) > 2,000 mg/kg.

Storage
Store in original container in a cool, dry place. If stored for a prolonged period, shake well before using.

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Cerefit

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cerefit A (PCP# 33522)	Corteva Agriscience	Picoxystrobin: 250 g/L	Suspension concentrate	5.3 L
Cerefit B (PCP# 33348)		Propiconazole: 435 g/L	Emulsifiable concentrate	3.5 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Timing and specific comments
Wheat	Leaf rust (*Puccinia triticina*), stem rust (*Puccinia graminis*), powdery mildew (*Erysiphe graminis*), glume blotch (*Stagonospora nodorum*), leaf spot (*Septoria tritici*), stripe rust (*Puccinia striiformis*), tan spot (*Pyrenophora tritici-repentis*)	Cerefit A: 133 ml Cerefit B: 87 ml	Early application: apply at first sign of disease, usually at the beginning of stem elongation. Late application: apply at flag leaf. Do not apply after flowering.
Barley	Leaf Rust (*Puccinia triticina*), stem rust (*Puccinia graminis*), net blotch (*Pyrenophora teres*), powdery mildew (*Erysiphe graminis*) , scald (*Rhynchosporium secallis*), Septoria leaf spot (*Septoria tritici*), spot blotch (*Helminthosporium sativum*)		
Oats	Crown rust (*Puccinia coronata*), Septoria leaf blotch (*Septoria avenae*)		

Application information

How to apply: Ground and aerial application. **Water volume**: Ground – 40 - 80 L/acre. Aerial – 20 L/acre.

Application tips

Good coverage is essential for effective disease control. Cerefit should be applied as a preventative disease control measure.

How it works

Cerefit is a broad-spectrum fungicide using multiple modes of action to control or suppress several diseases in cereal crops. Both components are systemic fungicides that effectively move within and around the plant to protect it from disease.

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Restrictions

Maximum number of applications: Make no more than 2 applications per season. **Rainfall:** Rainfast within 60 minutes of application **Pre-harvest interval:** 45 days for wheat, barley and oats harvested for grain; 7 days for forage harvest and 14 days for greenfeed/hay. **Re-entry interval:** 12 hours. **Grazing:** Do not graze for 7 days after application. **Re-cropping:** Crops on the label may be replanted immediately after harvest. All other crops require10 months after the last application before planting.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Observe prescribed buffer zones. Minimize off-target drift. Do not apply to areas prone to runoff, and delay application if heavy rainfall is forecast.

Toxicity

Oral LD_{50} (rats): Cerefit A = >5000 mg/kg, Cerefit B = >2500 mg/kg. Dermal LD_{50} (rats): Cerefit A = >2000 mg/kg, Cerefit B = > 5000 mg/kg (rabbit).

Storage

Store in original container in a secured, dry storage area. Keep away from food and feed.

Cevya

Bio fungicide

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cevya (PCP # 33405)	BASF Canada	Mefentrifluconazole: 400 g/L	Suspension concentrate	4L

Crops, diseases controlled, rates and timing

Crops	Diseases suppressed/ controlled	Rate per acre	Staging and specific comments
Potato	Early blight (*Alternaria solani*)	75-100 mL	Begin applications prior to disease development. Apply an additional application at an interval of 7 - 14 days if disease persists or weather conditions are favourable. Do not apply more than 500 mL/acre of Cevya per season.
	Black dot (suppression) (*Colletotrichum coccodes*)		
	Brown spot (suppression) (*Alternaria alternata*)		

Application information

How to apply: Ground and aerial application. Water volume: Ground – 40 L/ac minimum. Aerial – 20 L/ac minimum.

Application tips

For resistance management, tank mix Cevya with another product with an alternate mode of action that is effective against the target pest.

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How it works
Cevya is a DMI or SBI (sterol biosynthesis inhibitor). It is a systemic product and is slow released from inner-leaf reservoirs for consistent protection.

Restrictions
Rainfall: Rainfast in 1 hour. **Grazing:** Treated crops may be grazed 7 days after application. **Pre-harvest interval:** 7 days. **Re-cropping:** All labelled crops may be planted immediately after application. Crops not on the label must not be planted for one month after application. **Re-entry interval:** 12 hours.

Environmental precautions
Toxic to aquatic organisms. Observe buffer zones specified on the label. **Runoff:** To reduce runoff from treated areas avoid application to areas with a moderate to steep slope, compacted soil or clay. It is recommended that Cevya not be used in areas treated with this product the previous season.

Toxicity
Oral LD_{50} (rats) = > 2000 mg/kg. Dermal LD_{50} (rats) = >5000 mg/kg

Storage
To prevent contamination, store away from good or feed.

Contans® WG biological fungicide

Bio fungicide

Formulation

Product	Company	Active ingredient	Formulation	Container size
Contans® WG (PCP# 29066)	Distributed by UAP Canada	Coniothyrium minitans 1 x 10^9 CFU/g	Water dispersible granules	20 kg

Crops, diseases controlled, rates and timing

Crops		Diseases suppressed/ controlled	Rate per acre	Timing and specific comments
Preplant In soils where canola, sunflower, dry edible bean, soybean and alfalfa will be planted (fields have a history of *Sclerotinia sclerotiorum*)	**All susceptible crops**	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	0.8 kg	Apply to soil prior to planting spring crop; at least 3 months before the typical onset of Sclerotinia stem rot. Product must be incorporated in the top 5 cm of the soil. The product should be incorporated within 1 week of application.
	All non-susceptible crops (e.g., cereal crops)		0.4 kg	Apply to soil prior to planting a non-susceptible crop. Incorporate product within 1 week of application. Product should be incorporated in the top 5 cm of the soil.

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Crops		Diseases suppressed/ controlled	Rate per acre	Timing and specific comments
Post-harvest On harvest residues (fields have a history of *Sclerotinia sclerotiorum*)	**Susceptible crop to be grown next spring**	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	0.6 - 0.8 kg	Apply product to crop residues after harvest. Incorporation should occur within 1 week of application. Product should be incorporated in the top 5 cm of the soil.
	Non-susceptible crop next spring		0.4 kg	
Maintenance All crops (annual maintenance treatment after initial application)			0.2 - 0.8 kg	After initial application of Contans, it is recommended to apply a maintenance treatment of 0.2 kg/acre to reduce inoculum levels in the field. Annual maintenance rate will depend on crop type and tillage practices.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** 40 L/acre minimum.

Application tips

Use sufficient water volume to ensure thorough coverage of the soil surface and/or crop residues. After incorporation, treated soils should not be disturbed (e.g., plowed) to avoid bringing untreated sclerotia from lower soil depths to the top soil layer. As part of an overall long term pest management strategy, it is recommended to use other management practices in addition to Contans such as in-crop foliar applications and following proper crop rotations.

Do not tank mix with fungicides or fertilizers. Do not tank mix with acids, alkalis or any product that attacks organic materials. Contact UAP Canada for more information on products that are compatable with Contans.

How it works

When applied correctly, the active ingredient in Contans WG will destroy Sclerotia in the soil before the Sclerotia are able to produce fruiting bodies. Regular use of Contans in successive years within a long term management strategy will improve disease control.

Restrictions

Pre-harvest intervals: Contans WG can be applied up to and including the day of harvest.

Environmental precautions

Do not apply this product directly to freshwater habitats. Do not contaminate irrigation or drinking water supplies by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (rats) > 2,500 mg/kg. Dermal LD_{50} (rats) = > 2,500 mg/kg.

Storage

Store in a dry area in original container. Maximum storage period of 1 year at temperatures of 4°C or up to 6 weeks at temperatures between 4 and 15°C. Please contact UAP Canada for more detailed storage information.

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Copper 53 W/Copper Spray/ Coppercide WP/Kocide 2000/ Parasol WG/Cueva/Coppercide XLR

Group M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Copper 53 W (PCP# 9934)	Loveland Products Canada	Basic copper sulphate: 53%	Wettable powder	10 kg
Copper Spray (PCP# 19146)	Loveland Products Canada	Copper oxychloride: 50%	Wettable powder	2 kg, 25 kg
Coppercide WP (PCP# 16047)	Loveland Products Canada	Copper hydroxide: 50%	Wettable powder	10 kg
Coppercide XLR (PCP# 33124)	Loveland Products Canada	Copper hydroxide: 50%	Wettable powder	
Kocide 2000 (PCP# 27348)	Mitsui	Copper hydroxide: 53%	Dry flowable	10 - 25 kg
Parasol WG (PCP# 29063)	Nufarm Agriculture Inc.	Copper hydroxide: 50%	Wettable granules	10 kg
Cueva (PCP# 31825)	Neudorff North America distributed by Belchim Crop Protection Canada	Copper octanoate: 1.8%	Liquid	1 - 1,000 L

Crops, diseases controlled and rates

Products	Registered crops	Diseases controlled	Rate per acre	Staging
Copper 53 W	Bean	Anthracnose (*Colletotrichum lindemuthianum*), downy mildew, bacterial leaf spot	2.2 kg	Apply as needed to keep the plants covered.
	Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	1.5 kg	Apply when plants are 12 - 18 cm high. Repeat at 7 - 10 day intervals.
Copper Spray	Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	1.62 kg	Apply when plants are 10 - 20 cm high. Repeat at 7 - 10 day intervals.
Coppercide WP	Bean	Bacterial blight Halo blight (*Pseudomonas phaseolicola*) Common blight (*Xanthomonas phaseoli*)	0.91 - 1.32 kg	Apply when plants are 15 cm tall. Apply on 7 - 14 day schedule based on local conditions.
Coppercide WP	Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	0.45 - 0.91 kg (Coppercide) + 0.7 - 0.91 kg (Mancozeb)	Apply at 7 - 10 day intervals starting when plants are 15 cm high until harvest.
			1.38 kg with dessicant (at vine kill) 1.38 kg (after vine kill)	Prior to harvest
Coppercide WP	Sugar beet	Cercospora leaf spot (*Cercospora beticola*)	0.91 - 1.8 kg	Apply when disease threatens and continue for 4 - 5 applications. Spray at 10 - 14 day intervals.

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Products	Registered crops	Diseases controlled	Rate per acre	Staging
Kocide 2000	Bean	Bacterial blight Halo blight (*Pseudomonas phaseolicola)* Common blight (*Xanthomonas phaseoli*)	0.65 - 0.93 kg	Apply when plants are 15 cm tall.
	Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	0.32 - 0.64 kg 0.96 kg (vine kill)	Apply when plants are 15 cm high. Repeat at 7 - 10 day intervals.
Parasol WG	Bean	Bacterial blight Halo blight (*Pseudomonas phaseolicola*) Common blight (*Xanthomonas phaseoli*)	0.91 - 1.32 kg	Apply when plants are 15 cm tall. Repeat at 7 - 14 days intervals.
	Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	0.45 - 1.01 kg 1.38 kg (vine kill)	Apply when plants are 12 - 18 cm high. Repeat at 7 - 10 day intervals.
	Sugar beet	Cercospora leaf spot (*Cercospora beticola*)	0.91 - 1.82 kg	Apply when disease threatens and continue for 4 - 5 applications.
Cueva	Potato	Early blight *(Alternaria soliani*), late blight (*Phytophtora infestans*), Septoria leaf spot (*Septoria apiicola*)	0.5% - 2.0% solution	For best control, start treatments 2 weeks before disease normally appears OR begin treatments when disease first appears. Repeat every 5 - 10 days as required. If disease pressure is high, apply at the higher rate.
	Sugar beet	Cercospora leaf spot (*Cercospora beticola*)	0.5% - 2.0% solution	
	Dry bean, field pea, soybean	Ascochyta blight (*Ascochyta pisi*), Halo blight (*Pseudomonas syringae pv. phaseolicola*), common blight (*Xanthomonas campestris pv phaseoli*), brown spot (*Pseudomonas syringae pv. syringae*), powdery mildew (*Erysiphe* spp.), rust (*Uromyces appendiculatus*)	0.5% - 2.0% solution	
Coppercide XLR	Bean	Suppression of bacterial halo blight and bacterial common blight	0.54 - 0.92 kg/acre	Apply at 7 - 14 day intervals. Do not apply within 2 days of harvest.
	Potato	Suppression of early blight and late blight	0.31 - 0.64 kg/acre + 0.7 - 0.9 kg/acre of Mancozeb	Apply at 7 - 10 day intervals starting when plants are 15 cm to harvest. Do not apply within 2 days of harvest.
	Sugar beet	Suppression of Cercospora leaf spot	0.64 - 1.2 kg/acre	Spray when disease threatens and continue for 4 to 5 applications. Do not apply within 2 days of harvest.

Registered tank mixes

Kocide 2000: Manzate DF or Manzate Pro-Stick in potato crops. Coppercide WP: Mancozeb.
Parasol WG: Mancozeb (80%) 0.7 - 0.9 kg/acre for early and late blight control in potato.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** Copper 53 W/Copper Spray – 404 L/acre. Cueva – 190 - 380 L/acre. Kocide 2000, Parasol WG – use sufficient water to obtain adequate spray coverage.

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Application tips
In potato, Kocide 2000,Parasol WG and Coppercide WP may be applied with a desiccant at vine kill or alone after vine kill, prior to harvest to reduce the risk of late blight infection.

How it works
Copper hydroxide, copper oxychloride, copper sulphate and copper octanoate are contact fungicides.

Restrictions
Pre-harvest intervals: Do not apply to crops within 1 day of harvest. **Re-entry interval:** 48 hours.

Environmental precautions
Copper-based fungicides are toxic to fish and other aquatic organisms. Keep out of any body of water; fish may be killed.

Toxicity
Copper hydroxide: Oral LD_{50} (rats) = 943 - 2,000 mg/kg. Copper oxychloride: Oral LD_{50} (rats) = 1,600 mg/kg. Copper sulphate: Oral LD_{50} (rats) = 1,000 mg/kg. Copper octanoate: Oral LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store in a cool, dry, ventilated place, away from feeds and foods.

Cotegra

Group 3, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Cotegra (PCP# 32530)	BASF Canada	Boscalid: 250 g/L Prothioconazole: 150 g/L	Suspension concentrate	9.8 L

Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Canola (including rapeseed and oriental mustard)	Control of Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	240 - 280 mL	Apply at 20 - 50% flowering. A second application can be made 7 - 14 days later up to full bloom if disease persists, or weather conditions are favourable for disease development. Use the high rate when risk for disease development is high (i.e., narrow host rotation with disease history and high potential for inoculum).
Chickpea	Suppression of white mould (*Sclerotinia sclerotiorum*) Control of Ascochyta blight (*Ascochyta rabiei*)	280 mL	Apply at the beginning of flowering or at the onset of disease symptoms. Apply a second application 7 - 14 days later if disease persists or weather conditions are conducive for disease development.
Dried bean, faba bean	Suppression of white mould (*Sclerotinia sclerotiorum*), ascochyta blight (*Ascochyta* spp.)	400 mL	Apply at 20 - 50% flowering. Apply a second application 7 - 14 days later if disease persists or weather conditions are conducive for disease development.

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Crops	Diseases controlled	Rate per acre	Staging and specific comments
Soybean	Control of frog eye leaf spot (*Cercospora sojina*), Asian soybean rust (*Phakopsora pachyrhizi*), pod and stem blight (*Diaporthe phaseolorum*) Suppression of white mould (*Sclerotinia sclerotiorum*), suppression of septoria brown spot (*Septoria glycines*)	280 mL	Apply at the onset of disease symptoms. Apply a second application 7 - 14 days later if disease persists or weather conditions are conducive for disease development.
Lentil	Control of anthracnose (*Colletrotrichum lentis*) including biotypes resistant to Group 11 fungicides at high rate; suppression at low rate. Suppression of white mould *(Sclerotinia sclerotiorum*) at high rate.	240-280 mL	Apply at the beginning of flowering or at the onset of disease symptoms. Apply a second application 7 - 14 days later if disease persists or weather conditions are conducive for disease development.
Field pea	Suppression of Mycosphaerella blight (*Mycosphaerella pinodes*), Ascochyta blight (*Ascochyta pinodes*), and white mould (*Sclerotinia sclerotiorum*).	280 mL	

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips

Good coverage is essential for effective disease control, and higher water volumes tend to increase performance with dense canopies. Cotegra works best when applied in a preventive manner prior to the development of disease.

How it works

The active ingredient boscalid is a SDHI fungicide with systemic activity and best applied as a preventive fungicide. The active ingredient prothioconazole is a triazole fungicide with broad spectrum systemic activity.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. Rainfast in 1 hour. **Grazing:** All crops can be grazed or fed to livestock 7 days of application. **Pre-harvest intervals:** Chickpea, dry bean, faba bean, lentil, field pea and soybean – 21 days. Canola and oriental mustard – 36 days. **Re-cropping:** Labelled crops may be planted 14 days after last application. All crops not on label require 30 days after last application.

Environmental precautions

Observe buffer zones specified on the label. Do not apply on any body of water and prevent cleaning of equipment near water bodies. Reduce risk of runoff from treated areas into aquatic habitats by avoiding application to areas with a moderate to steep slope or compacted soil. Toxic to aquatic organisms.

Toxicity

Oral LD_{50} (rats) = > 50 - < 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in original container. Protect from freezing.

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Curzate

Group 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Curzate (PCP# 26284)	Corteva Agriscience	Cymoxanil: 60%	Dry flowable	1.8 kg

Crops, diseases controlled and rates

Crops	Diseases controlled	Rate	Staging and specific comments
Potato	Late blight (*Phytophthora infestans*)	Curzate: 0.09 kg/acre **Plus** Manzate DF 0.55 - 0.65 kg/acre or Dithane Rainshield	Initial applications should start when local conditions indicate that late blight is imminent. Make additional applications at 5 - 7 day intervals, however, at least 20 days must pass between a second and third application. Apply no more than 4 applications per crop. Use higher rate of Manzate DF under conditions of high disease pressure. Do not mix and apply more than 38 kg of Curzate Fungicide per day for ground application (enough to treat 420 acres). Do not mix and apply more than 50 kg of Curzate Fungicide per day for aerial application (enough to treat 543 acres).

Registered tank mixes

Manzate 200 DF. Corteva Agriscience supports the use of Dithane Rainshield as a tank mix.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 80 - 400 L/acre. Aerial – 20 L/acre minimum.

Application tips

Caution: Use Curzate only in a tank mix with Manzate DF. Do not use Curzate alone.
Do not apply to a potato crop that is suffering from stress as a result of drought, water saturation, low temperatures, insect infestations, nutrient deficiency or any other factors contributing to a reduction in crop growth.

How it works

The active ingredient cymoxanil in Curzate is a highly active, locally systemic fungicide recommended for the control of late blight on potato. It works as a preventive, curative and inhibitive (against sporulation) product. Curzate offers a unique feature for late blight management called "kick-back" activity. It controls infections that have already attacked the crop but are not yet visible.

Restrictions

Rainfall: Curzate is rainfast within 2 hours after application. **Pre-harvest intervals:** Do not harvest within 8 days of treatment. **Re-entry interval:** 24 hours.

Environmental precautions

Overspray or drift to sensitive habitats must be avoided. For tank mixes, consult the labels of the tank mix partners and observe the largest (most) restrictive buffer zone. Do not contaminate sensitive habitats when cleaning and rinsing spray equipment and containers. Do not mix, load or apply within 15 metres of all wells. **Runoff:** Do not apply product during periods of intense rainfall or to soils saturated with water. Do not apply directly to standing or running water. Do not apply in areas where surface water from treatment site can run off to adjacent cropland, either planted or to be planted, or into streams, irrigation waters or wells. Do not contaminate any body of water, including irrigation water.

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Toxicity
Oral LD_{50} (rats) = 433 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store product in original container in a secure, dry area away from food or feed.

Custodia

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Custodia (PCP# 33672)	ADAMA Canada	Tebuconazole: 200 g/L Azoxystrobin: 120 g/L	Suspension	10.08 L

Crops, diseases controlled and rates

Crops	Diseases controlled	Rate	Staging and specific comments
Wheat (spring, winter, durum)	Leaf rust (*Puccinia triticina*), stem rust (*Puccinia graminis*), stripe rust (*Puccinia striiformis*), Septoria leaf blotch (*Septoria tritici*), tan spot (*Pyrenophora repentis*)	0.19 – 0.25 L	Apply at the first sign or very early stage of disease, up to the beginning of heading. Use the higher rate when weather conditions are conducive to heavy disease development.
Barley	Net blotch (*Pyrenophora teres*), spot blotch (*Cochiobolus sativus*), leaf rust (*Puccinia hordei*), stem rust (*Puccinia graminis*), stripe rust (Puccinia striiformis), Septoria leaf blotch (*Septoria tritici*), tan spot (*Pyrenophora repentis*)		

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre. Aerial – 20 L/acre minimum.

Application tips
Apply at flag leaf for optimal leaf disease control. Use sufficient water to ensure thorough coverage of plants. Do not use less than recommended water volumes. For resistance management, CUSTODIA® contains Group 3 and 11 fungicides. When possible, rotate the use of CUSTODIA® or other Group 3 and 11 fungicides with different groups that control the same pathogens.

How it works
CUSTODIA® is a broad-spectrum, preventative fungicide with systemic and curative properties.

Restrictions
Rainfall: Avoid application when heavy rainfall is forecast. **Grazing:** Do not allow livestock to graze or feed green forage to livestock prior to 6 days after treatment. Straw cut after harvest may be fed or used for bedding.
Pre-harvest intervals: Mature grains – 45 days. Forage and hay – 36 days. **Re-cropping:** Crops listed on the Custodia label may be replanted immediately following harvest. For crops not listed on the label, do not plant back within 120 days of the last application. **Re-entry interval:** 12 hours.

Environmental precautions
Tebuconazole and azoxystrobin are persistent and will carryover. It is recommended that any products containing tebuconazole and/or azoxystrobin not be used in areas treated with this product during the previous season.

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Toxicity
Oral LD_{50} (rats) = 300 mg/kg. Dermal LD_{50} (rabbit) = > 2000 mg/kg.

Storage
Store at temperatures above 5°C. Store in cool, dry, locked, well-ventilated area without floor drain.

Delaro® 325 SC Fungicide

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Delaro® 325 SC (PCP# 31533)	Bayer	Prothioconazole: 175 g/L Trifloxystrobin: 150 g/L	Suspension concentrate	7.1 L, 113.6 L

Crops, diseases controlled and rates

Crops	Diseases	Rate per acre	Staging and specific comments
Field pea	Mycosphaerella blight (*Mycosphaerella pinodes*), Ascochyta blight (*Ascochyta pisi*), white mould (*Sclerotinia sclerotiorum*), grey mould (*Botrytis cinerea*)	356 mL	Begin fungicide applications at first sign of disease. When disease pressure is high or when agronomic or weather conditions are conducive to disease development, make a second application 10 to 14 days later. Use shorter intervals for best protection.
Chickpea	Ascochyta blight (*Ascochyta rabiei*), white mould (*Sclerotinia sclerotiorum*), grey mould, (*Botrytis cinerea*)	356 mL	Begin fungicide applications at first sign of disease. When disease pressure is high or when agronomic or weather conditions are conducive to disease development, make a second application 10 to 14 days later. Use shorter intervals for best protection.
Lentil	Ascochyta blight (*Ascochyta lentis*), white mould (*Sclerotinia sclerotiorum*), grey mould (*Botrytis cinerea*), anthracnose (*Colletotrichum truncatum*)	356 mL	Begin fungicide applications at first sign of disease. When disease pressure is high or when agronomic or weather conditions are conducive to disease development, make a second application 10 to 14 days later. Use shorter intervals for best protection.
Soy bean	Asian soybean rust (*Phakopsora pachyrhizi*), frogeye leaf spot (*Cercospora sojina*), brown spot (*Septoria glycines*), charcoal rot (suppression) (*Macrophomina phaseolina*), phomopsis stem blight (*Phomopsis-longicolla*), white mould (suppression) (*Sclerotinia sclerotiorum*)	228 mL	Begin fungicide applications preventively or at the first signs of disease from early flowering (R1) to complete pod fill (R5). When disease pressure is high or when agronomic or weather conditions are conducive to disease development, make a second application 10 to 14 days later. The use of a non-ionic surfactant at 0.125%v/v may be used.
Corn (sweet corn, field corn, popcorn, including corn grown for seed)	Common rust *(Puccinia sorghi)*, southern corn rust *(Puccinia polysora)*, eye spot *(Aureobasidium zeae* (alt. *Kabatiella*)), northern corn leaf blight *(Setosphaeria turica,* anamorph: *Exserohilum turcicum)*, grey leaf spot *(Cercospora zeaemaydis)*	230 mL	Apply when disease first appears and continue on a 7 - 14 day interval if favourable conditions for disease development persist.

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Crops	Diseases	Rate per acre	Staging and specific comments
Wheat (spring, durum)	Leaf rust (*Puccinia triticina*), powdery mildew (*Erysiphe graminis*), Septoria leaf blotch (*Septoria tritici*), stem rust (*Puccinia graminis*), tan spot (*Pyrenophora tritici-repentis*)	230 mL	Apply preventively or at the very early part of disease development. Apply from the 4-leaf to flag leaf stage but prior to head emergence.
Barley	Net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*), leaf rust (*Puccinia hordei*), stem rust (*Puccinia graminis*), stripe rust (*Puccinia striiformis*), powdery mildew (*Erysiphe graminis*)	230 mL	Apply preventively or at the very early part of disease development. Apply from the 4-leaf to flag leaf stage but prior to head emergence.
Oats	Crown rust (*Puccinia coronata*), leaf blotch (*Septoria avenae*), stem rust (*Puccinia graminis*)		
Triticale	Stem rust (*Puccinia graminis*), scald (*Rhynchosporium secalis*)		
Wheat (winter)	Septoria leaf blotch (*Septoria tritici*), powdery mildew (*Erysiphe graminis*), tan spot (*Pyrenophora tritici-repentis*), leaf rust (*Puccinia triticina*), stem rust (*Puccinia graminis*), stripe rust (*Puccinia striiformis*)	177 - 230 mL	
Faba bean	Grey mould and chocolate spot (*Botrytis cinerea*), white mould (*Sclerotinia sclerotiorum*)	356 mL	Begin applications at the beginning of flowering or at the first sign of disease.
Alfalfa* (seed production only)	Blosson blight (*Sclerotinia sclerotiorum*, *Botrytis cinerea*)	356 mL	Begin applications at the beginning of flowering or at the first sign of disease. When disease pressure is high or weather conditions are conducive to disease development make a second application 10 - 14 days later.

* Registered under User Requested Minor Use Label Expansion program.

Registered tank mixes

Bayer supports the following mixes that are not on the Delaro label. Apply mixes according to the most restrictive use limitations for either product. Insecticides: Decis, Matador.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips

Use sufficient water volume and spray pressure to provide thorough, uniform coverage for optimum disease control. Do not apply more than 2 applications of Delaro 325 SC fungicide per season. Alternate with a fungicide with a different mode of action registered for the same use(s) after each application. If an alternative fungicide is not registered for the use, only 1 application should be applied.

How it works

Delaro 325 SC is a broad spectrum systemic fungicide for the control and suppression of certain crop diseases.

Restrictions

Pre-harvest intervals: Corn: 14 days. Do not apply within 30 days of harvest for dry pea, chickpea, alfalfa and lentil. Do not apply within 20 days of harvest for soybean. **Maximum number of applications**: Do not exceed 2 applications per season in field pea, chickpea, lentil, soybean and corn. **Grazing:** Do not apply within 7 days of cutting or swathing of dry pea, chickpea or lentil. Alfalfa: Do not graze treated fields or feed seed screenings to livestock. **Re-entry interval:** 24 hours. **Re-cropping:** Treated areas may be replanted with any crop specified on this label, including corn, cereals and sugar beet, as soon as practical after the last application. For crops not listed on this label, do not plant back within 30 days of last application.

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Environmental precautions
Delaro 325 SC is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified in the label. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment washwaters.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage
Store in original container. Do not store at temperatures below freezing. If stored for 1 year or longer, shake well before using.

Diplomat 5SC

Group 19

Formulation

Product	Company	Active ingredient	Formulation	Container size
Diplomat 5SC (PCP# 32918)	Belchim Crop Protection Canada	Polyoxin D Zinc Salt: 5.0%	Suspension concentrate	5 L

Crops, disease controlled, rates and staging

Crops	Diseases	Rate per acre	Staging and specific comments
Potato	Early blight *(Alternaria solani)* - suppression	218 - 375 mL (12 - 20 g active ingredient/acre)	When conditions are favourable for disease development, start preventive applications. Continue on a 7 - 14 day interval as needed to maintain disease suppression.

Application information
How to apply: Ground applications only. Do not apply by air. **Water volume:** Spray with sufficient water to ensure thorough coverage of foliage.

How it works
Diplomat inhibits the synthesis of chitin in fungal cell walls.

Restrictions
Pre-harvest intervals: Zero days. **Maximum seasonal rate:** Do not apply more than 60 grams active ingredient/acre/season. **Re-entry interval:** Do no enter treated areas until spray have dried.

Environmental precautions
To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast.

Toxicity
Acute oral LD_{50} (rats) > 5,000 mg/kg. Dermal LD_{50} (rats) > 5,050 mg/kg.

Storage
Store product in original container in a dry location.

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Dithane Rainshield™/Manzate Pro-stick/ Penncozeb 75DF Raincoat/Penncozeb 80WP/ Manzate Max

Group M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Dithane Rainshield™ (PCP# 29221)	Corteva Agriscience	Mancozeb: 75%	Dry flowable	20 kg
Manzate Pro-stick (PCP# 28217)	UPL AgroSolutions Canada	Mancozeb: 75%	Dry Flowable	
Penncozeb 75DF Raincoat (PCP# 30241)		Mancozeb: 75%	Dry Flowable	
Penncozeb 80 WP (PCP# 25396)		Mancozeb: 80%	Wettable Powder	
Manzate Max (PCP# 33299)		Mancozeb: 480 g/L	Flowable	10 L, 450 L

Note: Mancozeb has been re-evaluated by PMRA and the following label changes to field crops must be followed starting November 19, 2022. Mancozeb uses on lentils, alfalfa, and wheat have been cancelled as well as mancozeb use as a potato seed piece treatment.

Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate	Staging and specific comments
Alfalfa (for seed) (Dithane Rainshield™, Manzate Pro-stick, Penncozeb 75DF Raincoat only)	Leaf spot and stem spot disease (*Pseudopeziza medicaginis*)	0.59 kg/acre	Apply prior to 50% bloom. Maximum of 3 applications per year.
Alfalfa (for seed) (Manzate Max only)		0.923 L/acre	Apply prior to 50% bloom. Use a maximum of 3 applications per year. Repeat 7 - 10 days after the first application and 10 days after the second application.
Lentil (Dithane Rainshield™, Manzate Pro-stick, Penncozeb 75DF Raincoat only)	Anthracnose (*Colletotrichum truncatum*), Ascochyta blight (*Ascochyta* sp.)	0.91 kg/acre	Apply the first application before flower when bud formation is evident. A second application should be applied 10 - 12 days after the initial application, but before rows close in to form a dense canopy. If conditions for disease persist, a third application may be applied 10 - 14 days later. Do not make more than 3 applications during the growing season.
Lentil (Manzate Max only)		1.42 L/acre	
Potato (All mancozeb-based products)	Early blight (*Alternaria solani)*, late blight (*Phytophthora infestans*)	0.44 - 0.91 kg/ acre	Apply when plants are 10 - 15 cm tall. Repeat at 7 - 10 day intervals.
Potato (Manzate Max only)		0.696 - 1.42 L/ acre	
Potato – seed piece treatment (Pencozeb 80 WP only)		100 g per 100 kg of seed	Apply to thoroughly coat the surface of whole or cut seed pieces. If treated whole seed is cut, make a second application to protect the cut surface.
Sugar beet (Dithane Rainshield™, Manzate Pro-Stick, Penncozeb 75 DF Raincoat, Penncozeb 80 WP only)	Cercospora leaf spot (*Cercospora beticola*)	0.91 kg/acre	Apply when disease first threatens and repeat at 7 - 10 day intervals.
Sugar beet (Manzate Max only)		1.42 L/acre	

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Crops	Diseases controlled	Rate	Staging and specific comments
Wheat (All mancozeb-based products)	Leaf rust (*Puccinia recondita*), Septoria leaf blotch (*Septoria* sp.), tan spot (*Pyrenophora tritici-repentis*)	Early spray: 0.45 kg/acre Late spray: 0.91 kg/acre	An early application can be made when the crop is in the 3 leaf to tillering stage and/or a late application can be made when the head is fully emerged but prior to flowering. Do not make more than 2 applications during the growing season.
Wheat (Manzate Max only)		Early spray: 0.696 L/acre Late spray: 1.42 L/acre	

Registered tank mixes

Tank mix partner	Tank mix rate	Diseases controlled	Specific comments
Potato			
Kocide 2000	Manzate Pro-stick at 0.71 - 0.91 kg/acre PLUS Kocide 2000 at 0.32 - 0.64 kg/acre. Manzate Max + Kocide 2000: Manzate Max at 1.1 - 1.42 L/acre PLUS Kocide 2000 at 0.32 - 0.64 kg/acre.	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans)*	Apply at 7 - 10 days intervals starting when plants are 15 cm high until harvest.
Curzate	Manzate Pro-stick DF at 0.54 - 0.65 kg/acre PLUS Curzate at 0.09 kg/acre. Manzate Max + Curzate: Manzate Max at 0.854 - 1 L/acre PLUS Curzate at 0.09 kg/acre.	Late blight (*Phytophthora infestans)*	Initial applications should start when local conditions indicate that late blight is imminent. Apply no more than 7 applications per crop.

Note: Corteva Agriscience supports the use of Dithane Rainshield as a tank mix with Curzate.

Application information

How to apply: Ground and aerial application. Do not apply to sugar beet by air. **Water volume:** Utilize sufficient water to obtain thorough coverage. See label for information on water volumes for specific crops.

Application tips

Do not apply to a potato crop that is suffering from stress or any other factors contributing to a reduction in crop growth. Do not apply product during periods of intense rainfall or to soils saturated with water.

How it works

A contact fungicide.

Restrictions

Grazing: Do not graze the treated crop or cut for hay. Do not use on alfalfa sprout crops for human consumption. Do not use seed crop residue for animal consumption. **Pre-harvest intervals (days):** Lentil – 35. Potato – 1. Sugar beet – 21. Wheat – 40.

Environmental precautions

All mancozeb-based products are toxic to fish. Do not apply when weather conditions favour drift from areas treated. Do not apply directly to water or to areas where surface water is present. Do not contaminate water by disposing of equipment washwater.

Toxicity

Oral LD_{50} (rats) = >5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in a cool, dry, ventilated place away from fire and sparks.

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Double Nickel LC/Double Nickel 55

Bio fungicide

Formulation

Product	Company	Active ingredient	Formulation	Container size
Double Nickel LC (PCP# 31887)	Certis USA distributed by UAP Canada	*Bacillus amyloliquefaciens* strain D747 1 x 10^{10} spores/mL	Aqueous suspension	9.46 L, 1,000 L
Double Nickel 55 (PCP# 31888)	Certis USA distributed by UAP Canada	*Bacillus amyloliquefaciens* strain D747 5 x 10^{10} spores/mL	Water dispersible granule	2.27 kg

Crops, diseases Controlled, rates and staging

Crops	Diseases suppressed	Rate per acre		Staging and specific comments
		Double Nickel LC	Double Nickel 55	
Potato	White mould (*Sclerotinia sclerotiorum*)	Moderate/high disease pressure: 2.0 - 5.0 L Low disease pressure: 0.40 - 2.0 L	Moderate/high disease pressure: 0.4 - 1.0 kg Low disease pressure: 0.08 - 0.4 kg	Begin preventive applications when conditions are favourable for disease development. Repeat applications every 3 - 10 days for as long as conditions favour disease development.
	Early blight (*Alternaria solani*)	1.0 - 4.0 L	0.2 - 0.8 kg	Apply between onset of crop cover to tuber formation. Use higher rates under moderate/ higher disease pressure.
	Black scurf (*Rhizoctonia solani*)	Soil application: 0.40 - 2.0 L	Soil application: 0.08 - 0.4 kg	Apply at planting. See label for directions on soil applications.
Soybean	White mould (*Sclerotinia sclerotiorum*)	1.0 - 4.0 L	0.2 - 0.8 kg	Apply from early flowering until pod set. Repeat applications every 3 - 10 days for as long as conditions favour disease development. Use higher rates under moderate/higher disease pressure.
Hemp	Suppression of grey mould (*Botrytis cinera*) Partial supression of grey mould (*Sclerotinia sclerotiorum*), powdery mildew (*Golovinomyces cichoracearum*)	1.0 - 2.5 L	0.2 - 0.4 kg	Begin as a preventative spray. Apply at 3 - 11 day intervals for as long as conditions favour disease development. Use the shorter interval and the higher rate when high disease pressure is anticipated.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** Use sufficient water volume for uniform coverage (minimum of 80 L/acre).

Application tips

DOUBLE NICKEL® LC and DOUBLE NICKEL® 55 are most beneficial when applied in alternation with other fungicides that are registered for the specific use/pathogen or in a tank mix program with labelled fungicides as part of a disease management program. Mix only with fungicides having label instructions that do not prohibit such mixtures. The use of DOUBLE NICKEL® 55 in combination with other fungicides will help delay resistance to these fungicides.

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How it works

DOUBLE NICKEL® LC and DOUBLE NICKEL® 55 are broad-spectrum preventative biopesticides for suppression or partial suppression of fungal and bacterial diseases. The active ingredient is a beneficial bacterium, *Bacillus amyloliquefaciens* strain D747, which colonizes plant surfaces preventing establishment of disease-causing fungi and bacteria.

Restrictions

Rainfall: Rainfast in 4 hours. **Re-cropping:** No restrictions. **Re-entry interval:** 4 hours. **Pre-harvest interval:** Potato, soybean – can be applied up to and including the day of harvest. Hemp – 3 - 4 weeks.

Environmental precautions

Avoid application when heavy rain is forecast. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) > 5,050 mg/kg.

Storage

Store in original container out of direct sunlight at a temperature of 4 - 25˚C. Product can be stored for up to 2 years.

Dyax

Group 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Dyax (PCP# 32746)	BASF Canada	Fluxapyroxad: 250 g/L Pyraclostrobin: 250 g/L	Suspension concentrate	9.6 L

Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Chickpea	Ascochyta blight (*Ascochyta rabiei*), white mould suppression (*Sclerotinia sclerotiorum*)	160 mL	Apply at the beginning of flowering or at the onset of symptoms prior to row closure of field pea, lentil, chickpea and faba bean. Apply at 20 - 50% flowering or at the onset of symptoms to control Asian soybean rust and suppress frogeye leaf spot and septoria brown spot in soybeans. Apply at 20 - 50% flowering to suppress sclerotinia stem rot.
Field pea	Mycosphaerella blight (*Mycosphaerella pinodes*), powdery mildew (*Erysiphe pisi*), Ascochyta blight (*Ascochyta pinodes*), Asian soybean rust (*Phakopsora pachyrhizi*), white mould suppression (*Sclerotinia sclerotiorum*)	120 - 160 mL	
Lentil	Ascochyta blight (*Ascochyta lentis*), anthracnose (*Colletotrichum truncatum*), white mould suppression (*Sclerotinia sclerotiorum*)	120 - 160 mL	
Faba bean	Asian soybean rust (*Phakopsora pachyrhizi*), Ascochyta blight suppression (*Ascochyta spp.*), white mould suppression (*Sclerotinia sclerotiorum*)	120 - 160 mL	If disease persists or weather conditions are favourable for disease development, make a second application 10 - 14 days later with a fungicide that contains a different mode of action. Do not make sequential applications of Dyax.
Soybean	Asian soybean rust (*Phakopsora pachyrhzi*). Suppression: frogeye leaf spot (*Cercospora sojina*), Septoria brown spot (*Septoria glycines*), Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	120 - 160 mL	

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Crops	Diseases controlled	Rate per acre	Staging and specific comments
Dry bean	Rust *(Uromyces appendiculatus)*, anthracnose *(Colletotrichum lindemuthianum)*, Asian soybean rust (*Phakopsora pachyrhizi*), powdery mildew (*Erysiphe spp*.)	160 mL	Apply at the beginning of flowering or at the onset of symptoms to control rust, anthracnose, Asian soybean rust and powdery mildew in dry beans.
	Suppression of white mould *(Sclerotinia sclerotiorum)*	240 - 320 mL	Apply at 20 - 50% flowering to suppress white mould.
Canola	Control: Blackleg *(Leptosphaeria maculans);* Suppression: Sclerotinia stem rot *(Sclerotinia sclerotiorum)* Alternaria black spot *(Alternaria brassicae and A. raphani)*	120 - 160 mL	Apply Dyax at the 2 - 6 leaf stage to control blackleg. For suppression of sclerotinia stem rot and Alternaria black spot apply at 20 - 50% flowering. If disease persists or weather conditions are favourable for disease development, make a second application 10 - 14 days later with a fungicide that contains a different mode of action. Apply Dyax at late flowering to early green pod to suppress black spot. Use the high rate under high disease pressure.
Flax	Control: Pasmo *(Septoria linicola);* Suppression: Sclerotinia stem rot *(Sclerotinia sclerotiorum)*	120 - 160 mL	Apply at 20 - 50% flowering.
Sunflower	Suppression: Leaf rust *(Puccinia helianthi)*	160 mL	Apply at first sign of disease.
Alfalfa (seed production)	Control: Common leaf spot *(Pseudopeziza medicaginis; high rate only).* Suppression: Blossom blight *(Sclerotinia sclerotiorum)*	120 - 160 mL	Apply at the beginning of flowering (10-30% bloom) or at the onset of disease. Do not make more than 1 application per year.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips

Good coverage is essential for effective disease control, and higher water volumes tend to increase performance with dense canopies. The use of a non-ionic surfactant is not required but applications at 0.125% v/v may improve efficacy.

How it works

The active ingredient fluxapyroxad is a SDHI fungicide with systemic activity. The active ingredient pyraclostrobin is a member of the strobulirins class of chemistry used as a broad-spectrum fungicide.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. Rainfast in 1 hour. **Grazing:** All crops can be grazed or fed to livestock. For livestock feeding and grazing, observe minimum pre-harvest intervals specified for each crop. **Pre-harvest interval:** Canola (including rapeseed, *juncea*), mustard, sunflower, flax, soybean – 21 days. Dry bean, field pea, lentil, chickpea, faba bean and dry bean – 30 days. **Re-cropping:** Tuberous and corm vegetables, sugar beet, legume vegetables, fruiting vegetables, pome fruits, stone fruits, cereals and oilseeds may be planted immediately following the last application. 1 year for all other crops.

Environmental precautions

Observe buffer zones specified on the label. The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable and/or depth of the water table is shallow. Toxic to aquatic organisms, small mammals and non-target terrestrial plants.

Toxicity

Oral LD_{50} (rats) = > 50 - < 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in original container. Protect from freezing.

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Elatus

Group 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Elatus A (PCP# 31973)	Syngenta	Azoxystrobin: 250 g/L	Suspension	8.1 L
Elatus B (PCP# 31977)		Benzovindiflupyr: 100 g/L	Emulsifiable concentrate	8.1 L

Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Field pea	Aschochyta blight (*Aschochyta* spp.), Mycosphaerella blight, (*Mycosphaerella pinodes*), powdery mildew (*Microsphaera diffusa, Erysiphe pisi, E. polygoni*). Suppression of Sclerotinia (*sclerotina sclerotorium*)	Elatus A: 200 mL Elatus B: 200 mL	For Aschoyta and Mcyosphaerella, the first application must be before disease is established and no later than the onset of flowering. A second application can be made 10 - 14 days after the first application, when the disease pressure is high or weather conditions are conducive to disease development or movement. For powdery mildew, make the first application at 5% infection, followed by a second application 10 days later if conditions are favourable for disease development.
Chickpea, lentil	Aschochyta blight (*Ascochyta* spp.), Mycosphaerella blight (*Mycosphaerella* spp.), Anthracnose (*Collectotrichum* spp.). Suppression of Sclerotinia (*Sclerotinia sclerotiorum*)	Elatus A: 200 mL Elatus B: 200 mL	The first application must be before disease is established and no later than the onset of flowering. A second application can be made 10 - 14 days after the first application, when the disease pressure is high or weather conditions are conducive to disease development.
Potato, in-furrow application	Stem and stolon canker and black scurf (*Rhizoctonia solani*), silver scurf (*Helminthosporium solani*). Suppression of Verticillium wilt (*Verticillium dahliae*)	Elatus A: 4 - 6 mL/100 m row Elatus B: 200 - 300 mL/acre	Make an in-furrow application in a water volume of 20 - 60 L at planting. Apply the spray in a narrow band over the seed piece. See label for more details on in-furrow applications.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre.

Application tips

Use sufficient water volume to provide uniform coverage. Do not apply more than 2 applications of Elatus per season.

How it works

Elatus is a broad-spectrum product containing 2 fungicides. It has preventive and systemic properties and is recommended for the control of many important diseases.

Restrictions

Rainfall: Rainfast 2 hours after application. **Pre-harvest interval:** 15 days. **Re-entry interval:** 12 hours. **Grazing:** Do not feed dried pea vines to livestock. **Re-cropping:** Potato and tuberous and corm vegetables subgroup, dried shelled pea and bean, soybean, fruiting vegetables crop group, cucurbit vegetables, cereals (wheat, barley, oats, rye, triticale), corn (sweet, pop and specialty), rapeseed subgroup and all crops registered for use with azoxystrobin have no (zero days) re-cropping restrictions. All other crops intended for food or feed have a 180-day re-cropping restriction.

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Environmental precautions

Toxic to aquatic organisms. Observe a buffer zone of 1 metre around freshwater habitats. Benzovindiflupyr and azoxystrobin are persistent, and it is recommended that they are not used in areas treated with these products in the previous season.

Toxicity

Azoxystrobin: Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.
Benzovindiflupyr: Oral LD_{50} (rats) = 550 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Keep in original container. Store in a cool, dry, well ventilated area. Do not store below 0°C.

Evito

Group 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Evito (PCP# 30408)	UPL AgroSolutions Canada	Fluoxastrobin: 480 g/L	Suspension concentrate	4.8 L

Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Wheat	Leaf rust (*Puccinia triticina*), stripe rust (*Puccinia striiformis*), stem rust (*Puccinia graminis)*, tan spot (*Pyrenophora tritici-repentis*)	59 - 118 mL	Apply preventively and repeat if needed after 14 - 21 day intervals. Use higher rates and shorter intervals when disease pressure is high. Ideal timing is at Feekes 9 (flag leaf), prior to disease development. Applications can be made between Feekes 5 (pseudostem formation or end of tillering) and 10.5 (late head emergence).
	Powdery mildew (*Erysiphe graminis*)	74 - 118 mL	
	Septoria leaf blotch (*Septoria tritici*) suppression	59 - 118 mL	
Barley	Leaf rust *(Puccinia hordei),* stripe rust (*Puccinia striiformis*), stem rust (*Puccinia graminis*), net blotch (*Pyrenophora teres*)	59 - 118 mL	
Oats	Stem rust (*Puccinia graminis*), Crown rust (*Puccinia coronata*) suppression, Septoria leaf blotch (*Septoria avenae*) suppression	59 - 118 mL	
Corn	Common rust (*Puccinia sorghi*), Southern corn leaf blight (*Cochliobolus heterostrophus*), grey leaf spot (*Cercospora maydis*)	59 - 120 mL	Apply preventively and repeat if needed after 7 - 10 day intervals. Use higher rates and shorter intervals when disease pressure is high.
	Northern corn leaf blight (*Setosphaeria turcica, anamorph: Exserohilum turcicum*) suppression		
Soybean	Frogeye leaf spot (*Cercospora sojina*)	59 - 120 mL	Apply preventively and repeat if needed after an interval of 14 - 21 days. Use higher rates and shorter intervals when disease pressure is high. Do not apply later than R6 (full seed).
Canola	Sclerotinia stem rot/white mould (*Sclerotinia sclerotiorum*)	59 - 118 mL	Apply at 20 - 50% bloom. If needed a second application can be made 7 - 14 days later. Use the higher rates and shorter interval when disease pressure is high.

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Crops	Diseases controlled	Rate per acre	Staging and specific comments
Potato	Late blight (*Phytophthora infestans*)	112 mL	Apply preventively and repeat on a 7-day interval. If disease symptoms develop, switch to a fungicide with a different mode of action.
	Early blight (*Alternaria solani*) suppression	112 mL	Apply preventively and repeat on a 7-day interval. If disease symptoms develop, switch to a fungicide with a different mode of action.
	Black scurf (*Rhizoctonia solani*)	1.55 - 2.33 mL product/100 m row	Apply as an in-furrow application or banded application shortly after plant emergence, during herbicide application or cultivation.

Registered tank mixes

Wheat and barley: Fungicides – propiconazole, tebuconazole, Caramba, Proline 480 SC, Prosaro 250 EC. Herbicide – Everest 2.0.

Corn: propiconazole (field, seed, sweet), chlorothalonil (sweet corn only).

Soybean: propiconazole and tebuconazole.

Potato: chlorothalonil, mancozeb and metiram.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – minimum of 40 L/acre. Aerial – 20 L/acre.

Application tips

Good coverage is essential for effective disease control. Use sufficient water to ensure thorough coverage of plants.

How it works

Evito 480SC Fungicide is a systemic fungicide that works by interfering with respiration in plant pathogenic fungi and is an inhibitor of spore germination and mycelial growth.

Restrictions

Rainfall: avoid application when heavy rain is forecast. **Pre-harvest intervals:** Cereals – do not apply within 7 days of harvest for hay and forage or within 40 days of harvest for grain. Corn – do not apply within 7 days of harvest of sweet corn or within 30 days of harvest for grain corn. Soybean – do not apply beyond R6 (full seed). Potato – do not apply within 7 days of harvest. Canola – do not apply within 21 days of harvest. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms. Observe buffer zones as specified on the label. To reduce runoff from treated area into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Oral LD_{50} (rats) > 5,000 mg/kg. Dermal LD_{50} (rats) > 5,000 mg/kg.

Storage

Store in cool, dry place. Do not freeze.

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Folicur® 250 EW Fungicide/Palliser/Hornet 432 F /Orius 430 SC/Advantage Tebuconazole/Tebbie/FBN Tebuconazole 250/Toledo 250 EW/Tornado

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Folicur® 250 EW (PCP# 29820)	Bayer	Tebuconazole: 250 g/L	Emulsion in water	8.1 L
Palliser (PCP# 30491)	Loveland Canada Products	Tebuconazole: 432 g/L	Suspension	9.46 L
Hornet 432 F (PCP# 32500)	Nufarm Agriculture	Tebuconazole: 432 g/L	Suspension	9.46 L
Orius 430 SC (PCP# 33673)	ADAMA Canada	Tebuconazole: 430 g/L	Suspension	9.44 L
Advantage Tebuconazole 250 (PCP# 33887)	Advantage Crop Protection	Tebuconazole: 250 g/L	Emulsion in water	8.1 L, 96 L
Tebbie Foliar Fungicide (PCP # 33901)	Sharda CropChem	Tebuconazole: 250 g/L	Emulsion in water	9.46 L
FBN Tebuconazole 250 (PCP # 33779)	Farmer's Business Network	Tebuconazole: 250 g/L	Emulsion in water	8.1 L, 96 L
Toledo 250 EW (PCP # 33719)	Rotam North America	Tebuconazole: 250 g/L	Emulsion in water	8.1 L
Tornado (PCP # 33995)	New Agco Inc.	Tebuconazole: 250 g/L	Emulsion in water	8.1 L, 96 L, 1,000 L

Crops, diseases controlled, rates and staging

Crops	Diseases	Rate per acre		Staging
		Folicur 250 EW / Advantage Tebuconazole/ Tebbie/FBN Tebuconazole / Toledo/Tornado	Palliser/ Hornet/ Orius	
Wheat	Suppression of Fusarium head blight (*Fusarium graminearum*), control of septoria glume blotch (*Stagnospora nodorum*)	202 mL	118 mL	Timing of application is critical. Apply within the time period from when at least 75% of the wheat heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower.
	Rusts (leaf, stem and stripe) (*Puccina triticina, P. graminis, P. striformis*), Septoria leaf blotch (*Septoria tritici*), tan spot (*Pyrenophora tritici-repnetis*)	153 - 202 mL	89 - 118 mL	Apply to leaf foliage at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of the flowering stage.
	Powdery mildew (*Erysiphe graminis*)	202 mL	118 mL	
Barley	Net blotch (*Pyrenophora teres*), spot blotch (*Cochliobolus sativus*), scald (*Rhynchosporium secalis*), rusts (leaf, stem and stripe) *(Puccinia hordei, P. graminis, P. striiformis)*, Septoria leaf blotch (*Septoria passerinii*), powdery mildew (*Erysiphe graminis*)	153 - 202 mL	89 - 118 mL	Apply at the very early stage of disease development. Use the higher rate when weather conditions are conducive to heavy disease development.

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Crops	Diseases	Rate per acre		Staging
		Folicur 250 EW / Advantage Tebuconazole/ Tebbie/FBN Tebuconazole / Toledo/Tornado	Palliser/ Hornet/ Orius	
Oats	Crown rust (*Puccinia coronate*), stem rust (*Puccinia graminis*)	153 mL	89 mL	Apply at the very early stage of disease development
	Stagnospora *(Septoria)* leaf blotch and black stem, *Phaeosphaeria (Leptosphaeria) avenaria f. sp. avenaria (Stagnospora avenae* syn. *Septoria avenae)*	153 - 202 mL	NR*	Use the higher rate when weather conditions are conducive to heavy disease development.
Soybean	Asian soybean rust (*Phakopsora pachyrhizi*), frogeye leaf spot (*Cercospora sojina*), powdery mildew (*Microspaera diffusa*)	153 - 202 mL	NR*	Apply when the first symptoms of disease can be found or when the risk of infection is imminent. Use the higher rate when disease pressure is severe.

* Not registered.

Registered tank mixes

Folicur 250 EW/Palliser/Hornet /Orius/Advantage Tebuconazole/Tebbie/Tornado can be tank mixed with certain pesticides for control of early season leaf diseases, weeds and insects. Refer to label for registered pesticide products. Bayer supports the following tank mixes. Insecticides: Decis, Lorsban, Sevin XLR Plus. ADAMA supports the following insecticide tank-mixes: Pyrinex, SIlencer 120 EC. Apply mixes to the most restrictive use limitations for either product.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre.

Applicationt Tips

Spray coverage is essential. Ensure thorough coverage of all wheat heads for optimal suppression of Fusarium head blight. Always use a non-ionic surfactant with Palliser/Hornet such as Agral 90, Liberate or AgSurf at 0.125% v/v. Folicur and Tornado do not require the use of a non-ionic surfactant.

How it works

Tebuconazole is a broad-spectrum fungicide for disease control in cereals with preventive, curative and eradicative properties.

Restrictions

Grazing: So not allow livestock to graze or feed green forage to livestock prior to 6 days after application. Straw cut after harvest may be fed or used for bedding. **Pre-harvest intervals:** Do not apply within 36 days of harvest for wheat, barley and oats. Do not apply within 20 days of harvest for soybean. **Re-entry interval:** 12 hours. **Maximum allowable applications:** A maximum of 1 application per crop season. **Re-cropping:** Treated areas may be replanted following harvest with any crop listed on the label. Do not replant treated areas for 120 days after last application for crops not listed on the label.

Environmental precautions

Tebuconazole is toxic to birds, small wild animals, aquatic organisms and non-target plants. Do not apply directly to water or to areas where surface water is present. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Do not apply by ground or air within 30 metres of aquatic areas.

Toxicity

Oral LD_{50} (rats) = > 200 - < 2,000 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage

Store in a cool, dry place and prevent cross contamination with other pesticides, fertilizers, food and feed.

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Fontelis

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Fontelis (PCP# 30331)	Corteva Agriscience	Penthiopyrad: 200 g/L	Suspension	3.79 L

Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Alfalfa	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	506 - 708 mL	Begin applications prior to disease development and continue on a 7 - 14 day interval. Use higher rate and shorter interval when disease pressure is high.

Registered tank mixes

None registered.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground: 45 L/acre. Aerial: 16 L/acre.

Application tips

Use sufficient water to obtain thorough coverage of plants. Do not apply under periods of dead calm. Avoid application of this product when winds are gusty.

How it works

The active ingredient penthiopyrad is a carboxamide fungicide with broad spectrum, locally systemic and curative properties recommended for foliar and soil-borne plant diseases.

Restrictions

Rainfall: Rainfast 30 minutes after application. **Grazing:** Do not graze until 14 days after application.
Pre-harvest intervals: 14 days. **Re-entry interval:** 12 hours.
Re-cropping: Crops and crop groups that are on this label and the following list of crops and crop groups may be planted immediately after harvest: Canola, cereal grains crop group (barley, oats, rye, sorghum, wheat; except rice), corn (all types), cotton, legume vegetables crop subgroup (dried shelled pea and bean), soybean, sugar beet, sunflower, tuberous and corm vegetables and leaves crop subgroup (potato). All other crops cannot be planted until 12 months after the last application of Fontelis. **Maximum number of applications:** Do not exceed 2 consecutive applications of this product before switching to a fungicide with a different mode of action.
Maximum seasonal use rate: Alfalfa – 1.42 L/acre.

Environmental precautions

Toxic to aquatic organisms. Observe buffer zones specified on the label. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast. Refer to label for buffer zones.

Toxicity

Oral LD_{50} (rats) = >5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store product in original container only, away from other pesticides, fertilizer, food or feed.

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Forum

Group 40

Formulation

Product	Company	Active ingredient	Formulation	Container size
Forum (PCP# 32026)	BASF Canada	Dimethomorph: 500 g/L	Suspension concentrate	4.5 L

Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Potato	Late blight (*Phytophtora infestans*) (foliar)	182 mL	Make the first application when disease threatens or when visible signs of disease occur in nearby fields. Apply every 5 - 7 days under high pressure or every 7 - 10 days under low pressure.
	Late blight (*Phytophtora infestans*) storage rot	182 mL	Apply after first desiccation (or when stems are visible) to target stem lesions.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 80 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips

Do not apply Forum alone. Always tank mix Forum with 1 of the following: PolyGram DF, Dithane DG Rainshield or Bravo 500 at label rates.

How it works

Forum has protectant, systemic and antisporulant activity. Forum penetrates the plant and moves upward to protect leaves and stems by controlling spores.

Expected results

Control of foliar late blight. Suppression of late blight storage rot.

Restrictions

Pre-harvest interval: 4 days. **Rainfall:** Apply to dry foliage. Do not apply if rain is likely within 2 to 3 hours of application. **Re-cropping:** Do not plant a new crop in the treated area within 30 days of the last application. **Re-entry interval:** 12 hours.

Environmental precautions

Forum tank-mix combinations are toxic to fish and aquatic organisms. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid applications to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Acute Oral LD_{50} (rats) = 2,939 mg/kg.

Storage

Store under cool, dry conditions in secure, well-ventilated buildings, away from foodstuffs and animal feed.

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Fullback 125 SC

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Fullback 125 SC (PCP# 31679)	FMC of Canada Limited distributed by Belchim Crop Protection Canada	Flutriafol: 125.08 g/L	Suspension concentrate	1.5 L

Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Soybean	Asian soybean rust (*Phakopsora pachyrhizi*)	207 - 414 mL	Maximum of 3 applications during the growing season. Do not exceed 829 mL/acre per season. Apply only to soybean harvested for dry seed.
	Cercospora blight and leaf spot (*Cercospora kikuchili*), frogeye leaf spot (*Cercospora sojina*), brown spot (*Septoria glycines*)	207 - 414 mL	Apply when soybean plants are in the R3 growth stage (early pod fill) or when environmental conditions favour disease development. Maximum of 3 applications during the growing season. Do not exceed 828 mL/acre per season. Apply only to soybean harvested for dry seed.

Registered tank mixes

For Asian soybean rust, Fullback 125 SC may be tank mixed with Headline EC.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** Ground – 40 L/acre minimum.

Application tips

Good coverage is essential for effective disease control; use sufficient water to ensure thorough coverage of plants.

How it works

Fullback 125 SC is a DMI fungicide. Inhibits ergosterol synthesis causing fungal cell wall collapse and reduced hyphal growth. Provides contact and systemic activity and has both protective and eradicant action.

Restrictions

Rainfall: Disease control will be reduced if rainfall occurs within 2 hours of application. **Pre-harvest intervals:** do not apply within 21 days of harvest. **Re-entry interval:** 12 hours. **Grazing**:
Do not feed forage or hay to animals or permit animals to graze.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones as specified on the label.
To reduce runoff from treated area into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Oral LD_{50} (rats) > 3,000 mg/kg. Dermal LD_{50} (rabbit) > 4,000 mg/kg.

Storage

Store in cool, dry place.

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Gavel 75 DF

Group M, 22

Formulation

Product	Company	Active ingredient	Formulation	Container size
Gavel 75 DF (PCP# 26842)	Gowan	Mancozeb: 66.7% Zoxamide: 8.3%	Dry flowable	13.6 kg

Crops, diseases controlled, rates and timing

Crop	Diseases	Rate per acre	Staging
Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	0.69 kg	Begin applications at the first sign of disease or when blight is reported in the area. Apply every 7 days under low disease pressure and environmental conditions unfavourable for disease development.
		0.90 kg	Apply every 7 days under high disease pressure when either disease is present or environmental conditions favour continued disease development.

Registered tank mixes

None registered.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 90 L/acre. Aerial – 18 - 36 L/acre.

Application tips

Optimum disease control is achieved when the fungicide is applied in a regularly scheduled preventive spray program. Maximium of 6 applications per season. Under high disease pressure, use higher water volume to provide better crop coverage.

How it works

The active ingredient zoxamide is a benzimidazole-type fungicide with contact activity. The mancozeb component is a dithiocarbamate fungicide with contact activity.

Restrictions

Pre-harvest intervals: Do not apply within 3 days of harvest. **Re-cropping:** A 30-day interval is required before planting leafy vegetables and root and tuber vegetables. For all other crops not included on the label, a 140-day interval is required. **Re-entry interval:** 48 hours.

Environmental precautions

Toxic to fish. For terrestrial uses, do not apply directly to water and to areas where surface water is present. Do not contaminate water when disposing of equipment washwaters or disposing of wastes. See label for details on buffer zone requirements.

Toxicity

Oral LD_{50} (rats) = 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Keep away from fire and sparks. Store in a cool, dry, well ventilated area.

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Headline EC/Spade/Preach

Group 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Headline EC (PCP# 27322)	BASF Canada	Pyraclostrobin: 250 g/L	Emulsifiable concentrate	6.5 L, 120 L, 400 L
Spade (PCP# 32927)	NewAgco Inc.	Pyraclostrobin: 250 g/L	Emulsifiable concentrate	13 L, 120 L, 1,000 L
Preach fungicide (PCP # 33928)	Sharda CropChem Ltd.	Pyraclostrobin: 250 g/L	Emulsifiable concentrate	10 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Staging
Wheat	Leaf rust (*Puccinia recondita*), septoria leaf spot (*Septoria tritici* or *Leptosphaeria nodorum*), tan spot (*Pyrenophora tritici-repentis*)	0.12 - 0.24 L	Apply immediately after flag stage. Use the higher rate to obtain extended protection with maximum yield benefits. Apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists, or weather conditions are favourable for disease development.
	Powdery mildew (*Erysiphe graminis f. sp. tritici*), spot blotch (*Cochliobolus sativus*), stripe rust (*Puccinia striiformis*)	0.16 - 0.24 L	
Barley	Net blotch (*Pyrenophora teres*)	0.12 - 0.24 L	
	Scald (*Rhynchosporium secalis*), spot blotch (*Cochliobolus sativus*), stripe rust (*Puccinia striiformis*)	0.16 - 0.24 L	
Corn	Common rust (*Puccinia sorghi*), grey leaf spot (*Cercospora zeae-maydis*)	0.16 - 0.24 L	
Oats*	Crown rust (*Puccinia coronata*)	0.12 - 0.16 L	
Rye	Leaf rust (*Puccinia recondita*)	0.12 - 0.24 L	
	Powdery mildew (*Erysiphe graminis*)	0.16 - 0.24 L	
Dry bean (*Phaseolus*, *Vigna* and *Lupinus* spp.)	Anthracnose (*Colletotrichum* spp.), mycosphaerella blight (*Mycosphaerella spp.*), powdery mildew (*Erysiphe* spp.), rust (*Uromyces* spp.)	0.16 L	Apply at the beginning of flowering or at the onset of symptoms for the more aggressive diseases (e.g., Anthracnose in lentil). Apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists, or weather conditions are favourable for disease development.
	Asian soybean rust (*Phakospora pachyrhizi*)	0.16 - 0.24 L	
Dry pea (field), faba bean	Mycosphaerella blight (*Mycosphaerella* spp.), powdery mildew (*Erysiphe* spp.)	0.16 L	
	Asian soybean rust (*Phakopsora pachyrhizi*)	0.16 - 0.24 L	
Lentil	Anthracnose (*Colletotrichum spp.*), Ascochyta blight (*Ascochyta* spp.)	0.16 L	
Succulent bean and pea (*Phaseolus*, *Vigna* and *Pisum* spp.)	Ascochyta blight (*Ascochyta* spp.), Mycosphaerella blight (*Mycosphaerella* spp.), rust (*Uromyces* spp.), Asian soybean rust (*Phakopsora pachyrhizi*)	0.16 - 0.24 L	
Chickpea	Ascochyta blight (*Ascochyta rabiei*)	**Note:** Headline EC must be tank mixed at a rate of 0.16 - 0.24 L/acre with Lance WDG at 0.14 - 0.17 L/acre.	

*Note: Headline /Preach registered for use on oats.

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Crops	Diseases	Rate per acre	Staging
Flax	Pasmo (*Septorici linicolu*)	0.12 - 0.16 L	Flax: At the mid-flower stage (7 - 10 days after the initiation of flowering). Sugar beet: Apply at the onset of disease.
Soybean	Asian soybean rust (*phakosporu pachyrlizi*), frogeye leaf spot (*Cercospora sojina*)	0.16 - 0.24 L	
Sugar beet	Cerecospora leaf spot, (*Cercospora beticola*), powdery mildew (*Erysiphe betae*)	0.27 - 0.36 L	
Bluegrasses, fescues, ryegrasses	Leaf and stem rust (*Puccinia recondita; P. graminis*), powdery mildew (suppression) (*Erysiphe graminis*)	0.16 - 0.27 L	Apply prior to disease development and apply a second time 14 - 21 days later with a fungicide that contains a different mode of action if disease persists. Use the higher rate and shorter interval when disease pressure is high.
Alfalfa	Common leaf spot (*Pseudopeziza medicagnisis*)	0.16 L	Apply at beginning of flowering (10 - 30% bloom) or the onset of disease. Maximum 1 application per year.
Potato	Early blight (*Alternaria solani*) (spray interval 7 - 14 days)	0.18 - 0.27 L	Apply prior to row closure or when conditions become favourable for the development of disease. Do not make more than 1 application before alternating to an effective fungicide with a different mode of action for at least 1 application. Do not make more than 3 applications per season.
	Late blight (*Phytophthora infestans*) (spray interval 5 - 7 days)	0.18 - 0.27 L	
	Late blight (*Phytophthora infestans*) (spray interval 7 - 10 days)	0.18 - 0.27 L	In a tank mix with Bravo 500.
Rapeseed, canola, canola quality *Brassica juncea*, **mustard (oilseed and condiment)**	Black spot (*Alternaria brassicae* and *A. raphani*)	0.12 - 0.16 L	Apply at 20 - 50% bloom for suppression to early pod stage (90% bloom) for control in canola.
	Black leg (*Leptosphaeria maculans*)	0.12 - 0.16 L	Apply at the 2 - 6 leaf stage.
Sunflower	Rust (suppression) (*Puccinia helianthi*)	0.12 - 0.16 L	For optimal disease suppression, apply prior to disease development.

Registered tank mixes*

Tank mix partner	Crops registered
Lance WDG	Canola, chickpea
Odyssey WDG	XCEED (*Brassica juncea*)
Poast Ultra	All canola varieties
Liberty 150 SN, Liberty 200 SN	LibertyLink canola
Registered glyphosate products	Glyphosate tolerant canola
Bravo 500	Potato

*Note: Consult the label of the tank mix partner for diseases/weeds controlled, rates and timing of applications.

Application information

How to apply: Ground sprayers, aerial application or by pivot or sprinkle irrigation. Do not apply registered tank mixes listed above in potato, chickpea and canola with pivot or sprinkler irrigation. **Water volume:** Ground – 40 L/acre minimum except for potato and sugar beet where 80 L/acre minimum is recommended. Aerial – 20 L/acre minimum. Do not apply more than 0.16 L/acre of Headline EC by aerial application. Chemigation – application must be made without the use of end guns.

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Application tips
Good coverage is essential for effective disease control and higher water volumes tend to increase performance with dense canopies. Headline EC works best if it is applied in a preventive manner and performs best if applied in a regularly scheduled protective spray program. Do not apply more than 1 application of this product before alternating to a fungicide with an alternative mode of action.

How it works
Pyraclostrobin has a protective effect because it inhibits spore germination and a curative effect due to the inhibition of mycelial growth and sporulation of the fungus on the leaf surface. Headline is systemic within the leaf. Headline applied to the top surface of the leaf binds tightly in the waxy cuticle and also moves to the lower surface where it provides dual-sided protection against disease entry.

Restrictions
Rainfall: Avoid application when heavy rain is forecast. Rainfast in 1 hour. **Grazing:** Do not graze treated corn crops within 6 days of application. Do not feed alfalfa hay or forage to livestock. All other crops listed can be grazed or fed to livestock. **Pre-harvest interval:** Cereals – apply no later than the end of flowering. Corn – 7 days. Edible-podded legumes and succulent bean and pea – 7 days. Grasses (grown for seed) – 14 days. Potato – 3 days. Dry bean, field pea, faba bean and lentil – 30 days. Soybean, canola, canola quality *Brassica juncea*, mustard (oilseed and condiment), rapeseed – 21 days. Sugar beet – 7 days. **Re-cropping:** A plant-back restriction of 14 days is required for all crops not on the label. **Re-entry interval:** 12 hours.

Environmental precautions
Headline EC is toxic to aquatic organisms, non-target terrestrial plants and small mammals. Observe buffer zones specified on the label. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay.

Toxicity
Oral LD_{50} (rats) = 500 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage
Store in a cool, dry, locked, well ventilated area without floor drain.

Kenja 400 SC Fungicide

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Kenja 400 SC Fungicide (PCP# 31758)	ISK Biosciences Corporation distributed by Belchim Crop Protection Canada	Isofetamid: 400 g/L	Suspension	4 L

Crops, diseases controlled, rates and staging

Crops	Diseases	Rate per acre	Staging and specific comments
Field pea, lentil, chickpea, dry bean	White mould (*Sclerotinia sclerotiorum*) suppression	500 mL	Start applications prior to disease development. Use an interval of 7 - 14 days between applications. Do not make more than 2 sequential applications before rotating to a fungicide with a different mode of action. Do not apply more than 2 times a year.

Application information
How to apply: Ground application only. Do not apply by air. **Water volume:** Use sufficient water volume to ensure adequate coverage of foilage.

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How it works
A broad spectrum fungicide with preventive, local systemic and curative properties for foliar diseases.

Restrictions
Pre-harvest interval: 30 days. **Re-cropping:** Crops on this label may be planted immediately after the last treatment. Do not plant other crops not registered for this product within 30 days after the last application.
Re-entry interval: 12 hours.

Environmental precautions
Toxic to aquatic organisms, birds and small wild animals. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas.

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rabbit) = > 2,000 mg/kg.

Storage
Store in original container in a dry place.

Kumulus DF/Cosavet DF Edge

Group M

Formulation

Product	Company	Active ingredient	Formulation	Container size
Kumulus DF (PCP# 18836)	BASF Canada	Sulphur: 80%	Water dispersible granules	25 kg
Cosavet DF Edge (PCP# 31869)	Sulphur Mills Ltd. distributed by Belchim Crop Protection Canada	Sulphur: 80%	Water dispersible granules	13.6 kg

Crops, diseases controlled, rates and staging

Crops	Diseases	Rate per acre	Staging and specific comments
Field pea	Powdery mildew (*Erysiphe pisi*)	0.6 kg	Spray at first appearance of disease and repeat at 7 - 10 day intervals as necessary.

Registered tank mixes
Do not mix with dinitro compounds, tetradifon or oils.

Application information
How to apply: Ground application only. Do not apply by air. **Water volume:** 40 L/acre minimum.

Application tips
Do not apply when rain or night frost is expected. Do not apply if temperature is above 27°C (in shade) and high humidity prevails or if any of the above conditions are expected within 3 days after the treatment. Do not apply under intense sunshine. Do not apply when weather favours drift. Do not use within 30 days of an oil spray.

How it works
A contact and protectant fungicide.

Restrictions
Pre-harvest intervals: do not apply later than 1 day before harvest.

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Environmental precautions
Do not apply directly to aquatic habitats. Avoid drift onto neighboring crops.

Toxicity
Oral LD_{50} = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store in cool, dry, well ventilated locked area without a floor drain.

Lance AG

Group 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lance AG (PCP# 27495 and PCP# 27322)	BASF Canada	Boscalid: 70%	Wettable granules	3.5 kg Lance AG (A)
		Pyraclostrobin: 250 g/L	Emulsifiable concentrate	3.3 L Lance AG (B)

Crops, diseases controlled, rates and staging

Crops	Diseases	Rate per acre	Staging and specific comments
Alfalfa (seed production only)	Blossom blight (*Sclerotinia sclerotiorum, Botrytis cinerea*), common leaf spot (*Pseudopeziza medicaginis*), spring black stem (*Phoma medicagnis*), leaf spot (*Leptosphaerulina briosiani*)	175 g Lance AG (A) and 165 mL Lance AG (B)	Apply at 10 - 30% bloom or at the onset of symptoms. If disease persists or weather conditions are favourable for disease development, apply a second application 10 - 14 days later with a fungicide that contains a different mode of action.
Canola, mustard (oilseed and condiment)	Sclerotinia stem rot (*Sclerotinia sclerotiorum*), black spot (*Alternaria brassicae* and *raphani*)	140 g Lance AG (A) and 132 mL Lance AG (B)	Apply at 20 - 50% flowering to control Sclerotinia stem rot and suppress black spot. For control of Alternaria black spot, apply at late flowering to the early green pod stage. Do not make more than 2 applications per season.
Chickpea and lentil	Anthracnose (*Colletotrichum truncatum*), Ascochyta blight (*Ascochyta lentis*), white mould (*Sclerotinia sclerotiorum*), grey mould (*Botrytis cinerea*)	175 g Lance AG (A) and 165 mL Lance AG (B)	Apply at the beginning of flowering or at the onset of symptoms. In a planned two-pass application for lentil, product should be sprayed as a second pass 10 - 14 days after first application.
Pea (dry)	Ascochyta blight (*Ascochyta* spp.), Mycosphaerella blight (*Mycosphaerella pinodes*), grey mould (*Botrytis cinerea*), powdery mildew (*Erysiphe* spp.). Suppression of downy mildew (*Peronospora viciae*)	175 g Lance AG (A) and 165 mL Lance AG (B)	Apply at the beginning of flowering or at the onset of symptoms. In a planned two-pass application, product should be sprayed as a second pass 10 - 14 days after first application.

Application information
How to apply: Ground and aerial application. Ground: Alfalfa, canola, chickpea, dry pea, lentil. Aerial – Alfalfa, canola, chickpea, lentil. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips
Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.

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How it works

The active ingredient boscalid is a carboximide (SDHI) fungicide with systemic activity. The active ingredient pyraclostrobin is a member of the strobilurin class of chemistry used as a broad-spectrum fungicide.

Restrictions

Rainfall: Do not apply if rain is likely to occur within 2 hours of spraying. Avoid irrigation for 24 hours after application. **Grazing:** For alfalfa grown for seed production. Do not graze or feed treated hay to livestock. All other crops on label can be grazed or fed to livestock. **Pre-harvest intervals:** Chickpea, lentil, pea – 30 days; canola, mustard – 21 days. Alfalfa grown for seed: Not applicable. **Re-entry interval:** 12 hours. **Re-cropping:** Labelled crops can be planted immediately following application. All other crops not on the label can be planted 14 days after the last application.

Environmental precautions

Lance AG is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the label. **Runoff**: Do not apply to areas where runoff is likely to occur. Boscalid is persistent and will carry over. It is recommended that Lance AG not be used in areas treated with this product during the previous season.

Toxicity

Oral LD_{50} (male/female rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in original container in a cool, dry area. Do not ship or store near food, feed, seed and fertilizers.

Lance WDG

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Lance WDG (PCP# 27495)	BASF Canada	Boscalid: 70%	Wettable granules	2.83 kg

Crops, diseases controlled, rates and timing

Crop	Diseases	Rate per acre	Staging and specific comments
Field crops			
Alfalfa (seed production only)	Blossom blight (*Sclerotinia sclerotiorum, Botrytis cinerea*), common leaf spot (*Pseudopeziza medicaginis*), spring black stem (*Phoma medicagnis*), leaf spot (*Leptosphaerulina briosiani)*	170 g	Apply at 20 - 50% flowering to control blossom blight, common leaf spot and spring black stem. Apply every 7 - 14 days if disease persists or weather conditions are favourable for disease development. Do not make more than 3 applications per season.
Canola, mustard (oilseed and condiment), XCEED (*Brassica juncea*)	Sclerotinia stem rot (*Sclerotinia sclerotiorum*), black spot (*Alternaria brassicae* and *raphani)*	142 g	Apply at 20 - 50% flowering to control sclerotinia stem rot and suppress black spot. Apply a second time 7 - 14 days later up to full bloom if disease persists or weather conditions are favourable for disease development. For control of alternaria black spot, apply at late flowering to the early green pod stage. Do not make more than 2 applications per season.

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Crop	Diseases	Rate per acre	Staging and specific comments
Chickpea and lentil	Ascochyta blight** (*Ascochyta* spp.), grey mould (*Botrytis cinerea*), white mould (*Sclerotinia sclerotiorum*)	170 g	Apply at the beginning of flowering. Apply a second time 7 - 14 days later if disease persists or weather conditions are favourable for disease development. Do not make more than 2 applications per season.
Dry bean, faba bean	White mould (*Sclerotinia sclerotiorum*)	227 - 312 g	Apply at 20 - 50% flowering. Apply a second time 7 - 14 days later if disease persists or weather conditions are favourable for disease development. Use the higher rate to obtain extended protection and maximum yield benefit. Do not make more than 2 applications per season.
Pea (dry)	Ascochyta blight (*Ascochyta* spp.) grey mould (*Botrytis cinerea*), Mycosphaerella blight (*Mycosphaerella* spp.)	170 g	Apply at the beginning of flowering. Apply a second time 7 - 14 days later if disease persists or weather conditions are favourable for disease development. Do not make more than 2 applications per season.
Potato	Early blight (*Alternaria solani*)	70 - 126 g	Apply prior to disease development and at 14 days intervals. Do not make more than 4 applications per season.
	Late blight (*Phytophthora infestans*)	70 - 126 g	Lance must be tank mixed with Bravo 500 at label rates for control of late blight. Apply prior to disease development.
Sunflowers	Suppression of Sclerotinia head rot (*Sclerotinia sclerotiorum)*, suppression of leaf spot (*Alternaria helianthi*)	142 - 259 g	For optimal disease suppression, apply at early flower. Use the higher rate and shorter interval when disease pressure is high or there is a history of disease in the field. 1 application per season.
Caraway*	Suppression of blossom blight (*Botrytis cinerea*, *Sclerotinia sclerotiorum*), Ascochyta blight (*Ascochyta* spp.)	0.17 L	Application at 20 - 50% flowering. A second application may be made after 7 -14 days if disease persists or weather conditions are conducive for disease development.

* Registered under User Requested Minor Use Label Expansion program.

** For the control of Ascochyta blight in chickpea, Lance should be mixed with 160 - 240 mL/acre Headline EC.

Application information

How to apply: Ground and aerial application. Ground – alfalfa, canola, chickpea, dry bean, faba bean, dry pea, lentil, potato. Aerial – alfalfa, dry beans, faba bean, canola, chickpea, lentil, potato. **Pivot or sprinkler irrigation:** Alfalfa, canola, dry bean, faba bean, potato. **Water volume:** Ground – 40 L/acre minimum. For pivot and sprinkler irrigation applications: Do not exceed 0.64 cm (1/4 inch) or 25,700 L/acre. Aerial – 16 L/acre minimum.

Application tips

Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control.

How it works

Lance provides a protective effect because it inhibits spore germination and a curative-eradicative effect because it inhibits mycelial growth and sporulation of the fungus on the leaf surface. Optimum disease control is achieved when Lance WDG fungicide is applied in a regularly scheduled preventive spray program and is used as a protective application.

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Restrictions

Rainfall: Do not apply if rain is likely to occur within 3 hours of spraying. Avoid irrigation for 24 hours after application. **Grazing**: For alfalfa grown for seed production, do not graze or feed treated hay to livestock. All other crops on label can be grazed or fed to livestock. **Pre-harvest intervals:** Canola, chickpea, dry bean, faba bean, lentil, mustard (oilseed types), pea – 21 days; potato – 30 days; succulent bean and pea – 7 days. **Re-entry interval:** 12 hours. **Re-cropping:** Labelled crops can be planted immediately following application. All other crops not on the label can be planted 14 days after the last application.

Environmental Precautions

Lance is toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the label. **Runoff:** Do not apply to areas where runoff is likely to occur. Boscalid is persistent and will carry over; it is recommended that this product not be used in areas treated with this product during the previous season.

Toxicity

Oral LD_{50} (male/female rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage

Store in original container in a cool, dry area. Do not ship or store near food, feed, seed and fertilizers.

LifeGard WG

Bio fungicide

Formulation

Product	Company	Active ingredient	Formulation	Container size
LifeGard WG (PCP# 32526)	Certis USA distributed by UAP Canada	*Bacillus mycoides* isolate J 3 x 10^{10} spores/g	Wettable granules	0.454 kg

Crops, diseases controlled, rates and staging

Crops	Diseases suppressed	Rate	Staging and specific comments
Potato	White mould (*Sclerotinia sclerotiorum*), early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	28.3 g/acre in 80 L of water/ acre	Early and late blight: repeat applications at 7 day intervals. White mould: apply at 7 - 14 day intervals.
Sugar beet	Cercospora leaf spot (*Cercospora beticola*)		Apply at 14-day intervals in rotation with fungicides labeled for this use.
Hemp	Partial suppression: white mould (*Sclerotinia sclerotiorum*), grey mould (*Botrytis cinera*)		Begin as a preventative spray. Apply at 7 - 14 day intervals when only LifeGard WG will be applied. Use the shorter interval when high disease pressure is expected. When used as part of a rotational program with fungicides labelled for this use, repeat every 7 - 21 days.

Application information

How to apply: Ground application only. Do not apply by air. **Water volume:** Use sufficient water for uniform coverage (80 L/acre).

Application tips

LifeGard® WG should be applied preventatively, when conditions are conducive to disease development, but before disease is observed in the field.

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How it works

LifeGard® WG contains a biological disease control agent (*Bacillus mycoides* isolate J,or BmJ) that reduces the occurrence and severity of plant disease by inducing the plant's natural defense mechanisms against pathogens through a mechanism known as Systemic Acquired Resistance (SAR). BmJ itself has no direct effect on plant pathogens, but preventative applications (before infection or appearance of disease symptoms) can reduce the incidence and severity of subsequent disease. LifeGard® WG is most effective when used in conjunction with or alternation with fungicides having other modes of action, registered for the control of labelled diseases.

Restrictions

Rainfall: Rainfast in 4 hours. **Re-cropping:** No restrictions. **Pre-harvest interval:** Potato, sugar beet: Can be applied up to and including the day of harvest. Hemp: 3 - 4 weeks. **Re-entry interval:** 4 hours.

Environmental precautions

May be toxic to bees. Do not apply this product if bees are visiting the treatment area. Avoid application when heavy rain is forecast. To avoid runoff from treated areas, avoid application to areas with moderate to steep slopes, compacted soil or clay.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) > 5,050 mg/kg.

Storage

Store in original container at a temperature below 25˚C. Product should be used within 16 months from manufacture date.

Luna Tranquility® Fungicide

Group 7, 9

Formulation

Product	Company	Active ingredient	Formulation	Container size
Luna Tranquility® (PCP# 30510)	Bayer	Fluopyram: 125 g/L Pyrimethanil: 375 g/L	Suspension concentrate	4.86 L

Crops, diseases controlled, rates and staging

Crops	Diseases	Rate per acre	Staging and specific comments
Potato	Early blight *(Alternaria solani),* brown leaf spot *(Alternaria alternata)*	243 mL	Begin fungicide applications preventively. Continue as needed on a 7 - 14 day interval. With severe disease pressure, use the shorter intervals.
	White mould, sclerotinia stem rot *(Sclerotinia sclerotiorum)* Suppression of black dot *(Colletorichum coccodes)*	324 mL	

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 80 L/acre. Aerial – 20 L/acre.

How it works

Luna Tranquility fungicide is a combination of Group 7 and Group 9 fungicides for broad spectrum activity with preventative, systemic and curative properties. It is best suited for use in a preventative treatment program.

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Restrictions

Maximum number of applications: Do not apply more than 1.3 L/acre per season. **Pre-harvest interval: 7** days. **Re-entry:** 12 hours. **Re-cropping:** A plant-back interval of 30 days is required for canola, cereal grains, corn, soybean, dry bean, chickpea, lentil and alfalfa. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms and birds. Do not apply directly to water or to areas where surface water is present. Observe buffer zones outlined in the label.

Toxicity

Oral LD_{50} (rats) > 2,000 mg/kg. Dermal LD_{50} (rats) > 2,000 mg/kg.

Storage

Do not store below freezing. If stored for 1 year or longer, shake well before using.

Miravis Ace

Group 3, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Miravis Ace (PCP# 33573)	Syngenta	Pydiflumetofen: 150 g/L Propiconazole: 125 g/L	Suspension emulsion	8.1 L

Crops, diseases controlled, rates and staging

Crops	Diseases	Rate per acre	Staging and specific comments
Wheat (spring, winter, and durum)	Suppression of Fusarium head blight (*Fusarium* spp.), ergot (*Claviceps purpurea*) Control of septoria leaf spot (*Septoria tritici*), septoria glume blotch (*Stagonospora nodorum*), tan spot (*Pyrenophora tritici-repentis*), leaf rust (*Puccinia triticina*), stem rust (*Puccinia graminis f. sp. tritici*), stripe rust (*Puccinia striformis*), powdery mildew (*Erysiphe graminis*)	404 mL	Apply within the range of at least 75% of heads on the main stem fully emerged to when 50% of the heads on the main stem are flowering. Application at this timing is not intended to provide curative control of established leaf diseases. Apply with a 90% non-ionic surfactant at a rate of 0.125% v/v in the spray tank.
Barley	Suppression of Fusarium head blight (*Fusarium* spp.), ergot (*Claviceps purpurea*) Control of scald (*Rhynchosporium secalis*), spot blotch (*Cochliobolus sativus*), net blotch (*Pyrenophora teres*), septoria leaf spot (*Septoria tritici*), leaf rust (*Puccinia hordei*), stem rust (*Puccinia graminis f. sp. tritici* and *f.sp. secalis*), powdery mildew (*Erysiphe graminis*)	404 mL	For suppression of Fusarium head blight and ergot in barley, apply within the range of at least 70% of heads on the main stem fully emerged to 3 days after full head emergence. Use sprayer nozzles configured to provide coverage to the cereal head. Application at the timing for Fusarium head blight will control leaf diseases that occur later in the season. Application at this timing is not intended to provide curative control of established leaf diseases Apply with a non-ionic surfactant at a rate of 0.125% v/v in the spray tank.

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Crops	Diseases	Rate per acre	Staging and specific comments
Oats	Suppression of Fusarium head blight (*Fusarium* spp.), ergot (*Claviceps purpurea*) Control of septoria leaf blotch (*Septoria avenae*), crown rust (*Puccinia cornonata*)	404 mL	For suppression of Fusarium head blight and ergot in oats apply within the range of at least 75% of heads on the main stem fully emerged to when 50% of the heads on the main stem are flowering, Use sprayer nozzles configured to provide excellent coverage to the cereal head. Application at the timing for Fusarium head blight will control leaf diseases that occur later in the season. Application at this timing is not intended to provide curative control of established leaf diseases. Apply with a non-ionic surfactant at a rate of 0.125% v/v in the spray tank.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips
Use sufficient water volume to obtain thorough coverage. For ground applications, 80° or 110° drift reducing flat fan (e.g., those with a pre-orifice or turbulence chamber) or air induction nozzles are recommended. Use 50-mesh nozzle screens or as recommended by the nozzle manufacturer. Apply at uniform speed and avoid overlapping.

How it works
Miravis Ace is a broad spectrum, preventive fungicide recommended for the control or suppression of plant diseases, formulated as a suspo-emulsion.

Restrictions
Rainfall: Avoid application when heavy rain is forecast. **Grazing:** 7-day pre-harvest interval for harvest of forage or hay. Grain and straw can be harvested at normal harvest maturity. **Re-entry interval:** 12 hours.

Environmental precautions
Toxic to aquatic organisms. Observe buffer zones specified on the label. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or heavy clay.

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage:
Keep containers tightly closed in a dry, cool and well-ventilated area.

Miravis Bold

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Miravis Bold (PCP # 33213)	Syngenta	Pydiflumetofen: 200 g/L	Suspension concentrate	8.1 L

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Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Canola	Sclerotinia stem rot *(Sclerotinia sclerotiorum)*	400 mL The use of a non-ionic surfactant is required (0.125% v/v).	Apply at 10 - 50% bloom. Do not exceed 1 application per growing season.

Registered tank mixes
Consult Syngenta for tank mix information.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Air – 20 L/acre minimum.

Application tips
Add 0.125 L of a non-ionic surfactant per 100 litres spray solution. Apply in sufficient water volume to ensure thorough coverage of targeted plants.

How it works
Contains a Group 7 fungicide in the SDHI class.

Restrictions
Maximum seasonal rate: 400 mL/acre. **Rainfall:** Rainfast in 2 hours. Avoid application when heavy rain is forecast. **Pre-harvest interval:** 30 days. **Re-entry interval:** 12 hours. **Re-cropping:** Refer to label for information on re-cropping requirements.

Environmental Precautions
Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity
Oral LD_{50} (Rat, female) = 2,958 mg/kg. Dermal LD_{50} (Rat, male and female) = > 5,000 mg/kg.

Storage
Keep in original container. Store in a cool, dry, well-ventilated area.

Miravis Duo

Group 3, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Miravis Duo (PCP # 33206)	Syngenta	Pydiflumetofen: 75 g/L Difenoconazole: 125 g/L	Suspension concentrate	8.1 L

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Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Potato	Early blight *(Alternaria solani),* brown spot *(Alternaria alternata)* Suppression: white mould *(Sclerotinia sclerotiorum),* Botrytis grey mould *(Botrytis cinerea)*	400 mL	For early blight and brown spot control, apply on a 7 - 14 day interval, starting prior to disease establishment. If disease pressure is high, use the shortest interval. For suppression of white mould, begin applications at 20% bloom. Repeatapplications 10 - 14 days later. For suppression of Botrytis grey mould apply on a 7 - 14 day interval, starting prior to disease establishment. If disease pressure is high, use the shortest interval.
Sugar beet	Alternaria leaf blight (*Alternaria spp.*) Cercospora leaf blight (*Cercospora beticola*) Powdery mildew (*Erysiphe spp.*) Suppression: white mould (*Sclerotinia sclerotiorum*)	400 mL/ac	Apply on a 7 - 14 day interval, starting prior to disease establishment. If disease pressure ishigh, use the shortest interval. Do not apply using aerial applicant equipment.

Application information

How to apply: Ground and aerial application. Sugar beet: ground application only.
Water volume: Ground – 60 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips

Apply in sufficient water to obtain thorough coverage on target plants.

How it works

Consists of a Group 7 SDHI mode of action fungicide (pydiflumetofen), and difenoconazole (Group 3) to provide preventative and early curative activity against early blight. It also provides suppression on Botrytis in potato.

Restrictions

Rainfall: Rainfast in 1 hour. **Pre-harvest interval:** Potatoes – 14 days. Sugar beets – 7 days. **Re-entry interval:** 12 hours. **Re-cropping:** Refer to label for information on re-cropping requirements.

Environmental Precautions

Observe buffer zones specified on the label. The use of this chemical may result in contamination of groundwater in areas where soils are permeable and/or depth to water table is shallow. Toxic to aquatic organisms and non-target terrestrial plants.

Toxicity

Oral LD_{50} (Rat, female) = 1,098 mg/kg. Dermal LD_{50} (Rat, male and female) = > 2,000 mg/kg.

Storage

Keep in original container. Store in a cool, dry, well-ventilated area.

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Miravis Neo 300 SE

Group 3, 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Miravis Neo 300 SE (PCP# 33391)	Syngenta	Pydiflumetofen: 75 g/L Propiconazole: 125 g/L Azoxystrobin: 100 g/L	Suspension	10.125 L

Crops, diseases controlled, rates and staging

Crops	Diseases controlled	Rate per acre	Staging and specific comments
Field pea	Anthracnose (*Colletotrichum truncatum*), Mycosphaerella blight (*Mycosphaerella pinodes*), Asian soybean rust (*Phakopsora pachyrhizi*), powdery mildew (*Erysiphe pisi*)	404 - 505 mL	Apply before disease is established and no later than the onset of flowering.
Field pea/Lentil	Suppresion of white mould (*Sclerotinia sclerotiorum*)	505 mL	For suppression of white mould, begin application when plants are at first bloom to 10% bloom.
Chickpea/ Lentil	Powdery mildew (*Erysiphe pisi*), anthracnose (*Colletotrichum truncatum*)	404 - 505 mL	Apply before disease is established and no later than the onset of flowering. Use the higher rate under higher disease pressure conditions.
Chickpea	Ascochyta blight (*Ascochyta rabiei*), suppression of white mould (*Sclerotinia sclerotiorum*)	505 mL	For suppression of white mould, begin application when plants are at first bloom to 10% bloom.
Corn	Eye spot (*Aureobasidium zeae*), grey leaf spot (*Cercosporazeae-maydis*), northern corn leaf blight (*Setophaeria turcica*), southern corn leaf blight (*Cochliobolus heterostrophus*), common rust (*Puccinia sorghi*)	303 - 404 mL	Make the first application at the first sign of disease. A second application can be made 14 days after the first application, when disease pressure is high or when agronomic or weather conditions are conducive to disease development or movement.
Corn	Suppresion of fusarium and gibberella ear rots (*Fusarium* spp and *Gibberella zeae*)	404 - 505 mL	Apply once from developmental stage of corn between the tip of stigmata visible (silking) to the stigmata drying (silk browning).
Barley	Scald (*Rynchosporium secalis*), septoria leaf blotch (*Septoria* spp.) spot blotch (*Cochliobolus sativus*), tan spot (*Pyrenophora tritici-repentis*), net blotch (*Drechslera teres*), stripe rust (*Puccinia striiformis*)	300 mL	Make one application between end of tillering to 50% of heads on main stem emerged, with optimal application timing at flag leaf to maximize yield potential. Apply before disease development or at the beginning of disease.
Oats	Septoria leaf blotch (*Septoria avenae*), crown rust (leaf rust) (*Puccinia coronata*)	300 mL	Make one application between end of tillering to 50% of heads on main stem emerged, with optimal application timing at flag leaf to maximize yield potential. Apply before disease development or at the beginning of disease.
Rye	Scald (*Rynchosporium secalis*), septoria leaf blotch (*Septoria tritici*), tan spot (*Pyrenophora tritici-repentis*), stripe rust (*Puccinia striiformis*)	300 mL	Make one application between end of tillering to 50% of heads on main stem emerged, with optimal application timing at flag leaf to maximize yield potential. Apply before disease development or at the beginning of disease.

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Crops	Diseases controlled	Rate per acre	Staging and specific comments
Triticale	Septoria leaf blotch (*Septoria tritici*)	300 mL	Make one application between end of tillering to 50% of heads on main stem emerged, with optimal application timing at flag leaf to maximize yield potential. Apply before disease development or at the beginning of disease.
Wheat (spring, winter, durum)	Septoria leaf blotch (*Septoria tritici*), spot blotch (*Cochliobolus sativus*), tan spot (*Pyrenophora tritici-repentis*), leaf rust (*Puccinia triticina*), stripe rust (*Puccinia striiformis*)	300 mL	Make one application between end of tillering to 50% of heads on main stem emerged, with optimal application timing at flag leaf to maximize yield potential. Apply before disease development or at the beginning of disease.

Note: the recommended rate for peas, corn and lentil is 404 mL/acre. The recommended rate for chickpea is 505 mL/acre.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips

Apply at uniform speed and avoid overlapping. Coarse sprays are less likely to drift; therefore, avoid combinations of pressure and nozzle type that will result in overly fine particles.

How it works

Miravis Neo 300 SE is a broad spectrum, preventive fungicide recommended for the control or suppression of important plant diseases, formulated as a suspension.

Restrictions

Rainfall: Most effective when applied and allowed to dry before a rainfall. **Pre-harvest intervals:** Field pea, lentil, chickpea – 30 days. Dry pea hay may be fed or harvested 14 days after last application. Grain and forage corn – 30 days. Sweet corn – 14 days. Grain and stover may be fed or harvested 30 days after last application.
Re-cropping: Dried shelled pea and bean (except soybean), soybeans, cereals (wheat, barley), corn (field, sweet, pop and specialty), rapeseed may be immediately reseeded. Oats and rye – 45 days. All other crops intended for food or feed – 105 days. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones on the label should be observed.

Toxicity

Oral LD_{50} (rats) = > 550 mg/kg.

Storage

Keep in original container. Store in a cool, dry, well-ventilated area.

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Nexicor

Group 3, 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Nexicor (PCP# 32678)	BASF Canada	Fluxapyroxad: 30 g/L Pyraclostrobin: 200 g/L Propiconazole: 125 g/L	Emulsifiable concentrate	8 L, 128 L

Crops, diseases controlled, rates and staging

Crops	Diseases suppressed	Rate	Staging and specific comments
Wheat (all types including durum), triticale	Leaf rust (*Puccinia recondita*), stripe rust (*Puccinia striiformis*), tan spot (*Pyrenophora tritici-repentis*), Septoria leaf spot (*Septoria tritici, Leptosphaeria nodorum*), spot blotch (*Cochliobolus sativus*), scald (*Rhynchosporium secalis*)	200 mL	Fungicide performance is best when product is applied prior to disease development or at the onset of disease. To maximize yield in cereals, it is important to protect the flag leaf from disease. Optimum time to apply a single application is immediately after flag leaf emergence. Apply a maximum of 1 application per season. Nexicor may be applied for control of listed foliar diseases and followed with a fungicide that targets Fusarium head blight at anthesis stage.
Barley	Net blotch (*Pyrenophora teres*), stripe rust (*Puccinia striiformis*), spot blotch (*Cochliobolus sativus*), scald (*Rhynchosporium secalis*)	200 mL	
Rye	Leaf rust (*Puccinia recondita*), powdery mildew (*Erysiphe graminis f. sp. tritici*)	200 mL	
Oats	Crown rust (*Puccinia coronate*), Septoria leaf blotch (*Septoria avenae*)	200 mL	
Canola	Blackleg (*Leptosphaeria maculans*)	200 mL	Apply at the 2 - 6 leaf stage. Apply a maximum of one application per year.

Registered tank mixes

Tank mix partner	Crops registered
Odyssey WDG, Odyssey Ultra, and Ares Herbicide	Group 2 tolerant canola
Liberty Herbicide (150 SN or 200 SN)	Liberty Link canola
Registered glyphosate herbicides	Roundup Ready canola
Equinox and Poast Ultra Herbicide	All canola varieties

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips

Good coverage is essential for effective disease control, and higher water volumes tend to increase performance with dense canopies.

How it works

The active ingredient fluxapyroxad is a SDHI fungicide with systemic activity. The active ingredient pyraclostrobin is a member of the strobulirins class of chemistry used as a broad spectrum fungicide. The active ingredient propiconazole is a triazole fungicide with broad-spectrum systemic activity.

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Restrictions

Rainfall: Avoid application when heavy rain is forecast. Rainfast in 1 hour. **Grazing:** All crops can be grazed or fed to livestock within 3 days of application. **Pre-harvest interval:** Cereals – 45 days. Canola – 30 days.
Re-cropping: All major row crops may be planted immediately following last application. See label for complete list.

Environmental precautions

Observe buffer zones specified on the label. Do not apply on any body of water and prevent cleaning of equipment near water bodies. Reduce risk of runoff from treated areas into aquatic habitats by avoiding application to areas with a moderate to steep slope or compacted soil. Toxic to aquatic organisms and non-target terrestrial plants.

Toxicity

Oral LD_{50} (rats) = > 50 - < 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in original container. Protect from freezing.

Orondis Gold Potato/Orondis Gold

Group 4, 49

Formulation

Product	Company	Active ingredient	Formulation	Container size
Orondis Gold Part A (PCP# 33284)	Syngenta	Oxathiapiprolin	Suspension concentrate	2.84 L
Orondis Gold Part B (PCP# 32937)		Metalaxyl-M and S-isomer	Solution	3.56 L
Orondis Gold (PCP# 33508)		Oxathiapiprolin: 35 g/L	Emulsifiable concentrate	4.1 L
		Metalaxyl-M and S-isomer: 105 g/L		

Crops, diseases controlled, rates and staging

Crops	Diseases suppressed	Rate	Staging and specific comments
Potato	Suppression of pink rot in the daughter tubers (*Phytophthora erythroseptica*) Suppression of Pythium leak in the daughter tubers (*Pythium ultimum*)	Orondis Gold Part A: 3.2 mL/100 m row (0.14 L/acre assuming a 36 inch row spacing) Orondis Gold Part B: 4 mL/100 m row (0.18 L/acre assuming a 36 inch row spacing) Orondis Gold: 18.3 mL/100 m row (0.80 L/acre assuming 36 inch row spacing)	In-furrow application only.

Application information

How to apply: In-furrow application during seeding only. **Water volume:** 16 L/acre minimum.

Application tips

Slurrying the product with fertilizer is not recommend nor supported. A dedicated application system for in furrow pesticide application should be used. A system of 2 nozzles per row unit on the planter is recommended. 1 nozzle should be pointing 20° down, spraying 6 to 8 inches across the open furrow just before the tuber in the furrow, and a second nozzle should be pointing 70° down, spraying 6 to 8 inches across the open furrow before the furrow is closed. Use of water rates greater than 40 L/acre is not recommended. May be used in conjunction with Vibrance Ultra Potato seed treatment.

How it works

Orondis Gold combines 2 active ingredients: oxathiapiprolin (Orondis) and metalaxyl-M (Ridomil Gold 480SL). Orondis Gold Potato is readily absorbed by the roots and provides protection against the above diseases under varied weather conditions.

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Restrictions
Rainfall: Avoid application when heavy rain is forecast. Do not apply in greenhouses. **Re-entry interval:** 12 hours.

Environmental precautions
Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity
Orondis Gold A 200SC: LD_{50} (Oral) = 5,000 mg/kg. Orondis Gold B 480SL: LD_{50} (Oral) = 550 mg/kg.

Storage
Do not use or store near heat or open flame.

Orondis Ultra

Group U15, 40

Formulation

Product	Company	Active ingredient	Formulation	Container size
Orondis Ultra A (PCP# 32145) **Orondis Ultra B (PCP# 32146)**	Syngenta	Mandipropamid: 250 g/L Oxathiapiprolin: 100 g/L	Suspension concentrate/ oil dispersion	4.05 L + 1.21 L
Orondis Ultra (PCP# 32805)	Syngenta	Mandipropamid: 250 g/L Oxathiapiprolin: 30 g/L	Suspension concentrate	3.78 L

Crops, diseases controlled, rates and staging

Crops	Diseases	Rate per acre	Staging and specific comments
Potato	Late blight (*Phytothphora infestans*)	162 - 243 mL Orondis Ultra A* 49 - 142 mL Orondis Ultra B*	Begin applications prior to disease development and continue on a 7 - 10 day interval. Use higher rate and shorter interval when disease pressure is high.
		162 - 243 mL Orondis Ultra**	

Note: * When using the Orondis Ultra Co-Pack (Orondis Part A and Orondis Part B), the recommended rate is 40 acres/case.
** When using Orondis Ultra, the recommended rate is 75 acres/case.

Application information
How to apply: Orondis Ultra Co-pack – ground application only. Do not apply by air. Orondis Ultra – ground and aerial application. **Water volume**: Ground – 40 L/acre minimum.

How It works
The 2 modes of action provide protection against late blight in potato. Orondis Ultra combines mandipropamid, with oxathiapiprolin. Oxathiapiprolin penetrates the leaf surface and moves upward in the plant to effectively protect existing plant material plus new growth.

Restrictions
Maximum number of applications: Refer to each individual label. **Rainfall:** Avoid application when heavy rain is forecast. **Pre-harvest interval:** Potato 14 days. **Re-cropping:** For all legume crops except succulent pea, a plant-back interval of 180 days is required for Orondis Ultra B. Do not plant any crop that is not registered for use with Orondis Ultra A for a period of 30 days after the last application. **Re-entry interval:** 12 hours.

Environmental precautions
Orondis Ultra B contains an active ingredient and aromatic petroleum distillates that are toxic to aquatic organisms. May be toxic to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects. Oxathiapiprolin is persistent and may carry over. It is recommended that any products containing oxathiapiprolin not be used in areas treated with this product during the previous season.

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Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg body weight. Dermal LD_{50} (rats) = > 5,000 mg/kg body weight.

Storage
Store in a cool, dry place.

Phostrol

Group 33

Formulation

Product	Company	Active ingredient	Formulation	Container Size
Phostrol (PCP# 30449)	Belchim Crop Protection Canada	Mono- and dibasic sodium, potassium, and ammonium phosphites: 53.6%	Liquid	10 L, 1,000 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Staging and specific comments
Potato	Suppression of pink rot (*Phytophthora erythroseptica*)	2.3 - 4.7 L	In-furrow application. Apply at planting in a band directly over the seed prior to row closure.
	Late blight (*Phytophthora infestans*)	1.2 - 4.7 L	Foliar application. Begin applications when conditions favouring disease development are present and repeat on a 7 - 14 day interval. Use the higher application rate and shorter application interval when disease pressure is moderate to high.
	Suppression of pink rot (*Phytophthora erythroseptica*)	2.3 - 4.7 L	
	Suppression of early blight (*Alternaria solani*)	1.2 - 2.3 L	Post-harvest control: Directly apply to tubers and ensure complete and even coverage.
	Brown leaf spot (Alternaria altenata)	0.42 L in 2 L water to 1 tonne potato tubers	Post-harvest control: Directly apply to tubers and ensure complete and even coverage.
	Late blight (*Phytophthora infestans*)		
	Pink rot (*Phytophthora erythroseptica*)		
	Suppression of silver scurf (*Helminthosporium solani*)		
Field pea	Suppression of early season root rot (*Aphanomyces eutiches, Pythium ultimum*)	1.2 L/acre	Apply fungicide after field pea seed is treated with a registered seed treatment for control of various root rot pathogens. Apply at crop emergence followed by a second application 14 days later. OR Apply in furrow at planting followed by a second application at crop emergence.

Registered tank mixes
Potato in-furrow: Pink rot – Ridomil Gold 480SL.

Foliar: Pink rot – Ridomil Gold MZ 68WP Water Soluble Bag, Ridomil Gold MZ 68WG, Ridomil Gold 480SL.
Foliar: Late blight – Bravo 500, Bravo ZN, Echo 720, Echo 90DF, Dithane F-45, Dithane DG 75, Dithane DG Rainshield NT, Manzate Pro-Stick, Gavel 75DF, Penncozeb 75 DF.

Field pea: None registered.

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Application information
How to apply: Potato in-furrow, ground and aerial application. **Water volume:** Potato in-furrow – 12 L/acre. Ground – 80 L/acre. Aerial – 20 L/acre. Field pea – ground application – 40 L/acre.

Restrictions
Maximum number of applications: Potato – do not exceed 7 foliar applications per year. Field pea – do not exceed 2 applications per year. **Grazing:** Do not graze treated fields or feed treated forage or hay to livestock. **Pre-harvest interval:** Potato – can be e applied up to the day of harvest. Field pea – 21 days. **Re-entry interval:** 12 hours**. Re-cropping:** No restrictions listed.

Environmental precautions
Do not use to treat aquatic pests. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast.

Toxicity
Oral LD_{50} (rats) > 5,000 mg/kg. Dermal LD_{50} (rats) > 5,000 mg/kg.

Storage
Store in a dry, secure and ventilated area. Keep in original container.

Priaxor

Group 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Priaxor (PCP# 30567)	BASF Canada	Fluxapyroxad: 167 g/L Pyraclostrobin: 333 g/L	Suspension concentrate	9.6 L

Crops, diseases controlled, rates and timing

Crops*	Diseases	Rate per acre	Staging and specific comments
Wheat (all types including durum and winter) Triticale	Leaf rust (*Puccinia recondita*), Septoria leaf spot (*Septoria tritici* or *Leptosphaeria nodorum*), tan spot (*Pyrenophora tritici-repentis*), powdery mildew (*Erysiphe graminis f.* sp. *tritici*), spot blotch (*Cochliobolus sativus*), stripe rust (*Puccinia striiformis*)	90 - 120 mL	Apply immediately after flag stage, prior to head emergence. Use the higher rate to obtain extended protection with maximum yield benefits. Apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists, or weather conditions are favourable for disease development.
Barley	Net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*), spot blotch (*Cochliobolus sativus*), stripe rust (*Puccinia striiformis*)	90 - 120 mL	
Corn (field, sweet, pop, seed types)	Common rust (*Puccinia sorghi*), grey leaf spot (*Cercospora zeae-maydis*), northern leaf blight (*Setosphaeria turcica*), suppression of eye spot (*Aureobasidium zeae*)	120 mL	For optimal disease control, begin applications prior to disease development. Use the shorter interval when disease pressure is high. Do not make sequential applications. If disease persists or weather conditions are favourable for disease development, make a second application 10 -14 days later, with a fungicide that contains a different mode of action.

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Crops*	Diseases	Rate per acre	Staging and specific comments
Oats	Crown rust (*Puccinia coronata*)	90 - 120 mL	Apply immediately after flag stage, prior to head emergence. Use the higher rate to obtain extended protection with maximum yield benefits. Apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists, or weather conditions are favourable for disease development.
Rye	Leaf rust (*Puccinia recondita*), powdery mildew (*Erysiphe graminis*)	90 - 120 mL	
Dry bean (*Phaseolus, Vigna* **and** *Lupinus* **spp.)**	Anthracnose (*Colletotrichum lindemuthianum*), powdery mildew (*Erysiphe* spp.), rust (*Uromyces appendiculatus*)	120 mL	Apply at the beginning of flowering or at the onset of symptoms for the more aggressive diseases (e.g., anthracnose in lentil).
	Asian soybean rust (*Phakopsora pachyrhizi*)	120 - 180 mL	
Field pea	Mycosphaerella blight (*Mycosphaerella pinodes*), powdery mildew (*Erysiphe* spp.), Ascochyta blight (*Ascochyta pinodes*), Asian soybean rust (*Phakopsora pachyrhizi*), suppression of downy mildew (*Peronospora viciae f.* sp. *Pisi*)	120 - 180 mL	Apply at the beginning of flowering or at the onset of symptoms. If disease persists or weather conditions are favourable for disease development, make a second application 10 - 14 days later with a fungicide that contains a different mode of action.
	Suppression of white mould (*Sclerotinia sclerotiorum*)	180 mL	
Faba bean	Powdery mildew (*Erysiphe* spp.), Ascochyta blight (*Ascochyta* spp.), Asian soybean rust (*Phakopsora pachyrhizi*)	120 - 180 mL	Apply at the beginning of flowering or at the onset of symptoms. If disease persists or weather conditions are favourable for disease development, make a second application 10 - 14 days later with a fungicide that contains a different mode of action.
	Suppression of white mould (*Sclerotinia sclerotiorum*) and grey mould (*Botrytis cinerea*)	180 mL	
Lentil	Anthracnose (*Colletotrichum truncatum*), Ascochyta blight (*Ascochyta lentis*)	120 - 180 mL	
	Suppression of white mould (*Sclerotinia sclerotiorum*) and grey mould (*Botrytis cinerea*)	180 mL	
Succulent bean and pea (*Phaseolus, Vigna* **and** *Pisum spp.*)	Powdery mildew (*Erysiphe spp.*), Ascochyta blight (*Ascochyta* spp.), mycosphaerella blight (*Mycosphaerella* spp.), rust (*Uromyces* spp.), Asian soybean rust (*Phakopsora pachyrhizi*)	120 - 180 mL	Apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists or weather conditions are favourable for disease development.
	Suppression of white mould (*Sclerotinia sclerotiorum*) and grey mould (*Botrytis cinerea*)	180 mL	
Chickpea	Ascochyta blight (*Ascochyta rabiei*)	120 - 180 mL	Apply at the onset of symptoms for the more aggressive diseases. Apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists or weather conditions are favourable for disease development
	Suppression of white mould (*Sclerotinia sclerotiorum*) and grey mould (*Botrytis cinerea*)	180 mL	
Flax	Pasmo (*Septorici linicolu*)	90 - 120 mL	Pasmo control: apply at 20 - 50% flowering. White mould suppression: apply at 20 - 50% flowering.
	Suppression of white mould (*Sclerotinia sclerotiorum*)	180 mL	

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Crops*	Diseases	Rate per acre	Staging and specific comments
Soybean	Asian soybean rust (*Phakosporu pachyrhzi*),	90 - 120 mL	Apply at the onset of disease or first flower for optimal efficacy.
	Frogeye leaf spot (*Cercospora sojina*) Septoria brown spot (*Septoria glycines*)	97 - 120 mL	
	Suppression of white mould (*Sclerotinia sclerotiorum*)	180 mL	
Sugar beet	Cerecospora leaf spot (*Cercospora beticola*), powdery mildew (*Erysiphe betae*)	180 mL	Begin application prior to disease development. If disease persists or weather conditions are favourable for disease development, apply a second time 14 days later (up to full bloom). Use a fungicide that contains a different mode of action.
Bluegrasses, fescues, ryegrasses (seed production)	Leaf and stem rust (*Puccinia recondita*; *P. graminis*), suppression of powdery mildew (*Erysiphe graminis*)	90 - 120 mL	Apply prior to disease development and apply a second time 10 - 14 days later with a fungicide that contains a different mode of action if disease persists. Use the higher rate and shorter interval when disease pressure is high.
Alfalfa (seed production only)	Common leaf spot (*Pseudopeziza medicaginis*)	120 mL	Apply at beginning of flowering (10 - 30% bloom) or the onset of disease. Maximum 1 application per year.
	Suppression of blossom blight (*Sclerotinia sclerotiorum*)	180 mL	
Rapeseed, canola, canola quality *Brassica juncea*, **mustard (oilseed and condiment)**	Black spot (A*lternaria brassicae* and *A. raphani*)	90 - 120 mL	Apply at 20 - 50% bloom for suppression to early pod stage (90% bloom) for control in canola.
	Blackleg (*Leptosphaeria maculans*)	90 - 120 mL	Apply at the 2 - 6 leaf stage.
	Suppression of white mould (*Sclerotinia sclerotiorum*)	180 mL	Apply at 20 - 50% bloom for suppression
Sunflower	Suppression of leaf rust (*Puccinia helianthi*)	120 mL	For optimal disease suppression, apply prior to disease development.
Crop Group 18: Non-grass animal feeds including: alfalfa, velvet bean, clover, kudzu, lespedeza, lupin, sainfoin, trefoil, vetch, crown vetch, milk vetch and including mixed stands of forages grown for feed	Common leaf spot (*Pseudopeziza medicaginis*)	120 - 180 mL	For optimal disease control, apply at the beginning of flowering (10 - 30% bloom) or at the onset of disease. Make 1 application per forage cutting for feed. Maximum of 2 applications per season.
	Blossom blight (*Sclerotinia sclerotiorum*)	180 mL	

*See label for complete list of registered crops.

Registered tank mixes*

Tank mix partner	Crops registered
Lance WDG	Canola
Odyssey WDG	XCEED (*Brassica juncea*)
Poast Ultra	All canola varieties
Liberty 150 SN, Liberty 200 SN	LibertyLink canola
Registered glyphosate products	Glyphosate tolerant canola

*Note: Consult the label of the tank mix partner for diseases/weeds controlled, rates and timing of applications.

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Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips
Good coverage is essential for effective disease control. Priaxor works best if it is applied in a preventive manner prior to the development of disease. Do not apply more than 1 application of this product before alternating to a fungicide with an alternative mode of action. The use of a non-ionic surfactant is not required but applications at 0.125% v/v will improve efficacy.

How it works
The active ingredient fluxapyroxad is a carboximide (SDHI) fungicide with systemic activity. The active ingredient pyraclostrobin is a member of the strobilurin class of chemistry used as a broad spectrum fungicide.

Restrictions
Rainfall: Avoid application when heavy rain is forecast. Rainfast in one hour. **Grazing:** All crops can be grazed or fed to livestock except grasses and alfalfa grown for seed, but observe minimum pre-harvest interval for each crop. **Pre-harvest intervals:** Cereals – Apply no later than end of flowering. Dry pea, lentil, chickpea, and dry bean – 30 days. Corn, soybean, canola, sunflower, flax – 21 days. Grasses grown for seed – 14 days. Sweet corn, edible legumes, succulent pea and bean, sugar beet – 7 days. **Re-cropping:** All labelled crops and tuberous and corm vegetables, sugar beet, legume vegetables, pome fruits, stone fruits may be planted immediately following the last application. A plant-back interval of one year is required for all other crops.

Environmental precautions
Observe buffer zones specified on the label. The use of this chemical may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soils) and/or depth of the water table is shallow. Toxic to aquatic organisms, small mammals and non-target terrestrial plants.

Toxicity
Oral LD_{50} (rats) > 500 - < 2,000 mg/kg.

Storage
Store in original container. Protect from freezing. Store away from food or feed.

Proline® 480 SC Foliar Fungicide/Holdfast/ Soratel

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Proline 480 SC (PCP# 28359)	Bayer	Prothioconazole: 480 g/L	Suspension concentrate	5.1 L
Holdfast (PCP # 34013)	Winfield United Canada	Prothioconazole: 480 g/L	Suspension concentrate	5.1 L
Soratel (PCP # 34155)	ADAMA Canada	Prothioconazole: 250 g/L	Emulsifiable concentrate	9.6 L

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Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre Proline/ Holdfast	Rate per acre Soratel	Timing and comments
Barley	Fusarium head blight (suppression) (*Fusarium* spp.)	128 - 170 mL	240 - 320 mL	Apply when 70 - 100% of the barley main stem heads are fully emerged to 3 days after full head emergence. Application at the higher rate is suggested in situations where disease pressure is expected to be high. This may occur when prolonged periods of warm wet weather are forecast during barley head emergence, when barley and wheat is grown in a crop rotation that has contained corn or when susceptible cultivars are grown. Use of higher rate will typically provide highest levels of mycotoxin reduction.
	Net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*), spot blotch (*Cochliobolus sativus*)	85 - 128 mL	162 - 243 mL	Apply as a preventive foliar spray when the earliest disease symptoms appear on the leaves and stems. Barley fields should be observed closely for early disease symptoms, particularly when susceptible varieties are planted and/ or under prolonged conditions favourable for disease development. Maximum of 2 applications per season; minimal spray interval of 7 days.
Wheat (spring, durum, winter)	Fusarium head blight (suppression) (*Fusarium* spp.)	128 - 170 mL	240 - 320 mL	Fusarium head blight or control of glume blotch: Apply within the time period from when at least 75% of the wheat heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower. Use of higher rate will typically provide highest levels of mycotoxin reduction.
	Glume blotch (*Stagonosora nodorum*)	128 - 170 mL	240 - 320 mL	
	Speckled leaf blotch (*Septoria tritici*), tan spot (*Pyrenophora tritici-repentis*), leaf rust (*Pucciniarecondata*)	128 mL	240 mL	Observe crop closely, and apply as a preventive foliar spray when the earliest disease symptoms appear on the leaves and stems. Maximum of 2 applications per season. Minimum spray interval of 7 days between applications.
Oats	Crown rust (*Puccinia coronate*)	128 mL	240 mL	Apply as a preventive foliar spray when the earliest disease symptoms appear on the leaves and stems. Oat fields should be observed closely for early disease symptoms, particularly when susceptible varieties are planted and/or under prolonged conditions that favour disease development. Maximum of 2 applications per season. Minimum spray interval of 7 days.
Canola, rapeseed, oriental mustard, *Brassica carinata*	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	128 - 149 mL	240- 280 mL	Apply when the canola crop is in the 20 - 50% bloom stage. Best protection will be achieved when the fungicide is applied prior to petals beginning to fall and will allow for the maximum number of petals to be protected. The higher rate is recommended for fields with a history of heavy disease pressure or for dense crop stands. A second application at the lower rate may be applied 7 - 10 days after the first application - up to full bloom stage of canola, if disease persists or weather conditions are favourable for development of disease. When conditions favouring disease are severe, use the shorter spray interval. Good spray coverage of the plants is essential.
Flax	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	128 - 149 mL	243 - 283 mL	Apply when the crop is in the 20 - 50% bloom stage. Best protection will be achieved when the fungicide is applied prior to petals beginning to fall and will allow for the maximum number of petals to be protected. The higher rate is recommended for fields with a history of heavy disease pressure or for dense crop stands. Good spray coverage of the plants is essential.

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Crops	Diseases	Rate per acre Proline/ Holdfast	Rate per acre Soratel	Timing and comments
Chickpea	Ascochyta blight (*Ascochyta rabiei*)	128 - 170 mL	240 - 320 mL	Apply at the first sign of disease. Maximum 3 applications per year. After initial application, repeat applications can be made at 10 - 14 day intervals. Apply the higher rate when conditions favour disease development or when growing less disease resistant varieties. A maximum of 510 mL/acre may be applied per crop year.
	Grey mould (suppression) (*Botrytis cinerea*)	170 mL	NR*	
Lentil	Ascochyta blight (*Ascochyta* spp.), white mould (*Sclerotinia sclerotiorum*), anthracnose (suppression) (*Colletorichum lentis*)	128 - 170 mL	NR*	Apply at the beginning of flowering or at first sign of disease. Maximum 2 applications per year. After initial application, 1 additional application can be made 10 - 14 days after if conditions remain favourable for disease development. Apply the higher rate when conditions favour disease development or when growing less disease resistant varieties. A maximum of 339 mL/acre may be applied per crop year.
	Grey mould (suppression) (*Botrytis cinerea*)	170 mL	NR*	
Corn (field, sweet and popcorn)	Fusarium and Gibberella ear rots (*Fusarium* spp. and *Gibeberella* spp.) (suppression) Grey leaf spot (*Cercospora zeaemaydis*)	170 mL	320 mL	Fusarium ear rot outbreaks occur when the weather is warm and wet during silking. Timing of application is critical. For optimum suppression of ear rot apply from the development stage of corn between stigmata visible (silking, BBCH 63) to the stigmata drying (silk browning, BBCH 67). To achieve thorough cob coverage using ground equipment, drop nozzles are recommended. Maximum of 1 application per season.
	Rusts (*Puccinia sorgh, Puccinia polysora*), eyespot (*Kabatiella zeae* or *Aureobasidium zeae*), northern blight (*Setosphaeria turcicia*)	128 mL	320 mL	Apply as a preventive spray when the earliest disease symptoms appear on the leaves and stems. Under high disease pressure, it is recommended to use a non-ionic surfactant. Do not apply a non-ionic surfactant prior to tassel emergence as crop injury may occur. Maximum of 1 application per season.
Soybean	Asian soybean rust (*Phakopsora pachyrhizi*), frogeye leaf spot (*Cercospora sojina*)	85 mL	160 mL	Apply when disease symptoms are present or the risk of infection is imminent. Maximum of 1 application per season.
Sunflower Safflower	Sclerotinia head rot (suppression) (*Sclerotinia sclerotiorum*), sunflower rust (*Puccinia helianth*)	170 mL	NR*	Apply when the crop is in the 10 - 50% disk flower bloom stage.
Sugar beet	Cercospora leaf spot (*Cercospora beticola*)	128 - 168 mL	NR*	Apply at first sign of disease. Use the higher rate when conditions are favourable for severe disease pressure. Maximum of 3 applications per crop year. Repeat applications as needed using a 14 - 21 day interval depending on disease pressure.
	Rhizoctonia crown rot (*Rhizoctonia solani*) (soil borne disease)	168 mL	NR*	Apply at the 4 leaf stage to row closure growth stage. Repeat applications as needed using a 21 day spray interval.

* Not registered.

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Registered tank mixes
None registered.

Application information
How to apply: Ground equipment – wheat, barley, canola, rapeseed, oriental mustard, flax, chickpea, lentil, oats, corn, sugar beet. Aerial – wheat, barley, canola, rapeseed, oriental mustard, flax, oats, chickpea, lentil, soybean.
Water volume: Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

How it works
Prothioconazole is a broad spectrum, systemic fungicide for the control or suppression of listed diseases on registered crops.

Application tips
Proline/Holdfast: When used in wheat, barley and oat, apply with a non-ionic surfactant (AgSurf or Agral 90) at 0.125% v/v. Spray coverage is essential for optimum efficacy. Nozzles should be operated within the spray pressure recommendations suggested by the manufacturer.

Restrictions
Pre-harvest interval: Barley, wheat and oat – 30 days. Canola, flax, rapeseed or oriental mustard – 36 days. Chickpea, lentil or sugar beet – 7 days. Corn – 14 days. Soybean – 20 days. Sunflower or safflower – 45 days.
Re-entry interval: 24 hours. **Re-cropping:** Treated areas may be replanted with any crop specified on the label as soon as practical after the last application. For crops not listed on the label, do not plant back within 30 days of last application.

Environmental precautions
Toxic to aquatic organisms. Observe specified buffer zones. Do not apply this product directly to freshwater habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Runoff:** To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment.

Toxicity
Oral LD_{50} (rats) = 2,000 - 5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store in a cool, dry place. Store in original container. Do not store at temperatures below freezing.

Proline® GOLD Fungicide

Group 3, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Proline® Gold (PCP# 30511)	Bayer	Fluopyram: 200 g/L Prothioconazole: 200 g/L	Suspension concentrate	10.1 L

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Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Timing and comments
Dry bean	White mould (*Sclerotinia sclerotiorum)*	300 mL	Begin fungicide applications preventively. When disease pressure is high or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7 - 14 day interval. Use shorter intervals for best protection.
	Ascochyta blight (*Ascochyta* spp.), Anthracnose (*Colletotrichum lindemuthianum*), Asian soybean rust (*Phakospora pachyrhizi*) Mycosphaerella blight (*Mycosphaerella pinodes*)	200 - 300 mL	Begin fungicide applications preventively. When disease pressure is high or when agronomic or weather conditions are conducive to disease development, continue applications as needed on a 7 - 14 day interval. Use the higher rate when conditions for heavy infestation exist or when growing less resistant cultivars.
Canola	White mould *(Sclerotina sclerotiorum)*	253 mL	Apply at 20 - 50% bloom stage of crop. For best protection apply fungicide prior to petal drop. Apply second application 10 - 14 days later (up to full bloom) if disease persists or conditions are favourable for disease development.
Lentil	Anthracnose *(Colletotrichum lentis)*	300 mL	Make first application prior to the appearance of stem lesions, typically between the 8 - 10 node stage and early flowering. Apply a second application 7 -14 days later when disease pressure is high or conditions are conducive to disease development. Use shorter intervals for protection under high disease pressure. For maximum efficacy against anthracnose use an integrated approach to disease management including the use of alternative chemistries when multiple fungicide applications are required.

Registered tank mixes
None registered.

Application information
How to apply: Beans – ground equipment only. Do not apply by air. Canola – ground and aerial application.
Water volume: Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

How it works
Proline Gold is a broad spectrum fungicide with preventive, systemic, and curative properties recommended for the control of certain crop diseases.

Application tips
Use sufficient water volume and spray pressure to provide thorough, uniform coverage for optimum disease control.

Restrictions
Beans: Do not apply more than 0.6 L of Proline Gold per acre per season.

Pre-harvest interval: Dry beans – 14 days. Canola – 36 days. **Grazing:** Beans – do not graze treated area, and do not harvest for forage or hay for 7 days after application. Canola – do not graze treated area and do not harvest rapeseed forage for feed. **Re-entry interval:** 24 hours. **Re-cropping:** Do not re-plant to alfalfa for 14 days after application. Crops listed on this label as well as chickpea, lentil, cereals, corn, soybean, oilseeds, tuberous and corm vegetables and sugar beet may be rotated any time following the last application. All other crops may be re-planted 30 days following the last application.

Environmental precautions
Proline Gold is toxic to birds and aquatic organisms. Observe buffer zones specified in the label. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment washwaters.

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Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,050 mg/kg.

Storage
Store in a cool, dry place. Store in original container. Do not store at temperatures below freezing.

Prosaro® PRO Fungicide

Group 3, 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Prosaro® PRO Fungicide (PCP# 34093)	Bayer	Prothioconazole: 200 g/L Tebuconazole: 100 g/L Fluopyram: 100 g/L	Foliar fungicide suspension	6 L, 97 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Staging and specific comments
Wheat (spring, winter and durum) Triticale (spring and winter)	Rusts (leaf, stem and stripe) (*Puccinia triticina, P. graminis, P. striiformis*), leaf and glume blotch (*Septoria tritici, Stagonospora nodorum*) tan spot (*Pyrenophora tritici-repentis*), Powdery mildew (*Blumeria graminis syn. Erysiphe graminis*), spot blotch (*Cochliobolus sativus*), Fusarium head blight (suppression) (*Fusarium graminearum* syn. *Gibberella zeae*), ergot (suppression) (*Claviceps purpurea*)	304 mL	For suppression of Fusarium head blight and ergot, apply as a preventative spray within the time period from when at least 75% of the wheat heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower. Optimal application timing is when first flowers emerge on the main heads. Application at this timing will also control the listed leaf diseases.
Barley	Net blotch (*Pyrenophora teres*), spot blotch (*Cochliobolus sativus*), scald (*Rhynchosporium secalis*), Septoria leaf blotch (*Septoria passerinii*), leaf, stem and stripe rusts (*Puccinnia hordei, P. graminis, P. striiformis*), powdery mildew (*Blumeria graminis syn. Erysiphe graminis*), Fusarium head blight (suppression) (*Fusarium graminearum* syn. *Gibberella zeae*), ergot (suppression) (*Claviceps purpurea*)	304 mL	For suppression of Fusarium head blight and ergot, apply as a preventative spray within the time period when 70 to 100% of the barley main stem heads are fully emerged, to 3 days after full head emergence. Application at this timing will also control the listed leaf diseases.

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Crops	Diseases	Rate per acre	Staging and specific comments
Oats	Stem rust (*Puccinia graminis*), crown rust (*Puccinia coronata*), stagnospora (*Septoria*) leaf blotch and black stem (*Stagonospora avenae* syn. *Septoria avenae*), Fusarium head blight (suppression) (*Fusarium graminearum* syn. *Gibberella zeae*), ergot (suppression) (*Claviceps purpurea*)	304 mL	Leaf and stem diseases: Apply as a preventive foliar spray when the earliest disease symptoms appear on the leaves and stems. Fields should be observed closely for early disease symptoms, particularly when susceptible varieties are planted and/or under prolonged conditions favourable for disease development. For suppression of Fusarium head blight and ergot, apply as a preventative spray within the time period from when at least 75% of the oat panicles on the main stem are fully emerged to when 50% of the panicles on the main stem are in flower.

Registered tank mixes

None registered.

Application information

How to apply: Ground or aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips

A registered non-ionic surfactant must be used with this product (e.g., Agral 90 or AgSurf), at 0.125% v/v. Do not apply more than one application of Prosaro PRO per crop year.

How it works

Prosaro PRO fungicide is a broad-spectrum systemic fungicide for the control or suppression of certain diseases.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Grazing:** 14 days. **Pre-harvest Intervals:** 36 days.
Re-cropping: Treated areas may be replanted with any crop specified on this label and soybean as soon as practical after the last application. For all other crops, do not plant back within 120 days of last application.
Re-entry interval: 12 hours.

Environmental precautions

Toxic to birds, small wild mammals, aquatic organisms and non-target terrestrial plants. Observe spray buffer zones. See label for specific details on buffer zones. Do not apply directly to water or to areas where surface water is present. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

Toxicity

Oral LD_{50} (mouse) = > 2000 mg/kg.

Storage

Store this product away from food or feed. Do not contaminate water, food or feed by storage or disposal. Do not store below freezing. If stored for 1 year or longer, shake well before using. Keep the product in the original container during storage.

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Prosaro® XTR Fungicide/Shalimar/StarPro

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Prosaro® XTR (PCP# 32824)	Bayer	Prothioconazole:125 g/L Tebuconazole: 125 g/L	Emulsifiable concentrate	6.5 L, 104 L
Shalimar (PCP # 34357)	Sharda CropChem Ltd	Prothiconazole: 125 g/L Tebuconazloe: 125 g/L	Emulsifiable concentrate	6.5 L, 104 L
StarPro (PCP # 34349)	Rotam North America	Prothiconazole: 125 g/L Tebuconazloe: 125 g/L	Emulsifiable concentrate	6.5 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Timing and specific use restrictions
Wheat	Leaf, stem and stripe rusts (*Puccinia recondita*, *P. graminis*, *P. striiformis*), leaf blotch (*Septoria tritici*), glume blotch (*Stagonospora nodorum*), tan spot (*Pyrenophora tritici-repentis*), powdery mildew (*Erysiphe graminis*), Fusarium head blight (suppression) (*Fusarium* spp.)	325 mL	For suppression of Fusarium head blight apply when 75% of the wheat heads on the main stem are fully emerged to when 50% of the heads are in flower. For other diseases apply at the first sign or very early stage of disease, especially if weather conditions favour disease development. Apply up to the end of the flowering stage. Applications at this time will also control listed leaf diseases.
Barley	Net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*), leaf blotch (*Septoria passerenii*), spot blotch (*Cochliobolus sativus*), leaf, stem and stripe rusts (*Puccinia hordei*, *P. graminis*, *P. striiformis*), powdery mildew (*Erysiphe graminis*), Fusarium head blight (suppression) (*Fusarium* spp.)	325 mL	For suppression of fusarium head blight apply when 70 - 100% of the main stem heads are fully emerged up to 3 days after full head emergence. For other diseases apply at the first sign or very early stage of disease, especially if weather conditions favour disease development. Apply up to the end of the flowering stage.
Oats	Crown rust (*Puccinia coronata*), stem rust (*Puccinia graminis*), Stagonospora (*Septoria*), leaf blotch and black stem (*Stagonospora avenae* syn. *Septoria avenae*)	325 mL	Apply when the earliest disease symptoms appear on the leaves and stems. Fields should be observed closely for early disease symptoms, particularly when susceptible varieties are planted or under prolonged conditions favourable for disease development.

Registered tank mixes

Bayer supports the tank mix of Prosaro XTR and Lorsban. Apply this mix according to the most restrictive use limitations for either product.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum.
Aerial – 20 L/acre minimum.

Application tips

Spray coverage is essential. Ensure thorough coverage of all wheat or barley heads for optimal suppression of Fusarium head blight. Best results are achieved from forward to backward facing nozzles.

How it works

Prosaro XTR is a broad spectrum fungicide for disease control in cereals with protective and curative properties.

Restrictions

A maximum of 1 application may be applied per crop season.

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Sequential applications in wheat, barley, rye, triticale and canaryseed: Prosaro 250 EC Fungicide may be applied sequentially after an application of Folicur 432F Foliar Fungicide or Folicur 250 EW Fungicide (minimum 7-day application interval). Please refer to respective product labels for specific use directions, pertinent recommendations, restrictions and precautions.

Re-cropping: No restrictions. **Re-entry interval:** 12 hours. **Grazing:** Do not allow livestock to graze or feed green forage to livestock prior to 6 days after treatment. Straw cut after harvest may be fed or used for bedding.
Pre-harvest intervals: Wheat, barley, oats – 36 days.

Environmental precautions

Toxic to birds, small animals, aquatic organisms and non-target plants. Do not apply this product directly to freshwater habitats. Observe buffer zones. See label for specific details on buffer zones.

Toxicity

Oral LD_{50} (rats) > 2,000 mg/kg. Dermal LD_{50} (rats) > 2,000 mg/kg.

Storage

Do not store at temperatures below freezing. If stored for 1 year or longer, shake well before using.

Quadris/Azoshy 250 SC /Quasi

Group 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Quadris (PCP# 26153)	Syngenta	Azoxystrobin: 250 g/L	Suspension	3.78 L
Azoshy 250 SC (PCP# 32263)	Sharda CropChem Ltd.	Azoxystrobin: 250 g/L	Suspension	3.78 L
Quasi (PCP# 33807)	NewAgco Inc.	Azoxystrobin: 250 g/L	Suspension	8 L, 100 L, 1,000 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Staging and specific comments
Canola	Virulent blackleg (*Leptosphaeria maculans*)	202 mL	Apply at the 2 - 6 leaf stage. Maximum of 2 applications per season.
	Sclerotinia stem rot (*Screlontinia sclerotiorum*)	283 - 404 mL	Apply at the early bloom stage (prior to 30% bloom). Use the higher rate if there is a history of Sclerotinia infection in the area, and when environmental conditions favour disease development.
	Alternaria black spot (*Alternaria brassicae, Alternaria raphani*)	202 mL	Apply at the pod stage (90% petal fall).
Chickpea	Ascochyta blight (*Ascochyta* spp.)	202 mL	Apply at the first sign of disease and no later than the onset of flowering, followed by a second application 10 - 14 days later. Maximum of 2 applications per season.
Corn	Rust (*Puccinia sorghi*)	183 mL in 80 L of water/acre	Apply prior to disease establishment and subsequently at a 7 - 14 day interval. Apply a maximum of 2 applications per season.
Lentil	Anthracnose (*Collectotrichum trunctitum*), Ascochyta blight (*Ascochyta* spp.), Asian bean rust (*Phakopsora* spp.)	202 mL	Apply at the first sign of disease and no later than the onset of flowering, followed by a second application 10 - 14 days later. Maximum of 2 applications per season.

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Crops	Diseases	Rate per acre	Staging and specific comments
Pea/bean	Anthracnose (*Collectotrichum trunticum*), Ascochyta blight (*Ascochyta* spp.), Mycosphaerella blight (*Mycosphaerella pinodes*), powdery mildew* (*Erysiphe pisi*), Asian bean rust (*Phakopsora pachyrhyizi*)	202 mL	Apply at the first sign of disease and no later than the onset of flowering, followed by a 2nd application 10 - 14 days later. Maximum of 2 applications per season.
Potato (foliar)	Early blight (*Alternaria solani*)	202 - 324 mL	For early blight, use the high rate and short application interval under high disease pressures. If late blight becomes established, discontinue use of Quadris and use alternative fungicides.
	Late blight (*Phytophthora infestans*)	324 mL	
	Black dot (*Colletotrichum coccodes*)	500 - 800 mL	Apply on a 7 - 14 day interval, starting prior to disease establishment.
Potato (in furrow)	Silver scurf (*Helminthosporium solani*)	4 - 6 mL product/ 100 m row	Apply once as an in furrow spray in 20 - 56 L/acre. Mount the spray nozzle so the spray is directed into the furrow as a 15 - 20 cm band just before the seed is covered. Maximum of 2 applications per season.

* Field pea only.

Registered tank mixes

Always read all the labels and follow the precautionary statement, directions for use (rates, diseases controlled and application intervals) and other restrictions.

Tank mixture partner	Diseases/insects controlled	Rate	Specific comments
Bravo 500 Potato (foliar)	Early blight	Quadris/Azoshy/Quasi at 202 mL/acre **Plus** Bravo 500 at 808 mL/acre	Do not apply more than 3 applications of this tank mix per season. Pre-harvest interval: 2 days.
Quadris Plus Ridomil Gold 480SL (potato - in furrow)	Rhizoctonia stem and stolon canker, black scurf and the suppression of pink rot	Quadris/Azoshy/Quasi at 4 mL/100 m row **Plus** Ridomil Gold 480SL at 4 mL/100 m row	Do not apply more than 1 application per season. Pre-harvest interval: 90 days. A plant-back interval of 30 days for potato (root crops) is required.
Quadris Plus Ridomil Gold 480SL Plus Actara (potato - in furrow)	Rhizoctonia stem and stolon canker, black scurf, pink rot (suppression only), Colorado potato beetle, potato leafhopper, aphids	Quadris/Azoshy/Quasi at 4 - 6 mL/100 m row **Plus** Ridomil Gold 480SL at 4 mL/100 m row **Plus** Actara at 3.4 - 4.4 mL/100 m row	Do not apply more than 1 application per season. Pre-harvest interval: 90 days. Do not follow a soil application of Actara with a foliar application of Actara.
Matador 120 EC	All diseases with Quadris applied at 202 mL/acre PLUS Insects: all insects currently registered on the Matador 120EC label.	Quadris/Azoshy/Quasi at 202 mL/acre **Plus** Matatdor at 26 - 51 mL/acre	Do not apply more than 2 applications of this tank mix per season. Pre-harvest interval: 15 days for vegetables, 14 days for corn, 30 days for all others including soybean. Do not apply by air.
Tilt (barley)	Barley net blotch (*Pyrenophora teres*), barley scald (*Rhynchosporium secalis*), barley leaf rust (*Puccinia hordei*)	Quadris/Azoshy/Quasi at 90 mL/acre **Plus** Tilt at 202 mL/acre	Do not make more than 1 application per season of this tank mixture. An additional application of Tilt can be made, if required. Do not harvest wheat for forage. Do not graze or feed livestock treated forage or cut green crop for hay or silage. Pre-harvest interval 45 days.
Tilt (wheat and barley)	Septoria leaf spot (*Septoria* sp.), tan spot (*Pyrenophora tritici-repentis*)		
Tilt (spring wheat, winter wheat and barley)	Stripe rust (*Puccinia striiformis*)	Quadris/Azoshy/Quasi at 80 - 120 mL/acre **Plus** Tilt at 161 - 202 mL/acre	
Tilt (spring wheat and winter wheat)	Wheat leaf rust (*Puccinia triticina)*		

Application information

How to apply: Ground and aerial application. See label for application method of registered crops.
Water volume: Ground – 40 L/acre minimum. In-furrow treatment – 20 - 57 L/acre. Aerial – 18 L/acre minimum.

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Application tips
Good coverage is essential for effective disease control.

How it works
Quadris fungicide is a broad spectrum, preventive fungicide with systemic properties.

Restrictions
Rainfall: Quadris alone can be applied 6 hours before rainfall. **Grazing**: Do not feed pea vine to livestock. **Pre-harvest intervals** (days): Canola (30), legumes (15), potato (foliar application) (1) potato (in furrow)(90). **Re-cropping:** Broadleaf and root crops – 30 days. Cereals – 45 days. **Re-entry interval:** 12 hours.

Environmental precautions
This product is toxic to fish and aquatic organisms. Observe buffer zones specified on the label. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Runoff**: Avoid application to areas where runoff is likely to occur. **Leaching**: The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage
Heated storage required. Keep in original container. Store in a cool, dry, well ventilated area.

Quadris Top

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Quadris Top (PCP# 30518)	Syngenta	Azoxystrobin: 200 g/L Difenoconazole: 125 g/L	Suspension	10.125 L

Crops, diseases controlled, rates and staging

Crop	Diseases	Rate per acre	Staging and specific comments
Potato	Early blight (*Alternaria solani*) Suppression: brown spot (*Alternaria alternata*), black dot (*Colletotrichum coccodes*)	229 - 404 mL	Apply prior to disease development. Apply no more than 1 application to target these diseases. If disease pressure is high, use the highest rate.
Sugar beet	Cercospora leaf spot (*Cercosphora beticola*), Powdery mildew (*Erysiphe polygoni*)	229 - 404 mL	Apply on a 7 - 28 day schedule, alternating with a non-triazole fungicide that is registered for these diseases. If the disease rate is high, use the highest rate and shortest interval. Do not exceed 3 applications per year.

Application information
How to apply: Potato – ground and aerial application. Sugar beet – ground application only.
Water volume: Ground – 60 L/acre minimum. Aerial – 18 L/ acre minimum.

Application tips
Thorough coverage is essential for effective disease control.

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How It works
Quadris Top fungicide is a broad spectrum, preventive fungicide with systemic properties.

Restrictions
Rainfall: Do not apply when heavy rain is forecast. **Pre-harvest intervals (days):** Potato (14), sugar beet (7). **Re-cropping:** A plant-back interval of 60 days is required following a Quadris Top application to the preceding crop unless Quadris Top and/or Inspire are registered for that crop. **Re-entry interval:** 12 hours.

Environmental precautions
This product is toxic to fish and aquatic organisms. Observe buffer zones specified on the label. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Runoff:** Avoid application to areas where runoff is likely to occur. **Leaching:** The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow.

Toxicity
Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store in a cool, dry area.

Quash SC

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Quash SC (PCP# 33081)	Valent Canada Inc distributed by Nufarm Agriculture	Metconazole: 480 g/L	Soluble concentrate	4.8 L

Crops, diseases controlled, rates and staging

Crop	Diseases	Rate per acre	Staging and specific comments
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	59 - 118 mL	Apply product between 20% and 50% bloom. Under high disease pressure, use the higher application rate. Do not exceed 1 application per season.
Dry bean	Suppression of white mould (*Sclerotinia sclerotiorum*)	118 mL	Apply prior to disease development. Make first application at 20 - 50% bloom stage, before disease symptoms develop. Make a second application at full bloom. Do not make the second application until 7 days after the first application. Do not apply more than 236 mL/acre per year.
Field pea	Powdery mildew (*Erysiphe pisi*) Suppression of white mould (*Sclerotinia sclerotiorum*)		
Chickpea	Suppression of Ascochyta blight (*Ascochyta rabei*) and white mould (*Sclerotinia sclerotiorum)*		
Lentil	Suppression of Ascochyta blight (*Ascochyta lentis*) and white mould (*Sclerotinia sclerotiorum*)		
Potato	Early blight (*Alternaria solani*)	73 - 118 mL	Apply prior to infection for preventive control. If conditions favour disease development, make additional applications at 7 - 10 day intervals. Do not apply more than 354 mL/acre per year.
	Suppression of white mould (*Sclerotinia sclerotiorum*)	118 mL	

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Crop	Diseases	Rate per acre	Staging and specific comments
Sunflower	Rust (*Puccinia helianthi*)	354 mL	Apply when conditions favour disease development and prior to infection. Do not apply more than 236 mL/acre per year.
	Suppression of Sclerotinia head rot (*Sclerotinia sclerotiorum*)	118 mL	Make the first application preventively at early to mid-bloom. A second application may be made at full bloom or 7 - 14 days later. Do not apply more than 236 mL/acre per year.

Registered tank mixes
None registered.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – sunflower – 40 - 80 L/acre minimum. All other registered crops 80 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips
Apply Quash SC in sufficient water to ensure thorough coverage. Thorough coverage is required for optimal disease control.

How it works
Metconazole is a broad-spectrum triazole fungicide. Quash is systemic and is quickly absorbed into plant tissue. Metconazole can move up, but not down, in the plant.

Restrictions
Rainfall: Do not apply when heavy rain is forecast. **Pre-harvest intervals:** Canola – 45 days. Dry bean, field pea, chickpea, lentil, sunflower – 21 days. Potato – 8 days. **Re-cropping:** Do not plant any other crop for a period of 30 days unless Quash is registered for that use. **Re-entry interval:** Refer to label for re-entry intervals.

Environmental precautions
Toxic to aquatic organisms, non-target terrestrial plants, birds, and small wild mammals. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity
Oral LD_{50} (rats) = 1,750 mg/kg. Dermal LD_{50} (rabbit) = >5,000 mg/kg.

Storage
Store this product away from food or feed. Store in a cool, dry place.

Quilt/Topnotch/Sharda Fungtion SC/ Quasimodo

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Quilt (PCP# 28328)	Syngenta	Azoxystrobin: 75 g/L Propiconazole: 125 g/L	Suspension	10.125 L 101.25 L 405 L
Topnotch (PCP# 31126)	ADAMA Canada	Azoxystrobin: 143 g/L Propiconazole: 124 g/L	Suspension	8.6 L

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Product	Company	Active ingredient	Formulation	Container size
Sharda Fungtion SC (PCP# 32878)	Sharda CropChem Ltd.	Azoxystrobin: 75 g/L Propiconazole: 125 g/L	Suspension	10.125 L
Quasimodo co-pack of: Quasi (PCP # 33807) and Modo (PCP # 34213)	New Agco Inc.	Azoxystrobin: 250 g/L	Suspension	7.2 L, 72 L
		Propioconazole: 250 g/L	Emulsiafiable concentrate	8.1 L, 81 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre			Timing and specific use restrictions
		Quilt/Fungtion	Topnotch	Quasimodo	
Barley	Net blotch (*Pyrenophora teres*)	303 mL	214 mL	90 mL + 202 mL	Apply once between stem elongation and half-head emergence. Do not make more than 1 application per season. Pre-harvest interval: 45 days. When disease pressure from stripe rust, wheat leaf rust and other foliar diseases is expected to be high, the higher application rate should be used.
	Leaf rust (*Puccinia hordei*)	404 mL	214 mL	90 mL + 202 mL	
	Stripe rust (*Puccinia striiformis*)	303 - 404 mL	214 mL	90 mL + 202 mL	
Wheat, barley, rye	Septoria leaf spot (*Septoria* sp.), tan spot (*Pyrenophora tritici-repentis*), scald (*Rhynchosporium secalis*)	303 mL	214 mL	90 mL + 202 mL	Apply once between stem elongation and half-head emergence. Do not make more than 1 application per season. Pre-harvest interval: 45 days.
Wheat (spring, winter)	Leaf rust (*Puccinia triticina*), stripe rust (*Puccinia striiformis*)	303 - 404 mL	214 mL	90 mL + 202 mL	When disease pressure from stripe rust and wheat leaf rust is expected to be high, the higher application rate of 404 mL/acre should be used.
Durum wheat	Septoria leaf spot (*Septoria* spp.), tan spot (*Pyrenphora tritici-repentis*), stripe rust (*Puccinia striformis*)	NR*	214 mL	NR*	Apply once between stem elongation and half head emergence.
Oats	Crown rust (*Puccinia coronata* var. *avenae*)	303 - 404 mL	214 mL	NR*	Apply once between stem elongation and head emergence. Use high rate if field conditions favour disease development or if the field has a history of high disease pressure.
	Barley net blotch (*Pyrenophora teres*)	NR*	214 mL	90 mL + 202 mL	
	Septoria leaf spot (*Septoria* sp.)	NR*	214 mL	90 mL + 202 mL	
Triticale	Septoria leaf spot (*Septoria* sp.), tan spot (*pyrenophora triticirepentis*)	303 mL	214 mL	90 mL + 202 mL	Make 1 application between stem elongation and half-head emergence.
Corn (field, sweet, seed)	Rust (*Puccinia sorghi*), northern corn leaf blight (*Setosphaeria turcicum*), eye spot (*Aureobasidium zeae*), grey leaf spot (*Cercospora zeae-maydis*)	303 - 404 mL	NR*	90 mL + 202 mL	Make first application at the first sign of disease. A second application can be made 14 days after the first application. Do not apply to field corn and field corn grown for seed after brown silk. Pre-harvest Interval: forage corn – 30 days, sweet corn – 14 days. Do not make more than 2 applications per season.

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Crops	Diseases	Rate per acre			Timing and specific use restrictions
		Quilt/Fungtion	Topnotch	Quasimodo	
Lentil, soybean	Anthracnose (*Colletotrichum truncatum*)	404 - 606 mL	NR*	NR*	Make the first application at the first sign of disease. A second application can be made 14 days after the first application if disease conditions persist.
Field pea	Mycosphaerella blight (*Mycosphaerella pinodes*)	404 - 600 mL	310 - 620 mL	NR*	Make the first application at the first sign of disease. Apply the high rate only under conditions of high disease pressure. A second application can be made 14 days after the first application if disease conditions persist.
Chickpea, lentil, field pea, soybean	Asian rust (*Phakospora pachyrhyizi*)	404 - 606 mL	NR*	NR*	Make the first application at the first sign of disease. Apply the high rate under conditions of high disease pressure. Pre-harvest interval: 30 days.
				NR*	
Canola	Blackleg (*Leptosphaeria maculans*)	404 mL	NR*	NR*	Apply at the rosette stage between 2 true leaves and bolting. 1 application per year. Pre-harvest interval – 30 days.
Field pea, bean, soybean, lentil	Anthracnose (*Colletotrichum lindemuthianum*)	404 – 606 mL (lentil, soybean only)	310 – 620 mL	NR*	Make the first application at the first sign of disease. Apply the high rate only under conditions of high disease pressures. A second application 14 days later may be needed if conditions persist. Good spray coverage and canopy penetration are important forbest results.
	Ascochyta blight (*Ascochyta lentis*)	NR*	310 – 620 mL	NR*	
	White mould suppression (*Sclerotinia sclerotiorum*)	606 mL (soybean only)	310 mL	NR*	
	Powdery mildew (*Blumeria pisi*, *Erysiphe* spp.)	404 mL	310 mL	NR*	
Soybean	Frog eye leaf spot (*Cercospora sojina*)	404 - 606 mL	NR*	NR*	Make the first application at growth stage R3 (early pod set) and 4 days later at approximately growth stage R5.

* Not registered.

Registered tank mixes

Product	Herbicides	Insecticides	Fungicides
Quilt/Fungtion / Quasimodo		Matador 120 EC	
Topnotch	Axial, Broadband, Clodinafop-propargyl, Sierra, Touchdown Total, Traxion	Matador 120 EC, Silencer 120 EC	Quadris

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre. Aerial – 18 L/acre minimum.

Application tips

Quilt/Topnotch/Fungtion/Quasimodo has some phytotoxic effects when mixed with products that are formulated as emulsifiable concentrate. In addition, adjuvants that contain some form of silicone may contribute to phytotoxicity. Do not apply during periods of dead calm. Avoid application when winds are gusty.

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How it works

Quilt/Topnotch/Fungtio/Quasimodo consists of 2 fungicides, which have systemic properties and have different modes of action. They both have preventive and curative activity.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. **Re-cropping:** Do not rotate to any crop intended for food, grazing or any component of animal feed or bedding within 105 days of applying Quilt/Topnotch/Quasimodo unless the second crop appears on the label. **Pre-harvest interval:** Field pea, bean, soybean, lentil – 30 days. Cereals and straw – 45 days. Forage and hay – 30 days. Soybean hay and dry pea hay – 14 days. **Maximum number of applications:** Cereals – do not exceed 1 application. Field pea, bean, soybean – do not exceed 2 applications. **Re-entry interval:** Hand-harvesting and detasseling treated corn: 24 hours. All other crops and activities 12 hours.

Environmental precautions

This product is toxic to fish and aquatic organisms. Observe buffer zones specified on the label. Azoxystrobin is persistent and will carry over. It is recommended that this product not be used in areas treated with Azoxystrobin during the previous season. **Runoff:** Avoid application to areas where runoff is likely to occur. **Leaching:** The properties of this product indicate it may leach to groundwater. The use of this product may result in contamination of groundwater, particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow.

Toxicity

Oral LD_{50} (rats) = > 1,750 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in a cool, well ventilated area. Store above 0°C. Shake well before use.

Rampart/Confine Extra

Group 33

Formulation

Product	Company	Active ingredient	Formulation	Container size
Rampart (PCP# 30654)	Loveland Products Canada	Mono and dipotassium salts of phosphoric acids	Solution: 53%	9.46 L, 1,000 L
Confine Extra (PCP # 30648)	Winfield United Canada	Mono and di-potassium salts of phosphoric acids	Liquid: 53%	10 L, 1,000 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate	Timing and specific use restrictions
Potato (post harvest)	Late blight (*Phytophthora infestans*), pink rot (*Phytophthora erythroseptica*)	Prior to potato storage: Rampart: dilute 190 mL in 1 litre of water. Apply 2 litres of this solution to 1,000 kg of harvested potato as a spray or rinse. Confine Extra: dilute at a 1:5.13 ratio with water. To treat 1,000 kg potatoes mix 326 mL of Confine Extra with 1,674 mL water and apply as a spray. Stored potato: Rampart: Dilute 190 mL in 1 litre of water. Inject 2 litres of this solution per 1,000 kg of stored potato tubers into water used for post-harvest storage.	Maximum of 1 application per year to harvested potato tubers prior to storage or potato tubers in storage. Apply as soon as possible after harvest.

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Crops	Diseases	Rate	Timing and specific use restrictions
Potato (in-crop foliar application)	Suppression of late blight (*Phytophtora infestans*) and pink rot (*phytophtora erythroseptica*)	Rampart: 1.2 - 3.2 L/acre Confine Extra: 2 - 4 L/acre	Begin applications when conditions are favourable for disease development and continue on a 7-day interval. Use the higher rate when disease pressure is moderate or high. Do not make more than 5 applications in a season. Do not apply at intervals less than 3 days.

Registered tank mixes
None registered.

Application information
How to apply: Post harvest applications: See table above. **Foliar applications:** Ground and aerial (Rampart only) application.
Water volume: Ground – Rampart – 120 L/acre minimum. Confine Extra – 40 L/acre minimum. Aerial – Rampart – 40 L/acre minimum.

Restrictions
Rainfall: Do not apply if heavy rainfall is imminent. **Re-entry interval:** 4 hours.

Environmental precautions
To reduce runoff from treated areas into aquatic habitats, avoid application to areas with moderate to steep slopes, compacted soil or clay.

Toxicity
Oral LD_{50} = not established. Dermal LD_{50} = not established.

Storage
Store product away from food and feed.

Ranman 400SC

Group 21

Formulation

Product	Company	Active ingredient	Formulation	Container size
Ranman 400SC (PCP# 27984)	ISK Biosciences Corporation	Cyazofamid: 400 g/L	Suspension	3.79 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Timing and specific use restrictions
Potato	Late blight (*Phytophthora infestans)*	40 - 80 mL	Use the low rate (40 mL product/acre) for preventive applications or very low disease pressure, increasing the rate as disease pressure and/or crop development increases, up to a maximum rate (80 mL product/acre). For late blight tuber rot control, ensure that the last 2 - 3 applications of Ranman 400SC prior to desiccation are made at the maximum rate (80 mL product/acre) following resistance management practices. After 1 application, alternate Ranman 400SC fungicide with at least 1 application of fungicide having a different mode of action for control of late blight. Do not make more than 6 applications per year.

Note: Must be tank mixed with non-ionic or organosilicone surfactant at 0.6 L/acre.

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Registered tank mixes
None registered.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 80 - 240 L/acre. Aerial – 20 L/acre minimum.

How it works
The active ingredient cyanofamid is a member of the cyanofamidazole class of chemistry and has preventive and protectant activity. Although Ranman 400SC has limited systemic activity, it should be treated as a protectant fungicide and applied before the disease enters the crop.

Restrictions
Rainfall: Do not apply if heavy rainfall is imminent. **Pre-harvest intervals:** 7 days. **Re-entry interval:** 12 hours. **Re-cropping:** A plant-back interval of 30 days is required.

Environmental precautions
This product is toxic to aquatic organisms. Observe buffer zones specified on the label. To reduce runoff from treated areas into aquatic habitats, consider the characteristics and conditions of the site before treatment.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store product in original container in a secured, dry area separate from other pesticides, fertilizer, food and feed.

Reason 500 SC

Group 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Reason 500 SC (PCP# 27462)	Gowan	Fenamidone: 500 g/L	Suspension concentrate	2 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate	Timing and specific comments
Potato (foliar)	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	80 mL as a tank mix with either Dithane DG 75 at 500 g/acre or Bravo 500 at 500 mL/acre	Begin application when plants are 15 - 20 cm high or when disease threatens. Apply a fungicide having a different mode of action within 7 - 10 days after each application. Use the shorter spray interval when conditions favour disease development.
Potato (at planting)	Seed-borne late blight	10 mL/100 kg seed pieces (4.5 mL/cwt)	Apply as a seed-piece treatment.

Registered tank mixes
See information in table above.

Application information
How to apply: May be applied with ground equipment or by air. **Water volume:** Ground – minimum 91 L/acre. Air – minimim 15 L/acre.

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Application tips
Reason 500 SC should be applied as a preventive disease control measure. Good coverage is essential for effective disease control. Reason fungicide can also be applied as a seed-piece treatment at planting for control of seed-borne late blight.

How it works
Reason 500 SC is a preventive, protectant fungicide that inhibits spore germination and acts as an anti-sporulant.

Restrictions
Pre-harvest intervals: 14 days. **Re-cropping:** Potato and all other crops may be planted following a minimum plant-back interval of 30 days. **Re-entry interval:** Potato – do not not re-enter until residues have dried.

Environmental precautions
Reason 500 SC is toxic to aquatic organisms. Observe buffer zones specified on the label. This product may be harmful to beneficial predatory or parasitic arthropods. **Runoff**: To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store container in a cool, dry place. If stored for 1 year or longer, shake well before using. Do not store at temperatures below freezing.

Revus

Group 40

Formulation

Product	Company	Active ingredient	Formulation	Container size
Revus (PCP# 29074)	Syngenta	Mandipropamid: 250 g/L	Suspension	3.785 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Timing and specific comments
Potato	Late blight (*Phytophthora infestans*)	0.16 - 0.24 L	Begin applications prior to disease development and continue throughout the season on a 7 - 10 day schedule, following resistance management guidelines (see label for details). Do not make more than 4 applications in a season.
	Seed borne late blight (*Phytophthora infestans*) Suppression of pink rot (*Phytophthora erythroseptica*)	13 - 26 mL/100 kg seed	For seed applications, this product must be applied using a closed treatment system. Uneven or incomplete seed coverage may not give the desired level of disease control.

Registered tank mixes
Revus at 0.16 - 0.24 L/acre can be tank mixed with Bravo 500 at 0.19 - 0.4 L/acre.

Application information
How to apply: Ground and aerial application for foliar late blight. For seed applications, follow the manufacturer's application instructions for the seed treatment equipment being used. Refer to label for more information on the maximum number of foliar applications allowed following the use of Revus as potato seed piece treatment. Do not apply more than 242 mL manipropamid/acre/year.

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Water volume: Ground – 40 L/acre minimum. Aerial – 18 L/acre minimum. **Surfactant:** Non-ionic adjuvant is recommended at 0.25%.

How it works

After application, Revus adheres to the waxy cuticle of treated leaves, becomes rainfast and establishes a barrier to prevent fungi from taking hold. The fungicide also enters the leaf to provide protection to both sides of the leaf. Revus also provides anti-germination effects. Disease spores that land on the plant are prevented from germinating.

Restrictions

Pre-harvest intervals: 14 days. **Re-cropping:** Do not plant any crop that is not registered for use with Revus for a period of 30 days after the last application. **Re-entry interval:** 12 hours.

Environmental precautions

Do not apply this product directly to freshwater habitats. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. **Runoff:** To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast.

Toxicity

Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Does not require heated storage. Store container in a cool, dry place.

Roxar

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Roxar (PCP #32200)	UPL AgroSolutions Canada	Tetraconazole: 210 g/L	Microemulsion	8.5 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Staging and specific comments
Wheat (durum, winter, spring)	Control of tan spot (*Pyrenophora tritici-repentis*), stem rust (*Puccinia graminis*), stripe rust (*Puccinia striiformis*); Suppression of Septoria leaf and glume blotch (*Septoria tritici*)	135 mL	For optimum results, begin applications preventatively and repeat as needed on a 14- to 21-day interval. For leaf and stem diseases, apply prior to disease development from tillering up to late head emergence before flowering.
	Suppression of Fusarium head blight (*Fusarium graminearum*)	212 mL	Apply when at least 75% of the heads on the main stem have emerged to when 50% of the heads on the main stem are in flower.
Barley	Control of stem rust (*Puccinia graminis*), stripe rust (*Puccinia striiformis*), net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*) Suppression of Septoria leaf and glume blotch (*Septoria tritici*)	135 mL	For optimum results, begin applications preventatively and repeat as needed on a 14- to 21-day interval. For leaf and stem diseases, apply prior to disease development from tillering up to late head emergence before flowering.

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Crops	Diseases	Rate per acre	Staging and specific comments
	Suppression of Fusarium head blight (*Fusarium graminearum*)	212 mL	Apply when at least 75% of the heads on the main stem have emerged to when 50% of the heads on the main stem are in flower.

Note: A maximum of 270 mL/acre of Roxar can be applied in a single season.

Registered tank mixes
None registered.

Application information
How to apply: Registered for ground and aerial application. Roxar can be applied with a non-ionic surfactant at 0.2 to 0.25% v/v. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips
Thorough coverage is necessary to provide good disease control. Applications using sufficient water volume to provide thorough and uniform coverage generally provide the most effective disease control.

How it works
The active ingredient tetraconazole is a broad-spectrum sterol biosynthesis inhibitor fungicide.

Restrictions
Rainfall: Rainfast in 2 hours. **Grazing:** No restrictions listed. **Pre-harvest Intervals:** 40 days. **Re-cropping:** Wheat, barley, dried shelled pea and bean, canola, corn, and sugar beet can be planted immediately after the last application. For all other crops, a 30-day plant interval must be observed prior to planting.
Re-entry interval: 12 hours.

Environmental precautions
Toxic to aquatic organisms. Observe buffer zones as specified on the label. To reduce runoff from treated areas into aquatic habitats avoid application to ears with a moderate to steep slope, compacted soil, or clay.

Toxicity
Oral LD50 (rats) = >2000 mg/kg. Dermal LD50 (rats) = > 2000 mg/kg.

Storage
Store this product away from food or feed.

Scala® SC Fungicide

Group 9

Formulation

Product	Company	Active ingredient	Formulation	Container size
Scala® SC (PCP # 28011)	Bayer	Pyrimethanil: 400 g/L	Suspension	6.07 L

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Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Timing and specific comments
Potato	Early blight (*Alternaria solani*)	Scala SC must be applied in tank mix with Bravo 500: Scala SC at 300 mL PLUS Bravo 500 at label rate	Apply when plants are 15 - 20 cm high or when environmental conditions are conducive to disease development. Repeat applications at 7 - 14 day intervals or as necessary to maintain disease control. If severe disease conditions exist, use the 7-day interval. A maximum of 6 applications per year.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 120 L/acre. Aerial – 14 L/acre.
Caution: Do not apply more than 2.4 L/acre in a single growing season.

Application tips

Thorough coverage of all plant parts to be protected is essential for good disease control.

How it works

Scala SC is a systemic fungicide that is effective on early blight. Scala SC is best suited for use in a preventive treatment program.

Restrictions

Rainfall: Do not apply if heavy rain is forecast. **Pre-harvest intervals:** Potato – 7 days. **Re-cropping:** Wheat may be planted 30 days following the application of Scala SC. For all other crops not listed on the Scala SC label, a plant-back interval of 130 days must be observed. **Re-entry interval:** 12 hours.

Environmental precautions

This product is toxic to aquatic organisms. For ground application, maintain a 1-metre buffer zone between areas sprayed and aquatic systems. For aerial application in potato, maintain a 10-metre buffer zone between areas sprayed and aquatic systems. **Runoff:** Do not apply where runoff likely to occur. Do not apply this product through any type of irrigation system.

Toxicity

Oral LD_{50} (male rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg.

Storage

Store above 0°C. Do not store near feed or foodstuffs.

Senator 50 SC

Group 1

Formulation

Product	Company	Active ingredient	Formulation	Container size
Senator 50 SC (PCP# 32096)	Nippon Soda Co. Ltd.	Thiophanate-methyl: 500 g/L	Suspension concentrate	10 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Timing and specific comments
Sugar beet	Leaf spot (*Cercospora* sp.)	238 - 318 mL	Apply when disease first appears. Repeat 14 - 21 days later if required. Maximum seasonal rate is 635 mL/acre. For sugar beet grown for export only. To delay selection of fungicide resistance, alternate Senator 50 SC with a fungicide having a different mode of action.

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Application information
How to apply: Ground application only. Do not apply by air. **Water volume:** Apply in sufficient water to ensure coverage of the foliage.

How It works
Senator 50 WC is a systemic fungicide for control of certain fungal diseases.

Restrictions
Pre-harvest interval: 21 days. **Grazing:** No sugar beet or parts of sugar beet are to be used as fodder or feed.
Re-entry interval: Hand or mechanical harvesting – 21 days. All other activities – 12 hours.

Environmental precautions
Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Observe buffer zones specified on the label. Do not apply during periods of dead calm or when wind velocity and direction pose a risk of spray drift.

Toxicity
Oral LD_{50} (rats) technical = > 5,000 mg/kg (male).

Storage
Store in a dry place at room temperature.

Sercadis

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Sercadis (PCP# 31697)	BASF Canada	Fluxapyroxad: 300 g/L	Suspension	1.35 L

Crops, diseases controlled, rates and timing

Crops	Staging	Diseases Controlled	Rate per acre	Specific comments
Potato	In-furrow	Rhizoctonia canker (*Rhizoctonia* spp.)	135 mL	Apply in furrow. Refer to product label to determine rate per 1,000 m of row, depending on row spacing.
	Foliar	Early blight (*Alternaria solani*)	68 - 135 mL	Apply to foliage prior to disease development.
		White mould (*Sclerotinia sclerotiorum*)	135 mL	Apply at the beginning of flowering to control white mould. Apply a second time 7 - 14 days later if disease persists or weather conditions are favourable for disease development.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips
Maximum of 3 applications per season. In foliar applications, always tank mix Sercadis with another product with an alternate mode of action that is effective against the target pest. In foliar applications, the use of a non-ionic surfactant at 0.125% v/v is recommended.

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How it works
Sercadis is highly systemic. As a carboximide (SDHI) fungicide, Sercadis inhibits spore germination, mycelial growth and sporulation of the fungus on the leaf surface.

Expected results
Control of soil-borne Rhizoctonia, foliar early blight and white mould.

Restrictions
Pre-harvest interval: 7 days. **Rainfall:** Avoid application when heavy rain is forecast. Rainfast in 1 hour. **Grazing:** May be grazed or fed to livestock but observe pre-harvest interval. **Re-cropping:** Sugar beet, legumes, cereals and oilseeds may be planted immediately following the last application. A plant-back interval of 1 year is required for all other crops.

Environmental precautions
Observe buffer zones specified on the label. The use of this chemical may result in contamination of ground water, particularly in areas where soils are permeable (e.g., sandy soils) and/or depth of the water table is shallow. Toxic to aquatic organism and small mammals.

Toxicity:
Oral LD_{50} (rats) = > 500 - < 2,000 mg/kg.

Storage:
Store this product away from food or feed.

Serenade® OPTI Biological Fungicide

Group 44/Bio fungicide

Formulation

Product	Company	Active ingredient	Formulation	Container size
Serenade® OPTI (PCP# 31666)	Bayer	*Bacillus subtillis*, contains a minimum of 1.31 x 10^{10} CFU/g (QST 713 strain)	Wettable powder	2.72 kg

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Application Timing
Dry bean, chickpea, lentil, field pea	White mould *(Sclerotinia sclerotiorum)*, grey mould *(Botrytis cinerea)*	0.7 to 1.3 kg	Begin application soon after emergence and when conditions are conducive for disease development. Repeat on a 7 - 10 day interval.
Soybean	White mould *(Sclerotinia sclerotiorum)*	0.2 to 0.8 kg	Begin application soon after emergence and when conditions are conducive for disease development. Repeat on a 7 - 10 day interval.
	Brown spot *(Septoria glycines)*, frogeye leaf spot *(Cercospora sojina)*	0.04 to 0.2 kg	
Potato	Sclerotinia stem rot *(Sclerotinia sclerotiorum)*	0.4 to 1.3 kg	Begin application soon after emergence and when conditions are conducive for disease development. Repeat on a 7 - 10 day interval.
	Early blight *(Alternaria solani)*	0.4 to 0.9 kg	
	Silver scurf *(Helminthosporium solani)*	7 to 14 g/tonne	For post-harvest application to aid in the control of silver scurf. See label for details.

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Crops	Diseases	Rate per acre	Application Timing
Canola, flax, borage, camelina, mustard	Sclerotinia stem rot *(Sclerotinia sclerotiorum)*	0.1 to 0.4 kg	Begin application at 20 - 30% bloom. A second application may be made 7 - 10 days later, at approximately 50% bloom and prior to significant petal fall, if conditions for disease development are favourable. Use higher rates in fields with a history of heavy disease pressure.
Caraway, coriander, fenugreek	Botrytis grey mould *(Botrytis cinerea)*, white mould *(Sclerotinia sclerotiorum)*	0.7 to 1.3 kg	Begin application soon after emergence and when conditions are conducive for disease development. Repeat on a 7 - 10 day interval.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre. Aerial – 20 L/acre.

How it works
Serenade OPTI is a broad spectrum, preventive biofungicide for the suppression of plant diseases. It may be applied as a foliar spray alone or in an alternating spray program with other registered crop protection products.

Restrictions
Pre-harvest intervals: Serenade OPTI can be applied up to and including the day of harvest. **Re-entry interval:** 4 hours or until spray has dried.

Environmental precautions
Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wash water.

Toxicity
Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Product can be stored below 25°C for up to 3 years. Do not freeze.

Serenade® SOIL Biological Fungicide

Group 44

Formulation

Product	Company	Active ingredient	Formulation	Container size
Serenade® SOIL (PCP# 30647)	Bayer	*Bacillus subtillis* 1 x 10^9 CFU/g	Solution	9.46 - 511 L

Crops, diseases controlled, rates and timing

Crops	Diseases suppressed	Rate	Timing and specific comments
Bean (*Lupinus* spp., *Phaseolus* spp. and *Vigna* spp.), chickpea, lentil and pea (all types)	Fusarium root rot (*Fusarium* spp.), Pythium root rot (*Pythium* spp.), Rhizoctonia root rot (*Rhizoctonia solani*)	1.1 - 5.7 L/acre	Soil application.

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Crops	Diseases suppressed	Rate	Timing and specific comments
	Botrytis blight (*Botrytis cinerea*) White mould (*Sclerotinia sclerotiorum*)	1.6 - 6.1 L/acre	Ground application only. Begin application soon after emergence and when conditions are conducive to disease development. Repeat on 7 - 10 day intervals. Use higher rate and shorter application intervals when moderate to high disease pressure occurs.
Potato (at planting), sugar beet	Rhizoctonia root rot, black scurf and stem canker *(Rhizoctonia solani)*, Phytophthora root rot and pink rot *(Phytophthora erythroseptica)*, Pythium root rot and cavity spot *(Pythium* spp.*)*, Fusarium root rot *(Fusarium* spp.*)*	1.1 - 5.7 L/acre	Soil application.
Soybean	White mould *(Sclerotinia sclerotium)*	1.6 - 6.1 L/acre	Foliar ground application only. Begin application soon after emergence and when conditions are conducive to disease development. Repeat as necessary on a a 7 - 10 day interval.
	Brown spot *(Septoria glycines),* frogeye *(Cercospora sojina)*	0.4 - 1.6 L/acre	
Canola	Sclerotinia stem rot (*Sclerotinia sclerotiorum*)	0.4 - 1.6 L/acre	Ground and aerial foliar application. Begin application at 20 - 30% bloom. A second application may be made 7 - 10 days later, at approximately 50% bloom and prior to significant petal fall if conditions for disease development remain favourable. Use higher rates in fields with a history of heavy disease pressure. Spray volume: 20 L/acre minimum.
Corn (field corn, sweet corn, popcorn, seed corn, silage corn)	Rhizoctonia root rot (*Rhizoctonia solani*) Pythium root rot (*Pythium* spp.*),* Fusarium root rot (*Fusarium* spp.*)*	1.1 - 5.7 L/acre	Soil application. Use higher application rates when the weather conditions are expected to be conducive to disease development, if the field has a history of disease problems or if minimum/low-till programs are in place.
Alfalfa*	Blossom blight (suppression) (*Botrytis cinerea*)	1.6 - 6.1 L/acre	User should test the product on a small area under local conditions and using standard practices to confirm the product is suitable for widespread application. Begin application prior to disease development when environmental conditions are conducive to disease development. Use higher rate and shorter application intervals under conditions of moderate to high disease pressure. Repeat as necessary on a 7 - 10 day interval.

* Minor use registration.

Registered tank mixes

None registered.

Application information

How to apply: Refer to label for details on application method for registered crops. **Soil applications:** Apply in a manner that will concentrate the product in the seed or root zone. Delivery of Serenade SOIL to the seed or root zone can be accomplished by in-furrow application, broadcast or banded applications on the soil surface or by surface drip irrigation. These application methods facilitate the colonization of crop roots with the active ingredient and optimize efficacy. For in-furrow applications spray Serenade SOIL in a narrow band with the spray directed at the seed and surrounding soil before covering the seed or seed piece. For broadcast or banded application to the soil surface, Serenade SOIL must be incorporated into the seed zone by rainfall or overhead irrigation within 24 hours.

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Serenade SOIL may also be applied via overhead irrigation. Drip irrigation applications should be made with the first irrigation after seeding or transplanting. Serenade SOIL may be injected or shanked into the soil, at the seed zone, prior to planting a crop. After crop germination or transplanting, additional applications of Serenade SOIL may be made. Such applications may include drip irrigation (surface or subsurface), soil directed sprays or shanking in. Use higher rates with broadcast applications and in fields with a history of disease problems. Serenade SOIL can be used in a rotational program with other registered fungicides that control the disease. **Foliar applications:** Use enough water to achieve good coverage.

Application tips

Broadcast or band: Apply as a 15-cm band over the top of the seed row or as a broadcast spray after planting. Use higher rates for broadcast applications. Ensure incorporation into the seed zone within 24 hours of applications with rain or overhead irrigation. **In-furrow application:** Apply in-furrow in the appropriate amount of water per acre. Mount the spray nozzle so the spray is directed in the furrow just before the seed or seed-pieces are covered. **Overhead irrigation:** Apply with irrigation water, ensuring uniform coverage of the soil and incorporation of product into the seed zone. **Surface drip irrigation:** Apply product with the first irrigation after planting. **Post-planting applications at any crop stage:** Apply the finished spray mixture to the soil as a drench, spray or drip irrigation, directing it towards the base of the plant.

How it works

Bacillus subtilisis a bacterium that works as a bio-fungicide to prevent infection of labeled disease by multi-site biochemical activity.

Restrictions

Pre-harvest interval: Serenade SOIL can be applied up to and including the day of harvest. **Re-entry interval:** 4 hours or until spray has dried.

Environmental precautions

Do not contaminate irrigation or drinking water supplies or aquatic habitat by cleaning of equipment or disposal of wash water.

Toxicity

Oral LD_{50} (rats) > 5,000 mg/kg. Dermal LD_{50} (rabbit) > 5,000 mg/kg.

Storage

Maximum storage period of 2 years at room temperatures up to 25°C.

Sphaerex

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Sphaerex (PCP # 34263)	BASF Canada	Metconazole: 112.5 g/L Prothioconazole: 187.5 g/L	Emulsifiable concentrate	8.65 L

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Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Staging and specific comments
Wheat (all types)	Tan spot (*Pyrenophora tritici-repentis*), Septoria leaf spot (*Septoria tritici* or *S. nodorum*), leaf rust (*Puccinia recondita*), stripe rust (*Puccinia striiformis*), stem rust (*Puccinia graminis*), powdery mildew (*Erysiphe graminis f. sp. tritici*), Septoria glume blotch (*Stagonospora nodorum*)	162 - 215 mL	Prior to disease development or at onset of disease.
	Fusarium head blight (suppression) (*Fusarium graminearum*)	162 - 215 mL	For suppression, apply when crop is at 20% flowering using sprayer nozzles configured to provide excellent coverage of the cereal head. For optimal performance on fusarium head blight apply at the 215 mL/ac rate.
Barley	Net blotch (*Pyrenophora teres*), scald (*Rhynchosporium secalis*), leaf rust (*Puccinia hordei*), stripe rust (*Puccinia striiformis*), powdery mildew (*Erysiphe graminis f.sp. hordei*)	162 - 215 mL	Prior to disease development or at onset of disease.
	Fusarium head blight (suppression) (*Fusarium graminearum*), spot blotch (*Cochliobolus sativus*)	162 - 215 mL	For suppression, apply when 75 - 100% of main stem barley spikes are emerged until 3 days after full spike emergence using sprayer nozzles configured to provide excellent coverage of the cereal head. For optimal performance on fusarium head blight apply at the 215 mL/ac rate.
Oats	Crown rust (*Puccinia coronata*), Septoria leaf blotch (*Septoria avenae*)	162-215 mL	Prior to disease development or at onset of disease.
	Fusarium head blight (suppression) (*Fusarium graminearum*)	162 - 215 mL	For suppression apply when oats are in anthesis stage (GS 61-69), that is at early panicle stage when anthers are yellow to white stage. Use sprayer nozzles configured to provide excellent coverage of the panicles. For optimal performance on fusarium head blight apply at the 215 mL/ac rate.
Rye, triticale	Leaf rust (*Puccinia recondita*), stripe rust (*Puccinia striiformis*), powdery mildew (*Erysiphe graminis*)	162 - 215 mL	Prior to development or at onset of disease.
	Fusarium head blight (suppression) (*Fusarium graminearum*)	162 - 215 mL	For suppression, apply when rye or triticale are in anthesis stage; that is at early heading stage when anthers are yellow to white stage. For optimal performance on fusarium head blight apply at the 215 mL/ac rate.

Registered tank mixes

None registered.

Application information

How to apply: Ground and aerial application. **Water Volume:** Ground – 40L/acre. Aerial – 20L/acre.

Application tips

Leaf diseases: Thorough coverage is essential to protect target plants from disease development.
Fusarium head blight: Timing of application and thorough head coverage is critical for optimum suppression of Fusarium head blight.

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How it works
The active ingredients in Sphaerex belongs to the triazole class of fungicides. The mode of action of metconazole and prothioconazole is inhibition of erosterol biosynthesis.

Restrictions
Pre-harvest intervals: Wheat, barley, and oats – 30 days. **Re-cropping:** A plant-back interval of 35 days is required for all crops not listed on the label. **Re-entry interval:** 24 hours. **Rainfall:** Avoid application if heavy rain is forecast. **Grazing:** All crops can be grazed or fed to livestock 30 days after application.

Environmental precautions
Toxic to aquatic organisms, non-target terrestrial plants and small wild animals. Avoid runoff from treated areas into aquatic areas. Do not discharge into the subsoil/soil. Do not discharge into drains/surface waters/groundwater.

Toxicity
Oral LD_{50} (rat) = > 2,000 - < 5,000 mg/kg. Dermal LD_{50} (rat) = > 5,000 mg/kg.

Storage
Store in original container. Protect from freezing.

Stadium

Group 3, 11, 12

Formulation

Product	Company	Active ingredient	Formulation	Container size
Stadium (PCP #31050)	Syngenta	Azoxystrobin: 143 g/L Difenoconazole: 112 g/L Fludioxynil: 143 g/L	Suspension concentrate	10 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate	Timing and specific comments
Potato	Fusarium dry rot (*Fusarium* spp.) Silver scurf (suppression) (*Helminthosporium solani*)	32.5 mL/tonne	Final spray solution of Stadium and water should deliver an application rate of 2 L per metric tonne of potato. Ensure proper coverage of the tubers. Tubers should be tumbling as they are treated.

Application information
How to apply: In-line aqueous spray application. See label for detailed mixing instructions.

How it works
Stadium helps control the spread of pathogens to preserve tuber quality. 3 active ingredients deliver multiple modes of action to support broad-spectrum disease control and resistance management.

Restrictions
Maximum Residue Limits (MRLs) in potato products for export to a number of countries outside North America have been established for the active ingredients in Stadium; however, they are not harmonized with North American levels. Prior to application, growers are advised to check with their potato buyer regarding Stadium use. It should also be noted that Stadium is NOT registered for use on seed potato.

Environmental precautions
This product is toxic to fish and aquatic invertebrates. Do not apply directly to water. Do not allow contaminated waste water from the processing areas to enter lakes, streams, ponds or other waters. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

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Toxicity
Oral LD_{50} (rats) > 550 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in a cool, dry place.

Tanos

Group 11, 27

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tanos (PCP# 27435)	Corteva Agriscience	Famoxadone: 25% Cymoxanil: 25%	Dry flowable	3.4 kg

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Timing and specific comments
Potato	Early blight (*Alternaria solani*), late blight (*Phytophthora infestans*)	227 - 340 g	A minimum 12 day application window must pass between the first and second application of Tanos fungicide. A minimum 24 day application interval must pass between the second and third application of Tanos Fungicide. Fungicides other than Tanos may be used as necessary to protect the crop during these intervals. Do not apply Tanos Fungicide to more than 247 acre/day. Apply no more than 3 applications per year.

Registered tank mixes
None registered.

Application information
How to apply: Ground and aerial application. May be applied with ground sprayers or air-assisted sprayers. Do not apply by air. **Water volume:** Use 100 - 120 L/acre water volume with conventional sprayers. Use a minimum of 44 L/acre water volume with air assisted sprayers. Aerial – 20 L/acre minimum.

Application tips
Tanos must not be applied to any crop suffering from stress as a result of drought, waterlogging, low temperatures, insect attacks, nutrient or lime deficiency or other factors reducing crop growth.

How it works
Tanos is both a protectant and locally systemic fungicide containing 2 modes of action.

Restrictions
Rainfall: Tanos fungicide rapidly penetrates into plant tissues and is rainfast within 12 hours after application. **Re-cropping:** Crops that are on the Tanos label may be planted back at any time; cereal grains may be planted back following a minimum plant-back interval of 30 days, and all other crops may be planted back following a minimum plant-back interval of 1 year. **Re-entry interval:** 24 hours.
Pre-harvest intervals: 14 days.

Environmental precautions
Tanos is toxic to fish and other aquatic organisms. This product is toxic to birds and wild mammals and is harmful to beneficial arthropods, such as predators and parasitoids. Toxic to aquatic organisms and non-targeted terrestrial plants. Observe buffer zones specified on the product label. **Runoff:** Do not apply to areas that are vulnerable to runoff. If rainfall is imminent, delay spraying.

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Toxicity
Famoxadone: Oral LD_{50} (rats) = > 5,000 mg/kg. Dermal LD_{50} (rabbit) = > 2,000 mg/kg.
Cymoxanilis: Oral LD_{50} (rats) = > 960 mg/kg. Dermal LD_{50} (rabbit) = > 2,000 mg/kg.

Storage
Store product closed in original container only. Protect against humid air and water.

TilMOR™ 240 EC Fungicide

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
TilMOR™ 240 EC (PCP# 33825)	Bayer	Prothioconazole: 80 g/l Tebuconazole: 160 g/l	Emulsifiable concentrate	10.12 L

Crops, diseases controlled, rates and timing

Crops	Diseases controlled	Rate per acre	Timing and specific comments
Wheat (spring, winter, durum)	**Suppression:** Fusarium head blight (*Gibberella zeae / Fusarium graminearum*)	253 ml	For suppression of Fusarium head blight, apply when at least 75% of the wheat heads on the main stem are fully emerged to when 50% of the heads on the main stem are in flower. Maximum of 1 application per crop season.
	Control: Leaf rust (*Puccinia recondita*), stem rust (*Puccinia graminis*), stripe rust (*Puccinia striiformis*), leaf and glume blotch (*Zymoseptoria* syn. *Septoria tritici, Parastagonospora* syn. *Stagonospora nodorum*), Tan spot (*Pyrenophora tritici-repentis*), powdery mildew (*Erysiphe graminis)*		For leaf disease control apply to leaf foliage at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development, up to the end of the flowering stage. Maximum of 1 application per crop season.
Barley	Net blotch (*Pyrenophora teres*), spot blotch (*Cochliobolus sativus*), scald (*Rhynchosporium secalis*), leaf blotch (*Septoria passerinii*), leaf rust (*Pucinnia hordei*), stem rust (*Puccinia graminis*), stripe rust (*Puccinia striiformis*), powdery mildew (*Erysiphe graminis*)	253 ml	Apply at the very early stages of disease development. Maximum of 1 application per crop season.

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Crops	Diseases controlled	Rate per acre	Timing and specific comments
Oats	Crown rust (*Puccinia coronata*), stem rust (*Puccinia graminis*), stagonospora (*septoria*), leaf blotch and black stem (*Phaeosphaeria [*syn. *Leptosphaeria] avenaria f. sp. avenaria, asexual state Stagnospora avenae* syn. *Septoria avenae*)	253 ml	Apply at the very early stages of disease development. Maximum of 1 application per crop season.

Registered tank mixes
None registered.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40L/acre minimum. Aerial – 20 L/acre minimum.

Application tips
For Fusarium head blight spray coverage is essential. Spray equipment must be set up to ensure thorough coverage of all wheat heads.

How it works
Tebuconazole and prothioconazole are broad spectrum fungicides for disease control in cereals with preventative and curative properties.

Restrictions
Grazing: Do not allow livestock to graze or feed green forage to livestock less than 6 days after application. Straw cut after harvest may be fed or used for bedding. **Pre-harvest intervals:** Wheat, barley and oats – 36 days. **Re-entry interval:** 12 hours. **Re-cropping:** Registered crops and soybeans may be replanted in treated areas as soon as practical after the last application. For all other crops, do not plant back within 120 days of last application. **Rainfall:** Avoid application when heavy rain is forecast. Product is rain fast in 2 hours.

Environmental precautions
Tebuconazole is toxic to birds, small wild animals, aquatic organisms and non-target plants. Do not apply directly to water or to areas where surface water is present. Prothioconazole is toxic to aquatic organisms. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. To reduce runoff from treated areas, consider the characteristics and conditions of the site before treatment.

Toxicity
Oral LD_{50} (rats) = > 2,500 mg/kg. Dermal LD_{50} (rats) = > 2,000 mg/kg.

Storage
Store in a cool, dry place. Store in original container. Do not store at temperatures below freezing.

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Tilt 250 E/Bumper 432 EC/Pivot 418 EC/ Propi Super 25 EC/Fitness /Princeton Fungicide/Modo Fungicide

Group 3

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tilt 250 E (PCP# 19346)	Syngenta	Propiconazole: 250 g/L	Emulsifiable concentrate	8 L
Bumper 432 EC (PCP# 28017)	ADAMA Canada	Propiconazole: 432 g/L		4.8 L
Pivot 418 EC (PCP# 28219)	IPCO	Propiconazole: 418 g/L		4.8 L
Propi Super 25 EC (PCP# 32240)	Sharda CropChem Ltd	Propiconazole: 250 g/L		8 L
Fitness (PCP# 32639)	Loveland Products Canada	Propiconazole: 418 g/L		4.8 L
Co-op Pivot (PCP# 32986)	Federated Co-operatives Ltd	Propiconazole: 418 g/L		4.8 L
Princeton Fungicide (PCP# 338)	Sharda CropChem Ltd	Propiconazole: 418 g/L		4.8 L
Modo Fungicide (PCP # 34213)	NewAgco Inc.	Propioconazole: 250 g/L		8.1 L, 97 L

Crops, diseases controlled, rates and timing

Crop	Diseases	Rate per acre		Timing
		Tilt/Propi Super/Modo	Bumper/Pivot /Fitness/ Princeton Fungicide	
Wheat (durum, spring, winter)	Septoria leaf spot (*Septoria* sp.) Tan spot (*Pyrenophora tritici-repentis*)	101 - 202 mL	61 - 121 mL	**Early application**: For early season suppression (as early as the 2-leaf stage), use the lower rate under normal field conditions. If there is a history of high disease pressure and/or field conditions favour disease development, use the higher rate. **Late application**: Use the high rate at later growth stages but before head is half emerged.
Barley	Net blotch (*Pyrenophora teres*)			
Oats	Septoria leaf blotch (*Septoria avenae*), crown rust (*Puccinia coronata*)			
Canary seed	Septoria leaf mottle (*Septoria triseti*)	202 mL	121 mL	Apply only once at flag leaf emergence.
Timothy	Purple eyespot (*Cladosporium phlei)*	202 mL	Pivot: 121 mL Bumper: Not registered	Early Application: Apply at the first sign of disease. Late application: Full flowering.
Bean (dry)	Rust (*Uromyces* spp.)	202 mL	121 mL	Apply when there is 5% disease level in the field, followed by a second application 14 days after the first if disease development persists.
Chickpea, lentil, pea (dry)	Asian rust (*Phakospora pachyrhizi*)	202 - 305 mL	Not registered	
	Powdery mildew	202 mL	Not registered	
Canola	Blackleg (*Leptosphaeria maculans*)	202 mL	121 mL	Apply during the rosette stage (second leaf - bolting).

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Crop	Diseases	Rate per acre		Timing
		Tilt/Propi Super/Modo	Bumper/Pivot /Fitness/ Princeton Fungicide	
Corn	Rust (*Puccinia sorghi*)	202 mL	121 mL	Apply at the first sign of the disease.
	Northern corn leaf blight (*Setosphaeria turcicum*)	101 - 202 mL	61 - 121 mL	
	Eye spot (*Aureobasidium zeae*)	202 mL	121 mL	

Registered tank mixes

Herbicides

Tilt/Propi Super 25 EC: 2,4-D Amine, MCPA Amine, Buctril M, Pardner, Mextrol, Approve, Horizon, Axial 100EC, Broadband.

Bumper/Princeton Fungicide: 2,4-D Amine, MCPA Amine, Badge, Bromotril, Horizon 240EC.

Pivot: 2,4-D Amine, MCPA Amine, Buctril M, Pardner, Horizon 240EC, Logic M, Badge, Brotex 240, Bromotril 240EC.

Fitness: 2,4-D Amine, MCPA Amine, Buctril M, Logic M, Badge, Horizon 240EC, Pardner, Brotex 240, Bromotril 240EC.

Modo: 2,4D Amine, MCPA Amine, Buctril M, Pardner, Mextrol 450, Approve, MPower Aurora, Broadband

Insecticides: In corn only, Tilt, Pivot, Propi Super 25 EC and Modo may be tank mixed with 1 of the following pesticides: Matador, Mako. In corn, Bumper/Princeton Fungicide may be tank mixed only with Silencer. In legumes (see label for list of registered crops), Tilt 250E, Modo and Propel can be tank mixed with Matador.

Fungicides: In wheat, barley, rye, oats and triticale, Tilt 250E and Propi Super 25 EC can be tank mixed with Quadris. In legumes (see label for list of registered crops), Tilt 250E, Propi Super 25 EC and Modo can be tank mixed with Quadris for Asian soybean rust.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 80 L/acre. Aerial – 16 - 20 L/acre.

Application tips

Good coverage is essential for effective disease control. Any reduction in water volume can reduce disease control. Do not exceed 2 applications per season.

How it works

Partially systemic. Propiconazole is transported upwards in plants. It has both preventive and curative activity. Length of control will vary from 3 to 4 weeks depending on disease, crop and environmental conditions. Strongly absorbed by most soils.

Restrictions

Rainfall: If rainfall occurs within 1 hour of application, re-application is necessary. **Grazing:** Do not graze animals on treated green crops within 3 days of application. Do not feed straw from crops treated with herbicide tank mixes to livestock. **Pre-harvest intervals:** Wheat, barley and oats – 45 days. Canola – 60 days. Dry bean – 30 days. Timothy – 14 days. Corn – 30 days (field corn harvested for forage), 14 days (sweet corn). See label for pre-harvest intervals when tank mixing with a herbicide or an insecticide. **Re-entry interval:** Hand-harvesting and detasseling treated corn: 24 hours. All other crops and activities 12 hours.

Environmental precautions

Propiconazole is toxic to fish. Do not spray any body of water by direct application, drift or by cleaning and rinsing spray equipment. Formulated products contain petroleum distillate that is moderately to highly toxic to aquatic organisms.

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Toxicity

Tilt: Oral LD_{50} (rats) = > 2,105 mg/kg. Dermal LD_{50} (rabbit) = > 4,250 mg/kg.
Bumper 432 EC: Oral LD_{50} (rats) = > 2,000 mg/kg. Dermal LD_{50} (rabbit) = > 5,000 mg/kg. Pivot 418 EC/Princeton Fungicide: Oral LD_{50} (rats) = 982 mg/kg. Dermal LD_{50} (rabbit) = > 5,000 mg/kg.
Propel/Propi Super: Oral LD_{50} (rats) = 2,105 mg/kg. Dermal LD_{50} (rabbit) = 4,250 mg/kg.

Storage

Heated storage only.

Tornado Pro

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Tornado Pro a co-pack of Tornado (PCP# 33995) and Spade (PCP# 32927)	NewAgco Inc.	Tebuconazole: 250 g/L	Emulsion in water	9.8 L, 98 L
		Pyraclostrobin: 250 g/L	Emulsifiable concentrate	7.7 L, 77 L

Crops, diseases controlled, rates and timing

Crops	Diseases Controlled	Rate per acre	Stage
Wheat (spring, winter, durum)	Stem rust, leaf rust, stripe rust, Septoria leaf blotch, tan spot	150 mL Tornado + 120 mL Spade	Apply immediately after flag stage or at the first sign or very early stage of disease, especially if weather conditions are conducive to disease development.
Barley	Net blotch, spot blotch, scald, stem rust, leaf rust, stripe rust, Septoria leaf blotch, powdery mildew		

Registered tank mixes

None registered.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips

Good coverage is essential for effective disease control and higher water volumes tend to increase performance with dense canopies. Tornado Pro works best if it is applied in a preventative manner. Do not apply more than once per year. Do not apply once the head is emerged.

How it works

Pyraclostrobin has a protective effect because it inhibits spore germination and a curative effect due to the inhibition of mycelial growth and sporulation of the fungus on the leaf surface. It is systemic within the leaf. Tebuconazole is a broad-spectrum fungicide with preventive, curative and eradicative properties.

Restrictions

Rainfall: Avoid application when heavy rain is forecast. Rainfast in 1 hour. **Grazing:** Do not allow livestock to graze or feed green forage to livestock prior to 6 days after application. **Pre-harvest intervals:** Do not apply within 36 days of harvest. **Plant-back interval:** Treated areas may be replanted following harvest with any crop listed on the label.

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Do not replant treated areas for 120 days after last application for crops not listed on the label.
Re-entry interval: 12 hours.

Environmental precautions

Tebuconazole is toxic to birds, small wild animals, aquatic organisms and non-target plants. Do not apply directly to water or to areas where surface water is present. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes. Do not apply by ground or air within 30 metres of aquatic areas. Pyraclostrobin is toxic to aquatic organisms, non-target terrestrial plants and small mammals. Observe buffer zones specified on the label. To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Pyraclostrobin: Oral LD_{50} (rats) = 500 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg. Tebuconazole: Oral LD_{50} (rats) => 200 - < 2,000 mg/kg. Dermal LD_{50} (rats) = > 4,000 mg/kg

Storage

Store in a cool, dry, locked, well ventilated area without floor drain and prevent cross contamination with other pesticides, fertilizers, food and feed.

Trivapro

Group 3, 7, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Trivapro A (PCP# 32184)	Syngenta	Azoxystrobin: 75 g/L Propiconazole: 125 g/L	Suspension	8.1 L, 160 L
Trivapro B (PCP #32185)	Syngenta	Benzovindiflupyr: 100 g/L	Emulsifiable concentrate	2.43 L, 12 L

Crops, diseases controlled, rates and timing

Crops	Diseases Controlled*	Rate per acre	Stage
Cereals	Stem rust (*Puccinia graminis*), leaf rust (*P. recondita*), stripe rust (*P. striiformis*), Septoria leaf blotch (*Septoria tritici*), tan spot (*Pyrenophora tritici-repentis*), powdery mildew (*Erysiphe graminis*), net blotch (*Drechslera teres*), barley scald (*Rhynchosporium secalis*)	Trivaro A: 0.40 L Trivapro B: 0.12 L	Apply between stem elongation and head half emergence up until the flag leaf stage.
Corn	Rust (*Puccinia sorghi*), northern corn leaf blight (*Setosphaeria turcicum*), southern corn leaf blight (*Cochliobolus heterostrophus*), eye spot (*Aureobasidium zeae*), grey leaf spot (*Cercospora zeae-maydis*), anthracnose leaf blight (*Colletotrichum graminicola*)		Begin applications prior to disease onset when conditions are conducive for disease. Make applications no closer than 14 days apart.

Registered tank mixes

Contact Syngenta for tank mix information.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 80 L/acre minimum. Aerial – 18 L/acre minimum.

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How it works
Trivapro contains solatenol, azoxystrobin and propiconazole. These fungicides help cure existing leaf disease and prevent further infections.

Restrictions
Maximum allowable applications: Maximum of 2 applications per season to corn and cereals. **Pre-harvest intervals:** Cereals – 45 days. Forage and hay (wheat, oats, barley, triticale, rye) – 30 days. Grain and sweet corn — 14 days. Forage corn – 30 days. **Rainfall:** The product is most effective when applied and allowed to dry before a rainfall. **Re-cropping:** For crops not registered, do not apply within 180 days.

Environmental precautions
Toxic to aquatic organisms, non-target terrestrial plants and certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects. Both active ingredients are persistent and will carry over. It is recommended that this product not be used in areas treated with either active ingredient during the previous season. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of waste.

Toxicity
Trivapro A: Oral LD_{50} (rats) = 1,750 mg/kg body weight. Dermal LD_{50} (rats) > 5,000 mg/kg body weight.
Trivapro B: Oral LD_{50} (rats) = 550 mg/kg. Dermal LD_{50} (rats) > 5,000 mg/kg body weight.

Storage
Keep in original container. Store in a cool, dry, well ventilated area. Do not store below 0°C.

Twinline

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Twinline (PCP# 30337)	BASF Canada	Pyraclostrobin: 130 g/L Metconazole: 80 g/L	Liquid	8.1 L, 64 L, 128 L, 400 L

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases	Rate per acre	Staging and specific comments
Wheat (all types) **Triticale**	Tan spot (*Pyrenophora tritici-repentis*), Septoria leaf spot (*Septoria tritici* or *Stagonospora nodorum)*, leaf rust (*Puccinia recondita*), spot blotch (*Cochliobolus sativus*), stripe rust (*Puccinia striiformis*), powdery mildew (*Eryspiphe graminis* f. sp. *Tritici*)	154 - 202 mL	Prior to disease development or at onset of disease. Use the 202 mL/acre rate to obtain extended protection with maximum yield benefits.
Barley	Net blotch (*Pyrenophora teres*), spot blotch (*Cochliobolus sativus*), scald (*Rhynchosporium secalis*), stripe rust (*Puccinia striiformis*)	154 - 202 mL	
Oats	Crown rust (*Puccina coronata*)	154 - 202 mL	
Rye	Leaf rust, powdery mildew	154 - 202 mL	
Wheat (all types), barley, oats, rye, triticale	Suppression of Fusarium head blight (*Fusarium graminaerium*). Includes control of all leaf diseases controlled by lower application rates.	456 mL	Apply when weather is warm and wet at head emergence and flowering. For wheat and rye apply at 20% flowering. For barley apply between full head emergence up to 3 days after full emergence of the main stem heads.

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Registered tank mixes
None registered.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre. Aerial – 20 L/acre.

Application tips
Thorough coverage is essential to protect target plants from disease development. Optimal application timing is at the flag leaf of cereals for maximum protection and yield response.

How It works
The active ingredient metconazole is a broad spectrum sterol biosynthesis inhibitor fungicide. The active ingredient pyraclostrobin is a member of the strobulirin class of chemistry used as a broad spectrum fungicide.

Restrictions
Pre-harvest intervals: Wheat, barley, oats and rye – apply no later than the end of flowering. **Re-cropping:** A plant-back interval of 35 days is required for all crops not listed on the label. **Re-entry interval:** 6 days. **Rainfall:** Rainfast in 1 hour. Avoid application if heavy rain is forecast. **Grazing:** All crops can be grazed or fed to livestock.

Environmental precautions
Toxic to aquatic organisms, non-target terrestrial plants and small wild animals. Avoid runoff from treated areas into aquatic areas.

Toxicity
Oral LD_{50} (rats) > 50 - < 300 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage
Store in original container. Protect from freezing.

Veltyma

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Veltyma (PCP#34166)	BASF Canada	Mefentrifluconazole: 200 g/L Pyraclostrobin: 200 g/L	Suspension concentrate	8.1 L

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases	Rate per acre	Staging and specific comments
Potato	Early blight (*Alternaria solani*)	202 mL	Begin applications prior to row closure or when conditions are favourable for disease development. Apply an additional application at an interval of 7 - 14 days if disease persists or weather conditions are favourable.
	Black dot (*Colletotrichum coccodes*)		
	Brown spot (suppression) (*Alternaria alternata*)		

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre. Aerial – 20 L/acre minimum.

Application tips
Maximum of 1 L/acre of Veltyma to be applied per growing season.

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How It works
Veltyma is a broad-spectrum fungicide. The active ingredients belong to two classes for fungicides: mefentrifluconazole (DMI) and pyraclostrobin a strobilurin (QoI).

Restrictions
Rainfall: Rainfast when product has dried on crop. **Grazing:** Treated crops may be grazed 7 days after application. **Pre-harvest Interval:** 7 days. **Re-cropping:** All labelled crops may be planted immediately after application. Crops not on the label must not be planted for one month after application. **Re-entry interval:** 12 hours.

Environmental precautions
Toxic to aquatic organisms, non-target terrestrial plants and small wild animals. Observe buffer zones specified on the label. It is recommended that this product not be used in areas treated with any products containing mefentrifluconazole the previous season. **Runoff:** To reduce runoff from treated areas avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity
Oral LD_{50} (rats) = > 500 - 2000 mg/kg. Dermal LD_{50} (rats) = >5000 mg/kg.

Storage
To prevent contamination, store away from food or feed.

Velum® Prime Nematicide/Fungicide

Group 7

Formulation

Product	Company	Active ingredient	Formulation	Container size
Velum® Prime (PCP #32108)	Bayer	Fluopyram: 500 g/L	Suspension concentrate	4.04 L

Crops, Diseases Controlled, Rates and Staging

Crops	Diseases	Rate per acre	Staging and specific comments
Potato	Plant pathogenic nematodes: root lesion nematodes (*Pratylenchus* spp.), root knot nematodes (*Meloidogyne* spp.), potato cyst nematodes (including Pale cyst and golden nematode) (*Globodera pallida, Globodera rostochiensis*)	202 mL or 4.5 mL/100m of row (based on 90 cm row spacing)	Soil applications using ground equipment: Spray specified dosage in a 4 - 6 inch (10 - 15 cm) band in-furrow at planting and cover with soil. For best results direct the in- furrow spray to the seed and soil. Apply in 20 - 60 L of water per acre.
	Early blight (*Alternaria solani*) and black dot (*Colletotrichum coccodes*)		

Registered tank mixes
None registered.

Application information
For soil applications (in-furrow) using ground equipment in potatoes, spray specified rate in a 10 - 15 cm band in-furrow at planting and cover with soil. For best results uniformly spray the band over the seed-pieces and soil. Apply in 20 - 60 L of water per acre.

Application tips
Do not apply more than 200 g fluopyram/acre per year, regardless of formulation or method of application (soil or foliar). To limit the potential for development of disease resistance to this fungicide class do not make more than 2 sequential applications of Velum Prime or any other Group 7 containing fungicide before rotating with a fungicide

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from a different Group registered for the same use. Any nematode or fungal population may contain individuals naturally resistant to Velum Prime and other Group 7 nematicides/fungicides. A gradual or total loss of nematode control may occur over time if this product is used repeatedly in the same field. Other resistance mechanisms that are not linked to site of action, but specific for individual chemicals, such as enhanced metabolism, may also exist. Appropriate resistance-management strategies should be followed.

How It works

Velum® Prime is a broad spectrum nematicide/fungicide with preventative, systemic and curative properties recommended for the suppression of certain soil plant pathogenic nematodes and protection from certain crop diseases.

Crop restrictions

Rainfall: Avoid application when heavy rain is forecast. **Grazing:** 7 days. **Pre-harvest Intervals:** Do not apply Velum Prime within 7 days of harvest. Tops or greens from these crops may be utilized for food or feed. **Re-cropping:** Alfalfa – 14 days following application. All other crops may be replanted immediately following the last application of Velum Prime. **Re-entry interval:** 12 hours.

Environmental precautions

Toxic to aquatic organisms and non-target terrestrial plants. Observe buffer zones specified on the label. Toxic to birds. This product demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this product in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil or clay.

Toxicity

Oral LD_{50} (rat) = > 2,000 mg/kg. Dermal LD_{50} (rat) = > 2,000 mg/kg.

Storage

Store this product away from food or feed. Do not store below freezing. If stored for 1 year or longer, shake well before using. Keep the product in the original container during storage.

Zampro

Group 40, 45

Formulation

Product	Company	Active ingredient	Formulation	Container size
Zampro (PCP# 30321)	BASF Canada	Ametoctradin: 300 g/L Dimethomorph: 225 g/L	Suspension	4.14 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Timing and specific comments
Potato	Late blight (*Phytophthora infestans*)	0.32 - 0.40 L	Begin applications prior to disease development. Repeat applications on a 5 - 10 day interval. Use the higher application rate and shorter interval when disease pressure is high. Do not make more than 2 sequential applications of Zampro before alternating to a fungicide with a different mode of action. Do not exceed 3 applications per season.
	Tuber blight (*Phytophthora infestans*)	0.40 L	Application of Zampro immediately prior to or after vine kill helps reduce tuber blight.

Application information

How to apply: Ground and aerial application. **Water volume:** Ground – 80 L/acre. Aerial – 20 L/acre.

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How It works

Zampro consists of 2 fungicides. Ametoctradin is a non-systemic and preventive compound. It acts on pathogen cells by interfering with their respiration process. Dimethomorph is a systemic fungicide with protective activity. It acts as a lipid synthesis inhibitor.

Restrictions

Grazing: No restrictions listed. **Pre-harvest interval:** Do not apply within 4 days of harvest. **Re-entry interval:** 12 hours. **Re-cropping:** A plant-back interval of 30 days is required for all crops not listed on the label.

Environmental precautions

This product is toxic to aquatic organisms. Observe buffer zones specified on the label. **Runoff:** Do not apply to areas where runoff is likely to occur. Avoid application to areas with moderate to steep slope, compacted soil or clay. Avoid application when heavy rain is forecast.

Toxicity

Oral LD_{50} (rats) = > 500 - 2,000 mg/kg. Dermal LD_{50} (rats) = > 5,000 mg/kg.

Storage

Store in original container in a secure, dry area. Do not allow product to freeze.

Zolera FX

Group 3, 11

Formulation

Product	Company	Active ingredient	Formulation	Container size
Zolera FX (PCP #33367)	UPL AgroSolutions Canada	Fluoxastrobin: 200 g/L Tetraconazole: 200 g/L	Microemulsion	5.7 L

Crops, diseases controlled, rates and timing

Crops	Diseases	Rate per acre	Timing and specific comments
Field pea	Control of powdery mildew (*Erysiphe pisi*) Suppression of white mould (*Sclerotinia sclerotiorum*), Ascochyta blight (*Mycosphaerella pinodes*), Ascochyta leaf and pod spot (*Ascochyta pisi*)	142 - 223 mL	For optimum results, begin applications preventatively and continue as needed on a 7- to 14-day interval. Use the highest rate and the shortest interval when conditions favour high disease pressure. For management of listed Ascochyta disease use the highest rate. Do not make more than 2 applications of Zolera FX per season.
Lentil	Suppression of white mould (*Sclerotinia sclerotiorum*), Ascochyta leaf and pod spot (*Ascochyta lentis*)		
Dry bean, faba bean	Suppression of white mould (*Sclerotinia sclerotiorum*), anthracnose (*Colletotrichum lindemuthianum*)		

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Crops	Diseases	Rate per acre	Timing and specific comments
Chickpea	Suppression of white mould (*Sclerotinia sclerotiorum*)		
Corn	Control of common rust (*Puccinia sorghi*), grey leaf spot (*Cercospora maydis*) Suppression of northern corn leaf blight (*Setosphaeria turcica,* anamorph: *Exserohilum turcicum*)	202 mL	Apply preventatively between V4 (4 leaf collar) and dough stage (R4. Do not make more than 1 application of Zolera FX per season.

Registered tank mixes
None registered.

Application information
How to Apply: Ground application for all crops. Aerial application for corn only. **Water Volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Application tips
Thorough coverage is necessary to provide good disease control. Applications using sufficient water volume to provide thorough and uniform coverage generally provide the most effective disease control.

How It works
The active ingredient fluoxastrobin is a systemic fungicide that works by interfering with respiration in plant pathogenic fungi and is an inhibitor of spore germination and mycelial growth. The active ingredient tetraconazole is a broad-spectrum sterol biosynthesis inhibitor fungicide.

Restrictions
Rainfall: Avoid application when heavy rain is in the forecast. **Grazing:** No restrictions listed.
Pre-harvest intervals: Pulse crops – 14 days; Grain corn – 30 days. **Re-cropping:** All crops on the Zolera FX label may be planted immediately following harvest. Alfalfa and forage grasses may be planted following a 30 day plant back interval. Sunflowers may be planted following a 180 day plant back interval. For all other crops, do not plant back within one year of the last field application. **Re-entry interval:** 12 hours.

Environmental precautions
Toxic to aquatic organisms. Observe buffer zones as specified on the label. To reduce runoff from treated areas into aquatic habitats avoid application to ears with a moderate to steep slope, compacted soil, or clay.

Toxicity
Oral LD50 (rats) = 3383 mg/kg. Dermal LD50 (rats) = > 5,000 mg/kg.

Storage
Store this product away from food or feed.

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Fungicide – foliar treatment selector chart

Barley, wheat, oats and rye

Crop	Barley																					
Products	Acapela	Bumper/Pivot/Tilt/Fitness/Propi Super/Princeton/Modo	Caramba	Cerefit	Custodia	Evito	Folicur 250/Palliser/Hornet 432 F/ Advantage Tebuconazole/Orius/Tebbie /FBN Tebuconazole 250/Toledo/Tornado	Headline EC/Spade/Preach	Miravis Ace	Miravis Neo	Nexicor	Priaxor	Proline 480 SC	Prosaro XTR/Prosaro PRO	Quilt/Topnotch/Fungtion/Quasimodo	Roxar	Sphaerex	Tornado Pro	Tilmor	Trivapro	Twinline
Fusarium head blight			S						S				S	S		S	S				S
Leaf rust			C	C	C	C	C		C					C	C		C	C	C	C	
Glume blotch																					
Net blotch	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Powdery mildew	C		C	C			C		C					C			C	C	C	C	
Scald	C		C	C			C	C	C	C		C	C	C	C	C	C	C	C	C	C
Septoria leaf spot									C						C	S					
Septoria leaf blotch	C			C	C		C			C				C				C	C		
Spot blotch			S	C	C		C	C	C	C		C	C	C			C	C	C		C
Stem rust				C	C	C	C		C					C		C		C	C	C	
Stripe rust	C				C	C	C	C		C	C	C		C	C	C	C	C	C	C	C
Tan spot					C					C											
Crown rust																					

C = Control, S = Suppression

* Mancozeb-based products are Dithane Rainshield, Manzate 200, Manzate Pro-stick, Penncozeb 75DF, Penncozeb 80 WP, Manzate Max.

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Fungicide – foliar treatment selector chart

Barley, wheat, oats and rye (*continued*)

Crop	Wheat																						
Products	Acapela	Bravo/Echo	Bumper/Pivot/Tilt/Fitness/Propi Super/Princeton/Modo	Caramba	Cerefit	Custodia	Evito	Folicur 250/Palliser/Hornet 432 F/ Advantage Tebuconazole/Orius/Tebbie Toledo/Tornado	Headline EC/Spade/Preach	Mancozeb –based products*	Miravis Ace	Nexicor	Priaxor	Proline 480 EC	Prosaro XTR/Prosaro PRO	Quilt/Fungtion/Topnotch/Quasimodo	Roxar	Sphaerex	Tornado Pro	Tilmor	Trivapro	Twinline
Fusarium head blight		S		S				S			S			S	S		S	S		S		S
Leaf rust	C			C	C	C	C	C	C	C	C	C	C	C	C	C		C	C	C	C	C
Glume blotch		C			C						C			C	C					C		
Net blotch																		C				
Powdery mildew	C			C	C		C	C	C		C		C		C			C		C	C	C
Scald																						
Septoria leaf spot		C	C	C	C				C		C	C	C			C		C				C
Septoria leaf blotch	C					C	C	C		C				C	C		S		C		C	
Spot blotch				S				C	C				C									C
Stem rust				C	C	C	C	C			C				C		C	C	C	C	C	
Stripe rust	C			C	C	C	C	C	C		C	C	C		C	C	C	C	C	C	C	C
Tan spot	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		C	C	C	C
Crown rust																						

C = Control, S = Suppression

* Mancozeb-based products are Dithane Rainshield, Manzate 200, Manzate Pro-stick, Penncozeb 75DF, Penncozeb 80 WP, Manzate Max.

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Fungicide – foliar treatment selector chart

Barley, wheat, oats and rye (*continued*)

Crop	Oats																			Rye								
Products	Acapela	Bumper/Pivot/Tilt/Fitness/Propi Super/Princeton/Modo	Caramba	Cerefit	Evito	Headline/Preach	Folicur 250/Palliser/Hornet 432 F/ Advantage Tebuconazole/Orius/Tebbie /FBN Tebuconazole/Toledo/Tornado	Miravis Ace	Miravis Neo	Nexicor	Priaxor	Proline	Prosaro XTR/Prosaro PRO	Quilt/Fungtion/Quasimodo	Sphaerex	Tilmor	Topnotch	Trivapro	Twiniline	Acapela	Caramba	Headline EC/Spade/Preach	Miravis Neo	Nexicor	Priaxor	Sphaerex	Trivapro	Twiniline
Fusarium head blight			S					S					S*		S				S		S				S		S
Leaf rust																		C		C	C	C		C	C	C	C	C
Glume blotch																												
Net blotch																	C	C										
Powdery mildew	C																	C		C	C	C			C	C	C	C
Scald																		C		C			C					
Septoria leaf spot								C	C						C		C											
Septoria leaf blotch		C	C	C									C			C		C		C			C				C	
Spot blotch																												
Stem rust					C		C						C			C		C								C		
Stripe rust	C																			C			C			C	C	
Tan spot																							C				C	
Crown rust	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C									

C = Control, S = Suppression

(continued)

* Prosaro PRO only.

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Fungicide – foliar treatment selector chart

Canola, mustard and flax

Crop	Canola															Mustard			Flax				
Products	Acapela	Bumper/Pivot/Tilt/Fitness/Propi Super/Princeton/Modo	Contans WG	Cotegra	Dyax	Headline EC/Preach/Spade	Lance WDG/Lance AG	Miravis Bold	Nexicor	Priaxor	Proline 480 SC	Proline Gold	Quadris/Azoshy 250 SC/Quasi	Quash SC	Seranade OPTI	Proline 480 SC	Priaxor	Serenade OPTI	Dyax	Headline EC/Preach/Spade	Priaxor	Proline 480 SC	Serenade OPTI
Alternaria black spot					S	C	C			C			C				C						
Blackleg		C		C	C	C			C	C			C				C						
Pasmo																			C	C	C		
Sclerotinia white mould	C		C	C	S		C	C		S	C	C	C	C	C	C	S	C	C		S	C	C

Corn, alfalfa (grown for seed), grasses (grown for seed) and sugar beet

Crop	Corn										alfalfa							grasses		Sugar beet									
Products	Acapela	Bravo/Echo	Bumper/Pivot/Tilt/Fitness/Propi Super/Princeton/Modo	Evito	Headline EC/M/Spade/Preach	Priaxor	Quadris/Azoshy 250 SC/Quasi	Quilt/Fungtion/Quasimodo	Trivapro	Zolera FX	Acapela	Dyax	Fontelis	Headline EC/Spade/Preach	Lance WDG/Lance AG	Mancozeb –based products*	Priaxor	Headline EC/Spade/Preach	Priaxor	Caramba	Copper based products***	Headline EC/Spade/Preach	Lifegard WG	Mancozeb –based products**	Miravis Duo	Priaxor	Proline 480 SC	Quadris Top	Senator 50 SC
Northern leaf blight	C		C	C		C		C	C	S																			
Rusts		C	C	C	C	C	C	C	C	C																			
Grey leaf spot					C	C		C	C	C																			
Eye spot			C			S		C	C																				
Common leaf spot											C	C		C	C	C	C												
Spring black stem/ leaf spot															C														
Sclerotinia stem rot													C											S					
Leaf rust and stem rust																		C	C										
Powdery mildew																		S	S			C			C	C		C	
Cercospora leaf spot																				C	C	C	C	C	S	C	C	C	C

C = Control, S = Suppression

* Registered products include: Dithane Rainshield, Manzate Pro-stick, Penncozeb 75DF.

** Registered products include: Dithane Rainshield, Manzate Pro-stick, Penncozeb 75DF, Penncozeb 80 WP, Manzate Max.

*** Registered copper based products include: Coppercide WP, Parasol WG, Cueva, Coppercide XLR.

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Fungicide – foliar treatment selector chart

Pulse crops

Crop	Bean																	
Products	Acapela	Allegro	Bumper/Pivot/Tilt	Cercobin	Contnas WG	Copper 53 W	Copper based products*****	Cotegra	Delaro 325 SC ****	Headline EC/Spade/Preach	Kenja	Lance WDG	Priaxor	Proline Gold	Quadris/Azoshy 250 SC/Quasi	Quash SC	Quilt/Fungtion/Quasimodo	Serenade OPTI	Zolera FX
Asian bean rust	C								C						C		C		
Anthracnose	C					C				C			C	C	C				S
Aschochyta blight														C	C				
Bacterial blight						C	C												
Botrytis grey mould																		C	
Mycosphaerella blight										C					C				
Powdery mildew										C			C				C		
Downy mildew						C													
Rust			C							C			C						
Sclerotinia white mould	S	C		C	C			S	S		S	C		C		S		C	S

C = Control, S = Suppression *(continued)*

* Only in lentil.

** Only in chickpea.

*** Registered products include: Dithane DG, Manzate Pro-stick, Penncozeb 75DF.

**** Soybean only.

***** Registered products include: Coppercide WP, Kocide 2000, Parasol WG, Cueva, Coppercide XLR.

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Fungicide – foliar treatment selector chart

Pulse crops (*continued*)

Crop	Lentil/chickpea																			
Products	Acapela	Bravo/Echo	Bumper/Pivot/Tilt/Modo	Cotegra	Delaro 325 SC	Dyax	Elatus	Headline EC/Spade	Kenja	Lance AG	Lance WDG	Mancozeb-based products***	Miravis Neo 300 SE	Priaxor	Proline 480 SC	Quadris/Azoshy 250 SC/Quasi	Quash SC	Quilt/Fungtion /Quasimodo	Serenade OPTI	Zolera FX
Asian bean rust	C		C													C		C		
Anthracnose	C*	C*		C*	C*		C	C		C		C*	C	C*		C*		C*		
Aschochyta blight		C			C	C	C	C*		C	C	C*	C**	C	C	C	S			
Bacterial blight																				
Botrytis grey mould					C					C	C			S					C	
Mycosphaerella blight							C													
Powdery mildew			C										C					C		
Downy mildew																				
Rust																C*				
Sclerotinia white mould	S			S	C	S	S		S	C	C		S	S	C		S		C	S

C = Control, S = Suppression *(continued)*

* Only in lentil.

** Only in chickpea.

*** Registered products include: Dithane Rainshield, Manzate Pro-stick, Penncozeb 75DF, Manzate Max.

**** Soybean only.

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Fungicide – foliar treatment selector chart

Pulse crops (*continued*)

Crop	Pea																		
Products	Acapela	Bravo/Echo	Bumper/Pivot/Tilt/Modo	Cotegra	Delaro 325 SC	Dyax	Elatus	Headline EC/Spade/Preach	Kenja	Kumulus DF/Cosavet DF Edge	Lance AG	Lance WDG	Miravis Neo 300 SE	Priaxor	Quadris/Azoshy 250 SC /Quasi	Quash SC	Quilt/Fungtion/Quasimodo	Serenade OPTI	Zolera FX
Asian bean rust	C		C					C					C	C	C		C		
Anthracnose													C						
Aschochyta blight		C		S	C		C				C	C		C	C				S
Bacterial blight																			
Botrytis grey mould					C						C	C						C	
Mycosphaerella blight	S			S	C	C	C	C			C	C	C	C	C				
Powdery mildew			C			C	C	C		C	C		C	C	C	C	C		C
Downy mildew											S			S					
Rust																			
Sclerotinia white mould	S			S	C	S	S		S				S	S		S		C	S

C = Control, S = Suppression

* Only in lentil.

** Only in chickpea.

*** Registered products include: Dithane DG, Manzate Pro-stick, Penncozeb 75DF.

**** Soybean only.

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Fungicide – foliar treatment selector chart

Potato

Products	Allegro 500 F	Aprovia Top	Bravo/Echo	Cevya	Copper-based products**	Coppercide XLR	Curzate*	Diplomat 5SC	Double Nickel LC/ Double Nickel 55	Elatus	Evito	Forum	Gavel 75 DF	Headline EC/Spade/ Preach	Lance WDG	Lifegard WG	Luna Tranquility	Mancozeb-based products***	Miravis Duo	Orondis Gold Potato/ Orondis Gold	Orondis Ultra	Phostrol/ Confine Extra
Alternaria leaf spot																	C					
Botrytis grey mould			C																S			
Black dot				S													S					
Brown spot		S		S															C			
Early blight		C	C	C	C	S		S	S				C	C	C	S	C	C	C			
Late blight	C		C		C	S	C*				C	C	C	C	C	S		C			C	C
Late blight tuber rot												C										C†
Pythium leak																				S		
Pink rot																				S		C†
Rhizoctonia canker																						
Silver scurf										C												
White mould	C								C							C			S			

Potato (*continued*)

Products	Quadris/ Azoshy 250 SC/ Quasi	Quadris Top	Quash SC	Rampart	Ranman 400 SC	Reason 500 SC	Revus	Scala SC*	Sercadis	Serenade OPTI	Serenade SOIL	Stadium	Tanos 50 DF	Veltyma	Velum Prime	Zampro
Botrytis grey mould																
Brown spot		S												S		
Black dot		S												C	C	
Early blight	C	C	C			C*		C*	C	C			C	C	C	
Fusarium dry rot												C				
Late blight	C			C†	C	C*	C						C			C
Late blight tuber rot																C
Pythium leak																
Pink rot				C†			S									
Rhizoctonia canker									C							
Silver scurf	C									C	C†	S				
White mould			C						C							

C = Control, S = Suppression

* Must not be used alone. Use only as a tank mixture.

** Copper-based products are: Copper 53 W, Copper Spray, Kocide 2000, Parasol and Cueva.

*** Mancozeb-based products are Dithane Rainshield, Manzate Pro Stick, Penncozeb 75 DF, Penncozeb 80 WP, Manzate Max.

† Control achieved with post-harvest application.

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Plant growth regulator use in Alberta

Plant growth regulators (PGRs) are synthetic compounds that can beneficially modify plant growth and development. These compounds function by altering hormonal activity to produce shorter stems, reduce lodging and maintain grain yield. PGRs are a tool that can help mitigate lodging pressure and are most useful in environments with abundant moisture and high levels of fertility.

Research is ongoing to address many questions about PGRs. It is known that effective PGR applications require careful crop staging, but their use is not recommended under stressful environmental conditions, and responses are species and cultivar specific. However, PGRs can be a risk management tool to reduce lodging and yield losses commonly found in intensive management systems.

PGR performance

Cereal species and cereal varieties differ in their sensitivity to PGRs. Wheat is generally most responsive and barley is less responsive when height reductions are used as a measure of efficacy. Significant differences in lodging response to PGR applications have been reported, depending on the cultivar. Not all cultivars respond equally well to PGRs, and the height or lodging rating of a cultivar is not a reliable indicator of PGR effectiveness.

PGRs can have inconsistent responses between years, sites, cultivars and species. Alberta research suggests that 93% of the time, PGRs will cause significant wheat height reductions (between 3 and 13 cm) compared to no PGR application. However, there are occasional instances when some cultivars show no height reduction in response to PGR application.

PGR effects on plant growth

PGRs are applied to the crop foliage and change plant physiology by reducing cell elongation, reducing stem length, shortening the uppermost internodes and peduncle. They may also alter stem diameter. However, plant hormones act in concert. The level of one hormone affects other hormones, so PGRs may have secondary effects, such as delayed senescence, increased resistance to environmental stress or shifting assimilates to the roots resulting in increased root growth. PGRs can positively or negatively affect yield, but results are inconsistent depending on crop lodging, environmental conditions, crop species and cultivar.

PGRs are systemic but non-residual, which can result in undesirable side effects such as stem elongation in some cultivars and temporary, short-term height reduction. PGRs can also alter tiller growth.

PGR applications are frequently associated with significant increases in crop greenness, delayed maturity (up to three days) and decreased thousand kernel weight. Farmers must weigh the benefits of PGRs against the chance of extended days to maturity, reduced test weight and the possibility of reduced protein content when deciding to use a PGR.

Grain marketing considerations

PGRs are registered for use on certain crop types, however, not all grain markets will accept grain that has received a PGR application in the growing season. Farmers are advised to check the Keep it Clean website for product advisories. There are potential market risks associated with certain PGRs on certain crop types. As such, farmers should check with their grain buyer to confirm contract obligations and acceptance before use.

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Plant growth regulators index

Page/s

Manipulator 620

Formulation

Product	Company	Active ingredient	Formulation	Container size
Manipulator 620 (PCP#31462)	Taminco US Inc. distributed by Belchim Crop Protection Canada	Chlormequat chloride: 620 g/L	Solution	10 L, 859 L

Crops, staging and rates

Crop*	Application	Stage	Rate per acre
Barley, oats	Single application	From beginning of stem elongation to 2 stem nodes detectable but no later than flag leaf	0.93 L
	Split application	First application: from 4 leaf stage to 2 stem nodes detectable Second application: from 2 stem nodes detectable to flag leaf	0.46 L
Spring wheat (including durum)	Single application	1 - 2 node stage but no later than flag leaf	0.73 L
	Split application	First application: 2 leaf stage to beginning of stem elongation Second application: at the 1 - 2 node stage but no later than flag leaf	0.32 L - first application 0.40 L - second application
Winter wheat	Single application	1 node stage to just before flag leaf emergence	0.73 L
	Split application	First application: 2 leaf stage to the beginning of stem elongation Second application: 1 node stage to just before flag leaf emergence	0.40 L - first application 0.32 L - second application

* May be applied to crops under-seeded to clover or grasses. DO NOT apply later than just before flag leaf emergence.

Do not exceed 0.7 L of Manipulator 620 per acre in a single year for wheat or 0.93 L per acre for oats and barley

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Manipulator 620 (cont'd)

Registered tank mixes
None registered. Do not use in a tank mixture with liquid nitrogen fertilizer.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial – 20 L/acre minimum.

Mixing instructions
Use mixing instructions "a" as described on page 15

Application tips
Do not apply Manipulator 620 to crops under stress from drought, excess moisture or nutrient deficiency. Best results from early morning or evening application. Applications of Manipulator 620 may be made under normal seasonal temperatures down to 1°C. Do not apply during periods of frost.

How it works
Manipulator 620 affects the production of gibberellin, a plant hormone responsible for cell elongation resulting in plants with shorter, thicker stems.

Expected results
Improved resistance to lodging through reduced plant height, enhanced root structure and improved stem characteristics.

Restrictions
Rainfall: Rain within 2 hours may reduce effectiveness. Avoid application when heavy rain is forecasted. **Grazing:** Do not graze treated crops or cut for hay. **Re-cropping:** No cropping restrictions the year after application. **Re-entry interval:** 12 hours.

Environmental precautions
Manipulator 620 is toxic to non-target terrestrial plants. **Leaching:** The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow. **Runoff:** Reduce risk of runoff by avoiding application on moderate to steep slopes, compacted soil or clay. **Buffer:** For ground applications, use a 1-metre buffer between sprayed area and terrestrial habitat. For aerial applications, use a 10-metre buffer for fixed-wing and rotary-wing aircrafts in wheat (winter, spring and durum). Use a 15-metre buffer for fixed-wing aircrafts and a 10-metre buffer for rotary-wing aircrafts in barley (spring and winter) and oats (spring and winter).

Toxicity
Oral LD_{50} Oral (rat) = 520 mg/kg.

Storage
Store in cool, dry, locked, well-ventilated area without floor drain. Do not freeze.

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Moddus

Formulation

Product	Company	Active ingredient	Formulation	Container size
Moddus (PCP#33930)	Syngenta	Trinexapac–ethyl: 11.3%	Emulsifiable concentrate	10 L

Crops, staging and rates

Crop*	Application	Stage	Rate per acre
Spring wheat (including durum) Oats	Single application	BBCH 30 to 39 (pseudo stem erection to ligule of last leaf visible) Due to risk of injury to the crop, avoid overlapping and do not apply to wheat or oats that are environmentally stressed .	0.34 L
	Split application	Make the first application at BBCH 21 to 24 (main shoot and a maximum 4 tillers) Make the second application at BBCH 37 to 39 (flag leaf just visible to ligule of last leaf visible) Due to risk of injury to the crop, avoid overlapping and do not apply to wheat or oats that are environmentally stressed.	0.17 L per application (maximum 2 applications)
Winter Wheat	Single application	BBCH 30 - 39 (beginning of stem elongation to flag leaf stage). Optimal application timing is at BBCH 30 - 32 (stem elongation up to 2 nodes detectible in stem) Use the higher rate in varieties that are more prone to lodging and in fields that are intensively managed (i.e., high fertility, high seeding rate) Do not apply past BBCH 39 (ligule of last leaf visible).	0.34 L - 0.42 L
Barley	Single application	Optimal application timing is at BBCH 30 - 32 (stem elongation up to 2 nodes detectible in stem). Do not apply past BBCH 39 (ligule of last leaf visible). Due to risk of injury to barley, avoid overlapping and do not apply to barley that is environmentally stressed.	0.42 L
	Split application	Make the first application at BBCH 21 - 24 (main shoot and a maximum 4 tillers) Make the second application at BBCH 37 - 39 (flag leaf just visible to ligule of last leaf visible).	0.21 L per application (maximum 2 applications)
Perennial ryegrass (turf type) grown for seed	Single application	Before or during stem elongation stage of development (BBCH 30 - 37 or Feekes stages 5 - 8). Note: Although this product is effective at any time in this growth stage the best timing is early (BBCH 32 or Feekes 7) when the second node on the main stem is detectable Make only one application per season. Do not apply to forage-type perennial ryegrass.	0.69 L - 1.38 L

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Moddus (cont'd)

Registered tank mixes
None registered.

It is important to check the physical compatibility of tank mixes containing Moddus using a jar test following the WAMLEGS mixing order with proportionate amounts of mix partners, and water, before mixing in the spray tank. In some cases, tank mixing a pest control product, such as Moddus, with another pest control product or a fertilizer can result in biological effects that could include, but are not limited to, reduced efficacy or increased host crop injury.

Application information
How to apply: Ground and aerial application. **Water volume:** Ground – 40 L/acre minimum. Aerial (wheat and barley only) – 20 L/acre.

Nozzles and Pressure: Ground: Use a hydraulic nozzle with 80° or 110° drift reducing flat fan (e.g., those with a pre-orifice or turbulence chamber) or air induction nozzles with up to 80 mesh screens. Do not use flood type nozzles, controlled droplet application equipment, spray foils or hollow cone nozzles. Use a combination of volume and pressure recommended by the nozzle manufacturer to achieve no finer than ASAE medium sized droplets. **Screens:** Use 50 mesh or coarser line strainers and screens or 80 mesh with air induction nozzles.

Application tips
Due to risk of injury to the crop, avoid overlapping and do not apply to wheat, barley or oats that are or could become stressed, such as by low fertility, high temperatures, drought, frost or diseased or insect damage. Environmental conditions, crop management and cultural practices that affect plant growth and vigour will influence the response of the crop to Moddus applications.

How it works
Moddus aids in the growth and lodging management of wheat, barley and oats and the growth of perennial ryegrass.

Restrictions
Rainfall: Rain within 3 hours may reduce effectiveness. **Preharvest interval:** None indicated. **Grazing restrictions:** wheat, barley and oats – hay 30 days. Wheat and oats – forage – do not feed forage to livestock or permit livestock to graze. **Re-cropping:** Wheat, barley and oats (0 days); all other feed and food crops (30 days). **Buffer Zones:** None given. **Re-entry interval:** 12 hours**.**

Environmental precautions
Runoff: Reduce risk of runoff by avoiding application on moderate to steep slopes, compacted soil or clay. Reduce risk of contaminating aquatic areas due to runoff by including a vegetative strip between the treated area and the edge of the water body.

Toxicity
Oral LD_{50} Oral (rat) > 5,050 mg/kg. Dermal LD_{50} Oral (rat) > 4000 mg/kg.

Storage
Keep in original container, tightly closed, during storage. Store this product away from food or feed. Store in a cool, dry, well ventilated area.

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Nozzle sizing L/acre

Nozzle size	Pressure (psi)	Flow rate (US gpm)	Numbers in Table Body are mph, nozzle spacing = 20 inches									
			10 L/ac	20 L/ac	30 L/ac	40 L/ac	50 L/ac	60 L/ac	70 L/ac	80 L/ac	90 L/ac	100 L/ac
0.15 Green	30	0.13	14.6	7.3	4.9	3.7	2.9	2.4	2.1	1.8	1.6	1.5
	40	0.15	16.9	8.4	5.6	4.2	3.4	2.8	2.4	2.1	1.9	1.7
	50	0.17	18.9	9.4	6.3	4.7	3.8	3.1	2.7	2.4	2.1	1.9
	60	0.18	20.7	10.3	6.9	5.2	4.1	3.4	3.0	2.6	2.3	2.1
	70	0.20	22.3	11.2	7.4	5.6	4.5	3.7	3.2	2.8	2.5	2.2
	80	0.21	23.8	11.9	7.9	6.0	4.8	4.0	3.4	3.0	2.6	2.4
	90	0.23	25.3	12.6	8.4	6.3	5.1	4.2	3.6	3.2	2.8	2.5
0.2 Yellow	30	0.17	19.5	9.7	6.5	4.9	3.9	3.2	2.8	2.4	2.2	1.9
	40	0.20	22.5	11.2	7.5	5.6	4.5	3.7	3.2	2.8	2.5	2.2
	50	0.22	25.1	12.6	8.4	6.3	5.0	4.2	3.6	3.1	2.8	2.5
	60	0.24	27.5	13.8	9.2	6.9	5.5	4.6	3.9	3.4	3.1	2.8
	70	0.26	29.7	14.9	9.9	7.4	5.9	5.0	4.2	3.7	3.3	3.0
	80	0.28	31.8	15.9	10.6	7.9	6.4	5.3	4.5	4.0	3.5	3.2
	90	0.30	33.7	16.9	11.2	8.4	6.7	5.6	4.8	4.2	3.7	3.4
0.25 Lilac	30	0.22	24.3	12.2	8.1	6.1	4.9	4.1	3.5	3.0	2.7	2.4
	40	0.25	28.1	14.1	9.4	7.0	5.6	4.7	4.0	3.5	3.1	2.8
	50	0.28	31.4	15.7	10.5	7.9	6.3	5.2	4.5	3.9	3.5	3.1
	60	0.31	34.4	17.2	11.5	8.6	6.9	5.7	4.9	4.3	3.8	3.4
	70	0.33	37.2	18.6	12.4	9.3	7.4	6.2	5.3	4.6	4.1	3.7
	80	0.35	39.7	19.9	13.2	9.9	7.9	6.6	5.7	5.0	4.4	4.0
	90	0.38	42.2	21.1	14.1	10.5	8.4	7.0	6.0	5.3	4.7	4.2
0.3 Blue	30	0.26	29.2	14.6	9.7	7.3	5.8	4.9	4.2	3.7	3.2	2.9
	40	0.30	33.7	16.9	11.2	8.4	6.7	5.6	4.8	4.2	3.7	3.4
	50	0.34	37.7	18.9	12.6	9.4	7.5	6.3	5.4	4.7	4.2	3.8
	60	0.37	41.3	20.7	13.8	10.3	8.3	6.9	5.9	5.2	4.6	4.1
	70	0.40	44.6	22.3	14.9	11.2	8.9	7.4	6.4	5.6	5.0	4.5
	80	0.42	47.7	23.8	15.9	11.9	9.5	7.9	6.8	6.0	5.3	4.8
	90	0.45	50.6	25.3	16.9	12.6	10.1	8.4	7.2	6.3	5.6	5.1
0.4 Flame Red	30	0.35	38.9	19.5	13.0	9.7	7.8	6.5	5.6	4.9	4.3	3.9
	40	0.40	45.0	22.5	15.0	11.2	9.0	7.5	6.4	5.6	5.0	4.5
	50	0.45	50.3	25.1	16.8	12.6	10.1	8.4	7.2	6.3	5.6	5.0
	60	0.49	55.1	27.5	18.4	13.8	11.0	9.2	7.9	6.9	6.1	5.5
	70	0.53	59.5	29.7	19.8	14.9	11.9	9.9	8.5	7.4	6.6	5.9
	80	0.57	63.6	31.8	21.2	15.9	12.7	10.6	9.1	7.9	7.1	6.4
	90	0.60	67.4	33.7	22.5	16.9	13.5	11.2	9.6	8.4	7.5	6.7
0.5 Brown	30	0.43	48.7	24.3	16.2	12.2	9.7	8.1	7.0	6.1	5.4	4.9
	40	0.50	56.2	28.1	18.7	14.1	11.2	9.4	8.0	7.0	6.2	5.6
	50	0.56	62.8	31.4	20.9	15.7	12.6	10.5	9.0	7.9	7.0	6.3
	60	0.61	68.8	34.4	22.9	17.2	13.8	11.5	9.8	8.6	7.6	6.9
	70	0.66	74.4	37.2	24.8	18.6	14.9	12.4	10.6	9.3	8.3	7.4
	80	0.71	79.5	39.7	26.5	19.9	15.9	13.2	11.4	9.9	8.8	7.9
	90	0.75	84.3	42.2	28.1	21.1	16.9	14.1	12.0	10.5	9.4	8.4
0.6 Gray	30	0.52	58.4	29.2	19.5	14.6	11.7	9.7	8.3	7.3	6.5	5.8
	40	0.60	67.4	33.7	22.5	16.9	13.5	11.2	9.6	8.4	7.5	6.7
	50	0.67	75.4	37.7	25.1	18.9	15.1	12.6	10.8	9.4	8.4	7.5
	60	0.73	82.6	41.3	27.5	20.7	16.5	13.8	11.8	10.3	9.2	8.3
	70	0.79	89.2	44.6	29.7	22.3	17.8	14.9	12.7	11.2	9.9	8.9
	80	0.85	95.4	47.7	31.8	23.8	19.1	15.9	13.6	11.9	10.6	9.5
	90	0.90	101.2	50.6	33.7	25.3	20.2	16.9	14.5	12.6	11.2	10.1
0.8 White	30	0.69	77.9	38.9	26.0	19.5	15.6	13.0	11.1	9.7	8.7	7.8
	40	0.80	89.9	45.0	30.0	22.5	18.0	15.0	12.8	11.2	10.0	9.0
	50	0.89	100.5	50.3	33.5	25.1	20.1	16.8	14.4	12.6	11.2	10.1
	60	0.98	110.1	55.1	36.7	27.5	22.0	18.4	15.7	13.8	12.2	11.0
	70	1.06	119.0	59.5	39.7	29.7	23.8	19.8	17.0	14.9	13.2	11.9
	80	1.13	127.2	63.6	42.4	31.8	25.4	21.2	18.2	15.9	14.1	12.7
	90	1.20	134.9	67.4	45.0	33.7	27.0	22.5	19.3	16.9	15.0	13.5

Nozzle sizing US g/acre

Nozzle size	Pressure (psi)	Flow rate (US gpm)	Numbers in Table Body are mph, nozzle spacing = 20 in										
			5	6	7	8	9	10	12	14	16	18	20
			US gpa	US gpa	US gpa	US gpa	US gpa	US gpa	US gpa	US gpa	US gpa	US gpa	US gpa
0.15 Green	30	0.13	7.7	6.4	5.5	4.8	4.3	3.9	3.2	2.8	2.4	2.1	1.9
	40	0.15	8.9	7.4	6.4	5.6	5.0	4.5	3.7	3.2	2.8	2.5	2.2
	50	0.17	10.0	8.3	7.1	6.2	5.5	5.0	4.2	3.6	3.1	2.8	2.5
	60	0.18	10.9	9.1	7.8	6.8	6.1	5.5	4.5	3.9	3.4	3.0	2.7
	70	0.20	11.8	9.8	8.4	7.4	6.5	5.9	4.9	4.2	3.7	3.3	2.9
	80	0.21	12.6	10.5	9.0	7.9	7.0	6.3	5.3	4.5	3.9	3.5	3.2
	90	0.23	13.4	11.1	9.5	8.4	7.4	6.7	5.6	4.8	4.2	3.7	3.3
0.2 Yellow	30	0.17	10.3	8.6	7.3	6.4	5.7	5.1	4.3	3.7	3.2	2.9	2.6
	40	0.20	11.9	9.9	8.5	7.4	6.6	5.9	5.0	4.2	3.7	3.3	3.0
	50	0.22	13.3	11.1	9.5	8.3	7.4	6.6	5.5	4.7	4.2	3.7	3.3
	60	0.24	14.5	12.1	10.4	9.1	8.1	7.3	6.1	5.2	4.5	4.0	3.6
	70	0.26	15.7	13.1	11.2	9.8	8.7	7.9	6.5	5.6	4.9	4.4	3.9
	80	0.28	16.8	14.0	12.0	10.5	9.3	8.4	7.0	6.0	5.3	4.7	4.2
	90	0.30	17.8	14.9	12.7	11.1	9.9	8.9	7.4	6.4	5.6	5.0	4.5
0.25 Lilac	30	0.22	12.9	10.7	9.2	8.0	7.1	6.4	5.4	4.6	4.0	3.6	3.2
	40	0.25	14.9	12.4	10.6	9.3	8.3	7.4	6.2	5.3	4.6	4.1	3.7
	50	0.28	16.6	13.8	11.9	10.4	9.2	8.3	6.9	5.9	5.2	4.6	4.2
	60	0.31	18.2	15.2	13.0	11.4	10.1	9.1	7.6	6.5	5.7	5.1	4.5
	70	0.33	19.6	16.4	14.0	12.3	10.9	9.8	8.2	7.0	6.1	5.5	4.9
	80	0.35	21.0	17.5	15.0	13.1	11.7	10.5	8.8	7.5	6.6	5.8	5.3
	90	0.38	22.3	18.6	15.9	13.9	12.4	11.1	9.3	8.0	7.0	6.2	5.6
0.3 Blue	30	0.26	15.4	12.9	11.0	9.6	8.6	7.7	6.4	5.5	4.8	4.3	3.9
	40	0.30	17.8	14.9	12.7	11.1	9.9	8.9	7.4	6.4	5.6	5.0	4.5
	50	0.34	19.9	16.6	14.2	12.5	11.1	10.0	8.3	7.1	6.2	5.5	5.0
	60	0.37	21.8	18.2	15.6	13.6	12.1	10.9	9.1	7.8	6.8	6.1	5.5
	70	0.40	23.6	19.6	16.8	14.7	13.1	11.8	9.8	8.4	7.4	6.5	5.9
	80	0.42	25.2	21.0	18.0	15.8	14.0	12.6	10.5	9.0	7.9	7.0	6.3
	90	0.45	26.7	22.3	19.1	16.7	14.9	13.4	11.1	9.5	8.4	7.4	6.7
0.4 Flame Red	30	0.35	20.6	17.1	14.7	12.9	11.4	10.3	8.6	7.3	6.4	5.7	5.1
	40	0.40	23.8	19.8	17.0	14.9	13.2	11.9	9.9	8.5	7.4	6.6	5.9
	50	0.45	26.6	22.1	19.0	16.6	14.8	13.3	11.1	9.5	8.3	7.4	6.6
	60	0.49	29.1	24.2	20.8	18.2	16.2	14.5	12.1	10.4	9.1	8.1	7.3
	70	0.53	31.4	26.2	22.5	19.6	17.5	15.7	13.1	11.2	9.8	8.7	7.9
	80	0.57	33.6	28.0	24.0	21.0	18.7	16.8	14.0	12.0	10.5	9.3	8.4
	90	0.60	35.6	29.7	25.5	22.3	19.8	17.8	14.9	12.7	11.1	9.9	8.9
0.5 Brown	30	0.43	25.7	21.4	18.4	16.1	14.3	12.9	10.7	9.2	8.0	7.1	6.4
	40	0.50	29.7	24.8	21.2	18.6	16.5	14.9	12.4	10.6	9.3	8.3	7.4
	50	0.56	33.2	27.7	23.7	20.8	18.4	16.6	13.8	11.9	10.4	9.2	8.3
	60	0.61	36.4	30.3	26.0	22.7	20.2	18.2	15.2	13.0	11.4	10.1	9.1
	70	0.66	39.3	32.7	28.1	24.6	21.8	19.6	16.4	14.0	12.3	10.9	9.8
	80	0.71	42.0	35.0	30.0	26.3	23.3	21.0	17.5	15.0	13.1	11.7	10.5
	90	0.75	44.6	37.1	31.8	27.8	24.8	22.3	18.6	15.9	13.9	12.4	11.1
0.6 Gray	30	0.52	30.9	25.7	22.0	19.3	17.1	15.4	12.9	11.0	9.6	8.6	7.7
	40	0.60	35.6	29.7	25.5	22.3	19.8	17.8	14.9	12.7	11.1	9.9	8.9
	50	0.67	39.8	33.2	28.5	24.9	22.1	19.9	16.6	14.2	12.5	11.1	10.0
	60	0.73	43.6	36.4	31.2	27.3	24.2	21.8	18.2	15.6	13.6	12.1	10.9
	70	0.79	47.1	39.3	33.7	29.5	26.2	23.6	19.6	16.8	14.7	13.1	11.8
	80	0.85	50.4	42.0	36.0	31.5	28.0	25.2	21.0	18.0	15.8	14.0	12.6
	90	0.90	53.5	44.6	38.2	33.4	29.7	26.7	22.3	19.1	16.7	14.9	13.4
0.8 White	30	0.69	41.2	34.3	29.4	25.7	22.9	20.6	17.1	14.7	12.9	11.4	10.3
	40	0.80	47.5	39.6	33.9	29.7	26.4	23.8	19.8	17.0	14.9	13.2	11.9
	50	0.89	53.1	44.3	37.9	33.2	29.5	26.6	22.1	19.0	16.6	14.8	13.3
	60	0.98	58.2	48.5	41.6	36.4	32.3	29.1	24.2	20.8	18.2	16.2	14.5
	70	1.06	62.9	52.4	44.9	39.3	34.9	31.4	26.2	22.5	19.6	17.5	15.7
	80	1.13	67.2	56.0	48.0	42.0	37.3	33.6	28.0	24.0	21.0	18.7	16.8
	90	1.20	71.3	59.4	50.9	44.6	39.6	35.6	29.7	25.5	22.3	19.8	17.8

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Pesticide application record

Field description: _____ **Acres:** _____ **Crop:** _____

Variety: _____ **Date seeded:** _____ **Fertilizer:** _____ **Rate:** _____ **Date:** _____

Crop stage: _____ **Scouting date:** _____ **Date results were checked:** _____

Pest Weed/Insect/Disease		Density				Results	Field diagram	
Species	Leaf stage/ Instar/Symptom	Patches	Low	Medium	High			

Comments: _____

_____

Application information							Environment information			
Pesticide used	Date and time	Rate per acre	Water volume per acre	Acres per tank	Pesticide volume per tank	Tanks per field	Crop stand	Soil moisture	Temp-erature	Wind speed and direction
1 Lot #: _____							Ex. ..... G. ..... Fr. ..... Pr.	Ex. ..... G. ..... Fr. ..... Pr.		
2 Lot #: _____							Ex. ..... G. ..... Fr. ..... Pr.	Ex. ..... G. ..... Fr. ..... Pr.		
3 Lot #: _____							Ex. ..... G. ..... Fr. ..... Pr.	Ex. ..... G. ..... Fr. ..... Pr.		

Comments: _____

_____

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Note: Ex. = Excellent G. = Good Fr. = Fair Pr. = Poor

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Pesticide application record

Field description: _____ **Acres:** _____ **Crop:** _____

Variety: _____ **Date seeded:** _____ **Fertilizer:** _____ **Rate:** _____ **Date:** _____

Crop stage: _____ **Scouting date:** _____ **Date results were checked:** _____

Pest Weed/Insect/Disease		Density				Results	Field diagram	
Species	Leaf stage/ Instar/Symptom	Patches	Low	Medium	High			

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2 Lot #: _____							Ex. ..... G. ..... Fr. ..... Pr.	Ex. ..... G. ..... Fr. ..... Pr.		
3 Lot #: _____							Ex. ..... G. ..... Fr. ..... Pr.	Ex. ..... G. ..... Fr. ..... Pr.		

Comments: _____

_____

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Comments: _____

_____

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All recommendations in this publication are given in quantity of commercial product per acre (L or kg/ac). Product labels are given in quantity of product per hectare (L or kg/ha). To avoid application errors, be sure to read and understand label recommendations.

Warning
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Questions or concerns, contact:

Alberta Wheat Commission
Phone: 403-291-9111
Email: *bluebook@albertawheatbarley.com*

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