



Cutworm Outbreaks in Alberta



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Introduction

Cutworms (Lepidoptera: Noctuidae) include several species of economically significant pests capable of damaging field crops grown on the Canadian prairies. Cutworm outbreaks are highly unpredictable and occur with seemingly no pattern. Populations cycle locally over 1 to 10 year periods, and when high densities do occur, they can lead to complete crop loss². Recent cutworm losses were estimated as \$90 million in canola³, and \$5 million in fescue⁴. Understanding these cycles is key to developing effective management strategies for these pests.

Egg, larval, and pupal overwintering stages are present within the many species of Noctuidae so peak larval activity varies by cutworm species but also by region (e.g., Redbacked cutworms peak May-June and Armyworm, Bertha armyworm and Clover cutworm peak July-August¹). Climbing and subterranean cutworms also exist so roots, stems or leaves may be damaged.

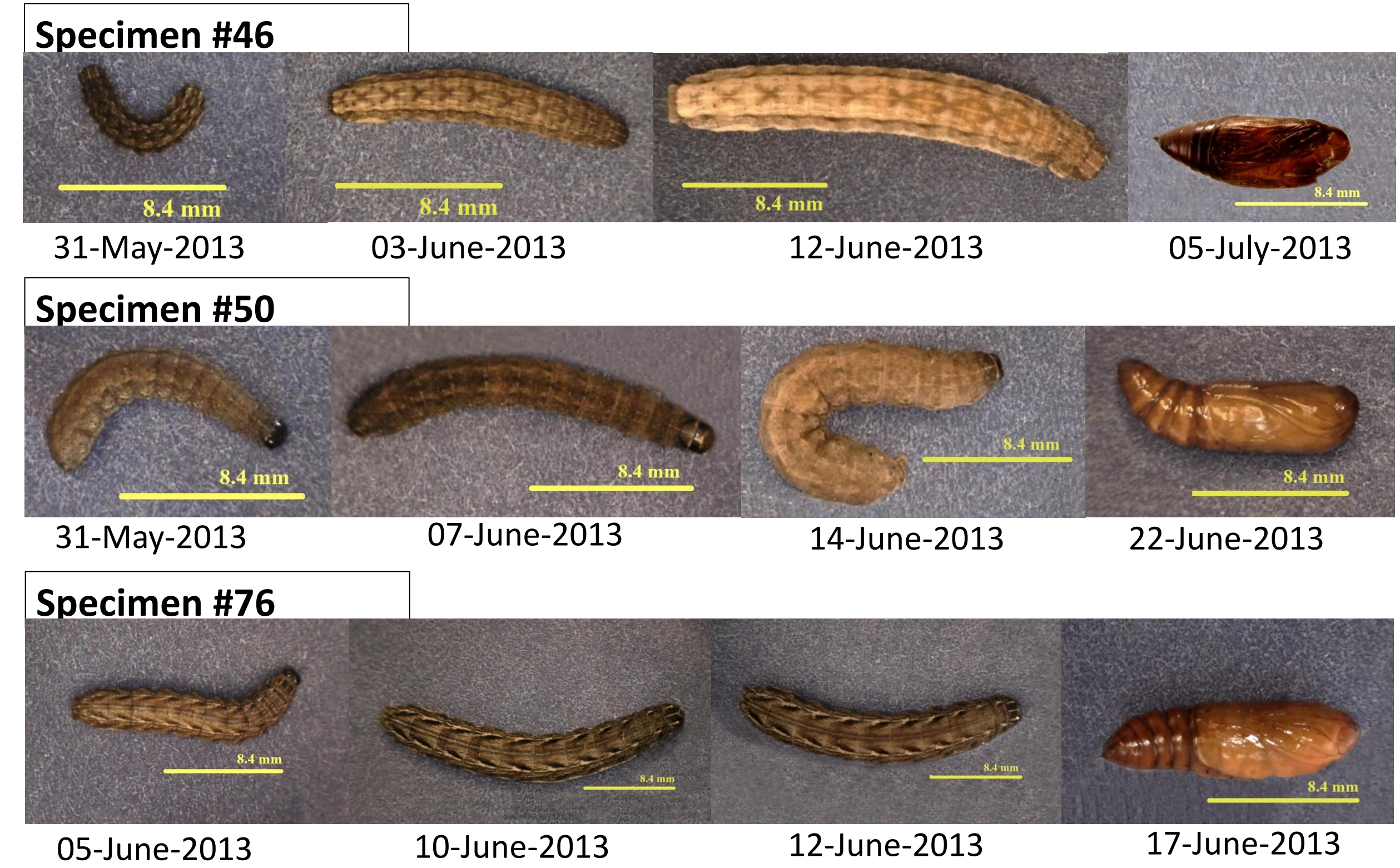


Fig. 1. Examples of cutworm larval development during rearing in 2013 (Note: Colour variations within specimen may be an artifact of lighting).

Objectives

- To identify the species and distribution of cutworms causing damage in field crops grown across the Canadian prairies.
- Collect cutworms associated with outbreaks on the Canadian prairies to identify the incidence and distribution of species of economic concern.
- Provide samples to colleagues for use in developing molecular tools to expedite identification of key pest species.
- Identify pathogens, parasitoids and predators recovered with cutworms and which may regulate cutworm outbreaks.
- Use molecular tools to identify parasitoids reared from cutworms; preliminary results already have identified species new to Canada.
- Develop image libraries for cutworm species and their natural enemies for use in identification and extension tools.

Methods

- Prepared and circulated collection protocol and fact sheet to facilitate specimens from growers and industry.
- Hand-collected cutworms; cutworms isolated in 1 oz. Solo cups, fed McMorran diet⁵, and reared at room temperature (18-24 °C).
- Dead cutworms forwarded to Dr. M. Erlandson (AAFC-Saskatoon) but moths and adult parasitoids preserved for morphological and molecular identification.



Fig. 2. Timothy (*P. pratense*) damaged by cutworms; frass and defoliation visible near base of plants and a cutworm was observed within an earthen burrow (~15mm below soil surface).

Results

- A total of 1789 cutworm larvae were collected (Fig. 3) between 2012-2014; highest densities were observed in Southern Alberta (Fig. 4 & Table 1).
- Cutworm densities and species diversity varied by region, by year, and by host crop (Fig. 4).



- Tentative cutworm species diversity (listed from dominant to least from 2012-2014):
Peace River region: Dingy > Redbacked > Bristly > Glassy > Pale western.
Central Alberta: Army = Redbacked > Dusky > Flat dart.
Southern Alberta: Redbacked > Dingy > Pale western > Army > Glassy.

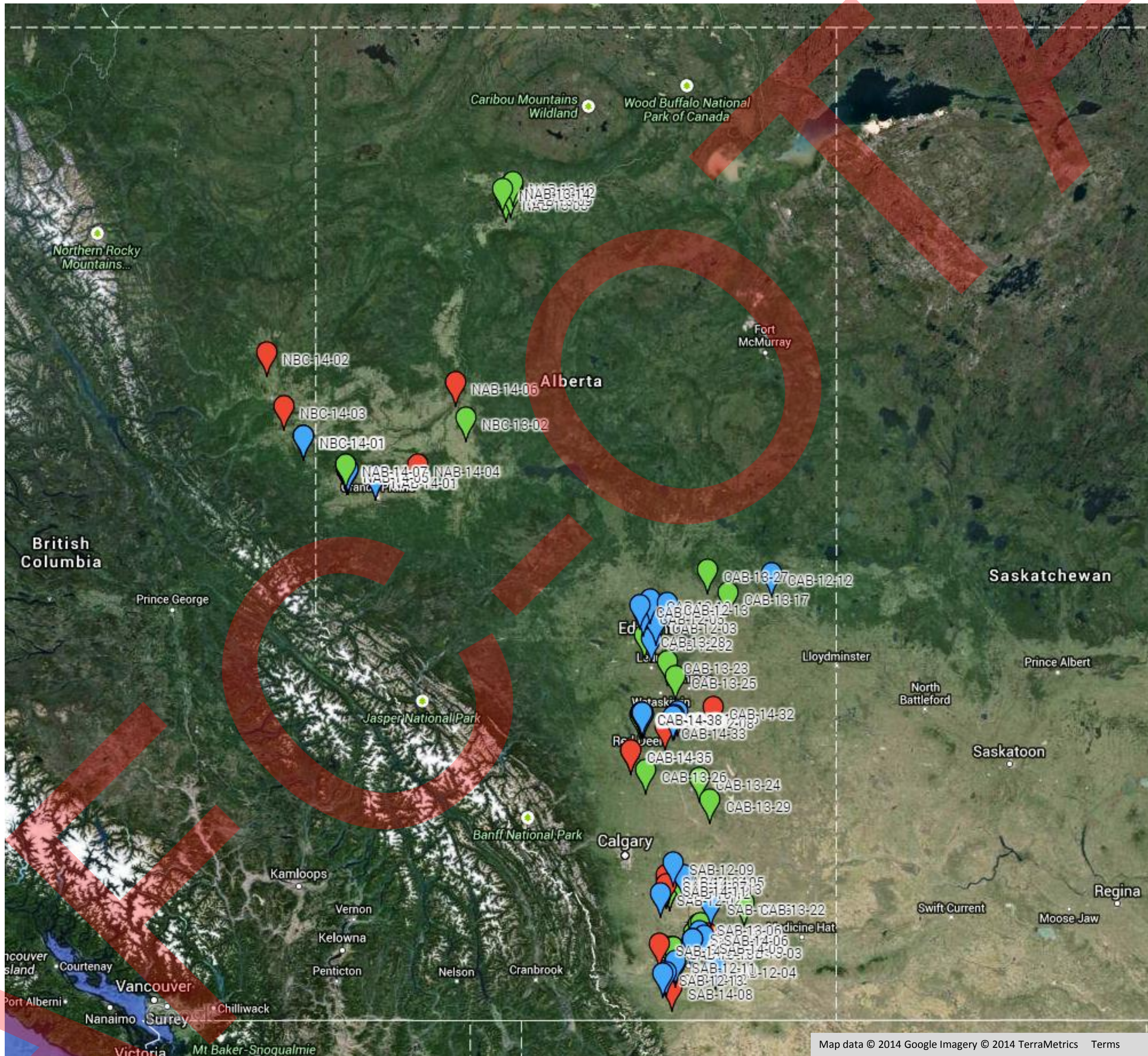


Fig. 3. Cutworm sites sampled in the Peace River region and Alberta in 2012 (blue pins), 2013 (green pins) and 2014 (red pins). All larvae were transported to Beaverlodge, Lacombe, or Lethbridge for rearing and observation.

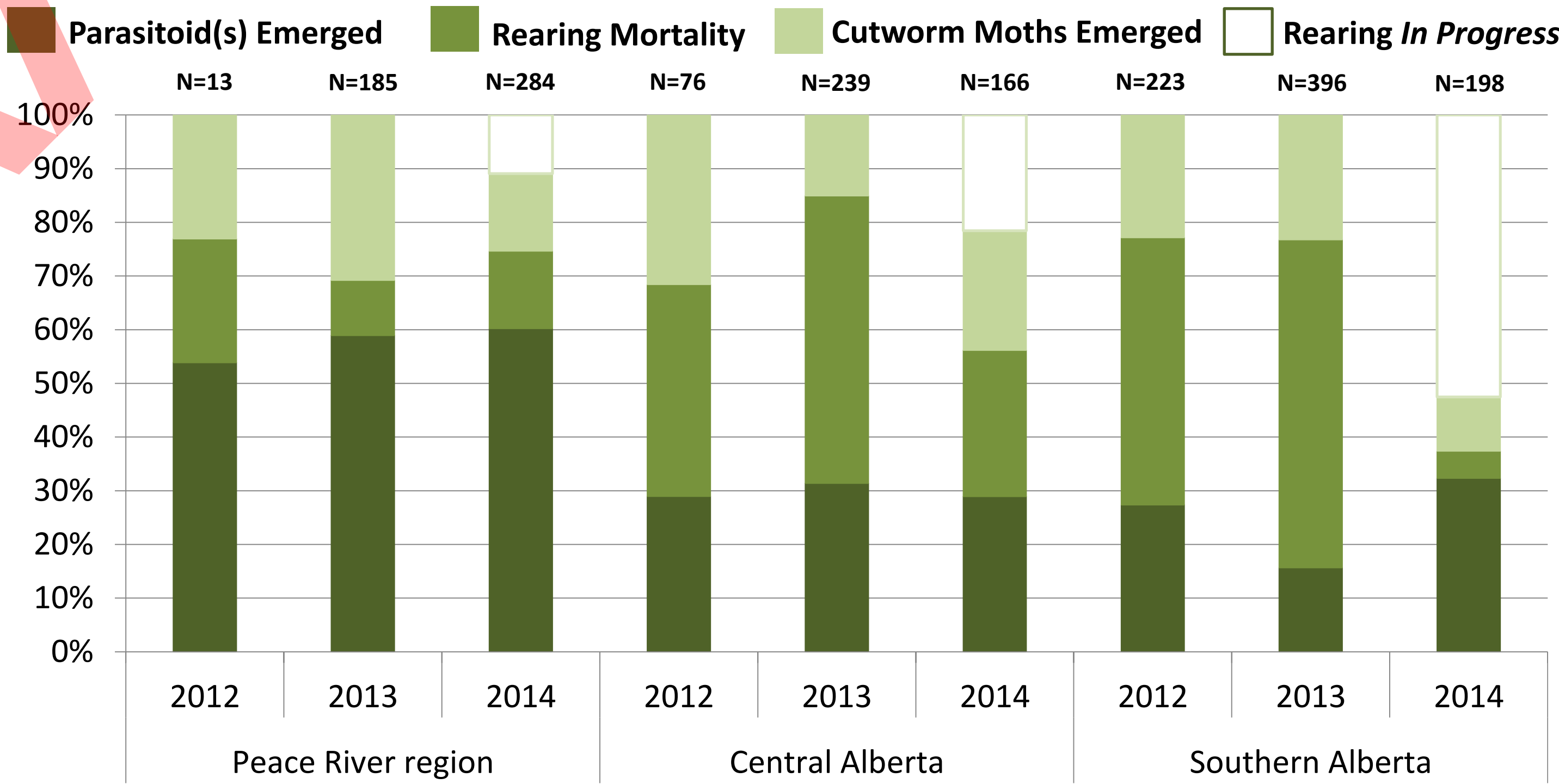


Fig. 4. Preliminary cutworm rearing results for specimens hand-collected as larvae between 2012-2014.

Region	Year	Host Crop	Sample Size (N)	Parasitoids Emerged (%)	Rearing Mortality (%)	Moths Emerged (%)	Rearing "In Progress" (%)	
Peace River region	2012	Barley	1	0.00%	0.00%	100.00%		
		Wheat (Spring)	2	0.00%	50.00%	50.00%		
		Horticulture*	6	50.00%	33.33%	16.67%		
		N/A	4	0.00%	100.00%	0.00%		
	2013	Canola	51	17.65%	64.71%	17.65%		
		Alfalfa	82	34.15%	63.41%	2.44%		
		Clover (Red)	14	35.71%	35.71%	28.57%		
		Timothy	36	41.67%	52.78%	5.56%		
	2014	Horticulture*	2	0.00%	0.00%	100.00%		
		Canola	4	0.00%	0.00%	75.00%	25.00%	
		Clover (Red)	195	7.18%	74.36%	12.31%	6.15%	
		Fescue (CR)	6	33.33%	16.67%	0.00%	50.00%	
		Timothy	35	22.86%	54.29%	11.43%	11.43%	
		Mixed Hay	1	0.00%	0.00%	100.00%	0.00%	
		Foxtail Barley	40	42.50%	12.50%	20.00%	25.00%	
Horticulture*		3	0.00%	33.33%	33.33%	33.33%		
Central Alberta	2012	Canola	47	19.15%	40.43%	40.43%		
		Peas	2	50.00%	0.00%	50.00%		
		Wheat (Winter)	1	0.00%	0.00%	100.00%		
		Horticulture*	26	53.85%	11.54%	34.62%		
	2013	Canola	65	30.77%	23.08%	46.15%		
		Faba bean	12	33.33%	58.33%	8.33%		
		Barley	20	5.00%	90.00%	5.00%		
		Wheat (Winter)	10	40.00%	20.00%	40.00%		
		Rye (Fall)	115	1.74%	26.96%	71.30%		
		Horticulture*	17	29.41%	11.76%	58.82%		
		2014	Canola	56	16.07%	5.6%	50.00%	28.57%
			Faba bean	20	15.00%	10.00%	60.00%	15.00%
	Oats		7	28.57%	14.28%	42.86%	14.29%	
	Wheat (Winter)		10	20.00%	0.00%	80.00%	0.00%	
		Horticulture*	73	28.77%	5.48%	41.10%	24.66%	
Southern Alberta	2012	Canola	135	28.89%	26.67%	44.44%		
		Peas	14	14.29%	42.86%	42.86%		
		Corn	30	0.00%	36.67%	63.33%		
		Horticulture*	8	25.00%	12.50%	62.50%		
		Sugar beets	36	22.22%	19.44%	58.33%		
	2013	Canola	118	11.02%	21.19%	59.32%		
		Alfalfa	87	11.49%	9.20%	79.31%		
		Peas	72	40.28%	19.44%	41.67%		
		Wheat-W	86	33.72%	13.95%	52.33%		
		Horticulture*	2	0.00%	0.00%	100.00%		
	2014	Triticale, W	40	27.50%	7.50%	65.00%		
		Canola	130	13.85%	32.31%	3.08%	50.77%	
		Peas	14	7.14%	71.43%	14.29%	7.14%	
		Wheat-S	28	0.00%	28.57%	0.00%	71.43%	
		Horticulture*	5	0.00%	0.00%	80.00%	20.00%	
	N/A	15	6.67%	6.67%	0.00%	86.67%		
	Sugar beets	6	0.00%	50.00%	0.00%	50.00%		
Totals			1789	20.18%	34.60%	37.17%	7.55%	

* Cutworms additionally obtained from host plants characterized as garden, ornamentals, sod, or weeds.

Summary

- “Complexes” of multiple cutworm species were collected as well as localized outbreaks often dominated by one species (e.g., redbacked or army cutworms).
- Cutworm outbreaks resulted in insecticide applications, re-seeding, and crop losses.
- Parasitism rates ranged up to 42% in the Peace River region, 54% in Central Alberta, and 40% in Southern Alberta (Fig. 4 & Table 1).
- Preliminary evidence suggest that some host crops may sustain or augment “source” populations of cutworm parasitoids.
- Rearing mortality may positively correlate with distance travelled from site to lab.

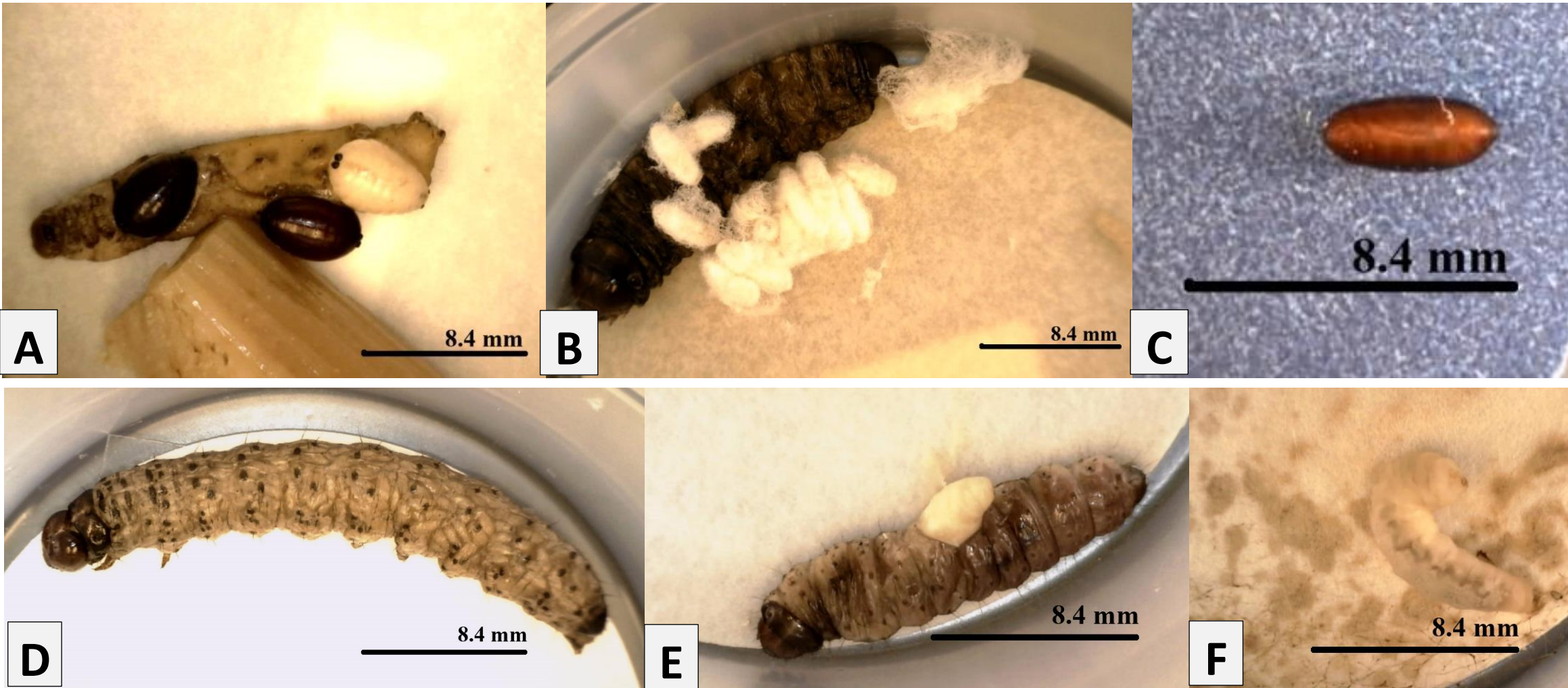


Fig. 5. Examples of gregarious and solitary parasitoids within, exiting, or forming puparia following emergence from cutworm hosts; a gregarious parasitoid species after their exit (A), silken parasitoid cocoons (B), a solitary dipteran pupa (C), polyembryonic parasitoids visible within an immobile cutworm (D), a solitary parasitoid larva exiting (E), and a solitary dipteran parasitoid larva that exited from a cutworm (F).

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