2014 CARP Cutworm Rearing Project Summary: Peace River Region

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Introduction

Cutworms (Lepidoptera: Noctuidae) include a host of pest species that pose a continuing problem in most crops grown across the Canadian prairies. Molecular and visual identification tools are needed to differentiate these very similar species so proper management steps can be taken. Overwintering may occur at any stage of development (except adult), so depending on which stages emerge in spring, crop damage can peak in May and June (redbacked cutworm) or in July and August (armyworm, bertha armyworm, clover cutworm)[1].

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 loss[2]. Some estimates have placed losses at $90 million in Canola[3], and $5 million in fescue[4]. Understanding these cycles is key to developing effective management strategies for this pest.

Objectives

To document the species and population dynamics of cutworms causing damage in commercial fields and, more specifically, to contribute to cutworm life history studies[1]:

- Knowledge on species of increased economic importance; e.g., dingy cutworm, bronze cutworm
- Field surveys in different regions of the Prairies to recover cutworms for studies on biology and natural enemies
- Image libraries of different cutworm species (all life stages) and their natural enemies for use in extension tools
- Understanding cutworm population cycles and regulation by pathogens, parasitoids and predators; many of these species are unknown
- Identification of parasitoids recovered in field collections with molecular methods; preliminary results have identified species new to Canada

Site Locations

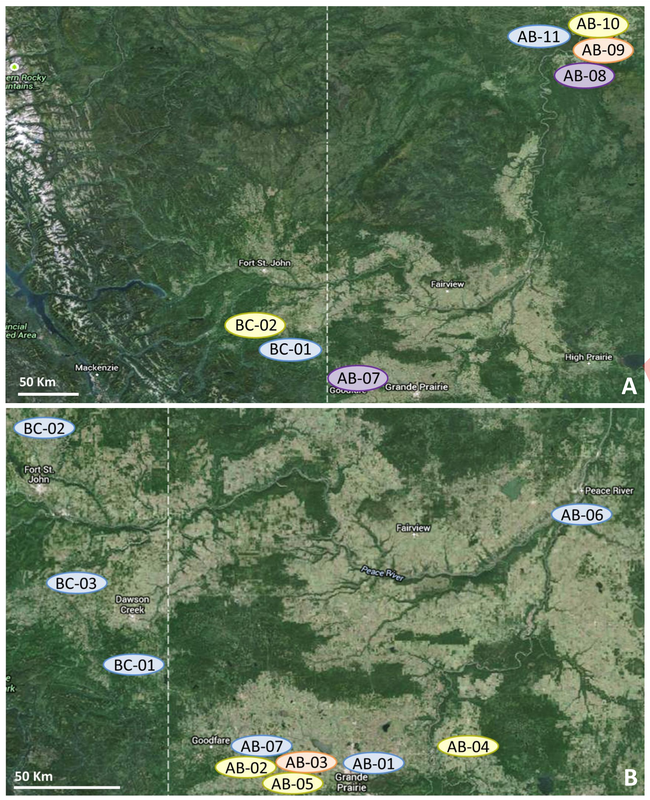

Fig. 1: Cutworm sites sampled in 2013 (A) and 2014 (B). Legend: Blue - N=0-10 cutworm larvae per site, Violet - N=11-25, Yellow - N=26-50, Orange - N=100+. All larvae transported to Beaverlodge, AB for rearing.

Methods

- Located collection sites by responding to calls about damage from various producers.
- Larvae were brought to the lab in containers with McMorran diet.
- Rearing containers were changed three times every week and were kept at temperatures between 18 °C and 25 °C.
- Larvae were photographed and measured at each check date in order to monitor larval development.
- All adult parasitoids and moths were preserved for identification.

Dipteran Parasitoids

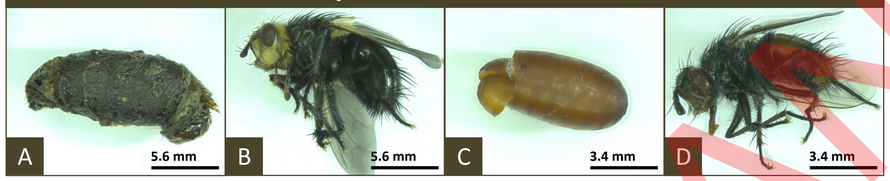

Fig. 2: Dipteran pupa within host larvae (A) from which an adult dipteran parasitoid later emerged (B). Silken parasitoid cocoon (C) from which an adult dipteran parasitoid later emerged (D).

Results

Fig. 3: Cutworm rearing results by site (A, C) and by crop (B, D) for 2013 and 2014. (Notes: Percent parasitism based on emergence from host.

Larval Development

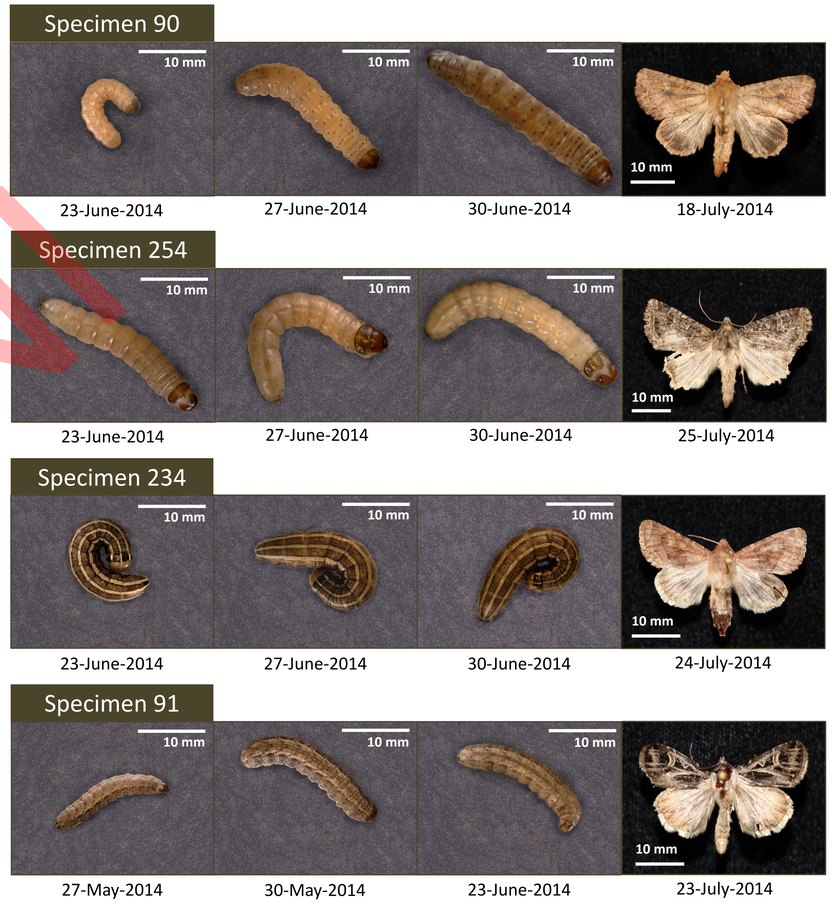

Fig. 4: Examples of larval development during laboratory rearing in 2014 (Notes: Scale size between moths varies, and colour variation is an artifact of lighting).

Summary

Areas sampled in the Peace River Region in 2014 had average parasitism rates of 9±3% (N=10 sites). In comparison, the average parasitism rate in 2013 was 24±4%. Forage crops had substantially higher parasitism rates, 7-23%, compared to canola with 0% (Fig. 3 D). Similarly, the parasitism rates in forage crops in 2013 were much higher at 25-38% than rates seen in canola at 11% (Fig. 3 B). These figures suggest forage crops could provide source populations of parasitoids.

Hymenopteran Parasitoids

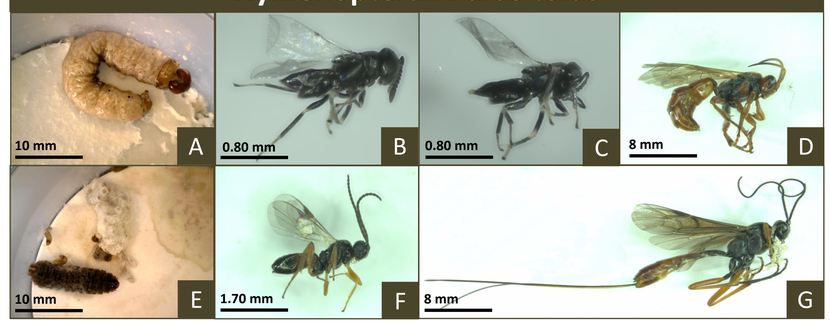

Fig. 5: Gregarious parasitoids pupating within host (A). These parasitoids later emerge in two separate occurrences (B, C). Solitary hymenopteran parasitoid (D). Gregarious parasitoids pupating in a cluster following emergence from host (E). Multiple hymenopteran parasitoids later emerge from the cluster of pupae (F). Solitary female hymenopteran parasitoid with extended ovipositor (G).

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