

Biology and Control of the Raspberry Crown Borer in Arkansas Blackberries

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Abstract

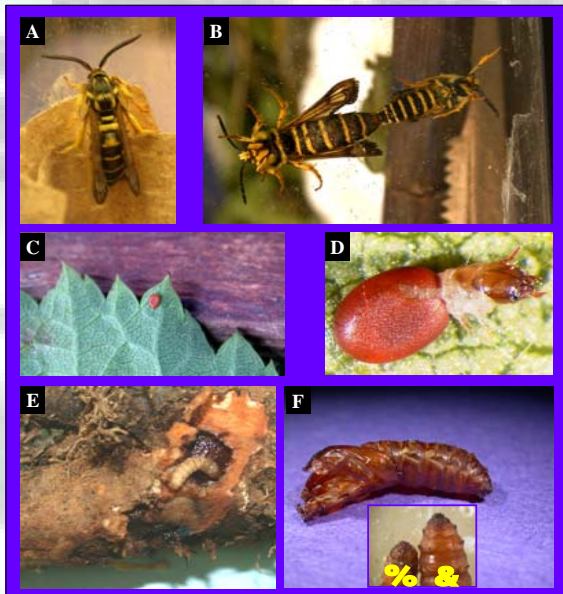
- In October when RCB larvae are small and still located in the cambium of the plant, soil drench treatments of blackberry crowns with Brigade, Lorsban or Guthion produced significantly fewer numbers of RCB larvae when compared to the untreated check. None of the treatments applied on 6 May caused a significant reduction in the number of RCB larvae per crown probably due to the location of the larvae deep within the crown of the plant at this time.
- RCB has a one year lifecycle in Arkansas. Eggs hatch through October. Larvae pupate in September, adults emerge and lay eggs in September and early October, most of the eggs hatch by late October and larvae bore into lower canes to over winter.
- A few parasitoids of RCB have been identified in the U.S. One species of egg parasitoid in the Eulophid family emerged from RCB eggs collected in Arkansas.

Introduction

The raspberry crown borer, *Pennisetia marginata* (Harris), has been observed as a serious pest of blackberries in the U.S., causing loss of vigor, loss in yield and destruction of plants. Only one insecticide formulation remains labeled for this pest, Guthion Solupak, (Azinphosmethyl), and it may be cancelled in the near future. In the cooler northern states, RCB takes two years to complete its lifecycle, but in Arkansas there are longer, warmer summers which could shorten this lifecycle to one year. RCB adults emerge in September (Figure 1. A), mate and lay eggs on the undersides of leaves (Figure 1. B & C). The eggs hatch in mid October (Figure 1. D). The larvae crawl down the cane and bore into the cane about 1 inch above the soil surface where they over winter. The larvae migrate into the crown of the plant in May (Figure 1. E). The larvae pupate in July (Figure 1. F). There are few known egg parasitoids of this pest.

The objective of this study was to collect efficacy data for several new insecticides and a nematode species against RCB, to determine the duration of the RCB lifecycle in Arkansas, and find egg parasitoids of RCB.

Figure 1. Raspberry crown borer (RCB) lifecycle: A) adult, B) mating pair, C) egg on underside of leaf, D) egg hatching, E) larvae in the crown of a plant, and F) pupae



Methods

Timing and Efficacy against RCB. In Judsonia AR, crown drench treatments were applied on either 24 October 2003 or 6 May 2004 at a rate of 3785 liters/ha (400 gal/A) in a randomized complete block (5-plant plots, 5 replicates) in a 'Arapaho' blackberry planting at Conway, AR (Figure 2). Treatments included: Guthion, Novaluron, Brigade, Lorsban, *Steinernema feltiae*, *Steinernema feltiae* infected *Galleria Mellonella* larvae, and an untreated check. Each chemical treatment was applied to soil around each crown at rate of 400 gal/acre via a watering can; nematodes were applied at a rate of 60,000 infective juveniles per crown by pouring them from a graduated flask around each crown. One *Steinernema feltiae* infected *Galleria Mellonella* larvae was buried by each crown, two inches under the soil. In June 2004, crowns were dug, dissected and the number of RCB larvae per plot recorded.

Lifecycle in Arkansas. In Conway AR, 10 plants were dug and dissected for larvae every two weeks from April to October 2004 when 0 larvae were obtained.

Parasitization of RCB eggs. In Conway and Searcy AR, RCB eggs were collected in October from 10 blackberry plants and monitored daily for emergence.

Figure 2. A) applying nematodes and **B)** 'Arapaho' blackberry test plots



Figure 3. Egg parasitoid



Figure 4. Number of larvae and pupae in 10 dissected crowns and adults observed during 2 hrs of scouting a blackberry planting in Conway, AR (2004)

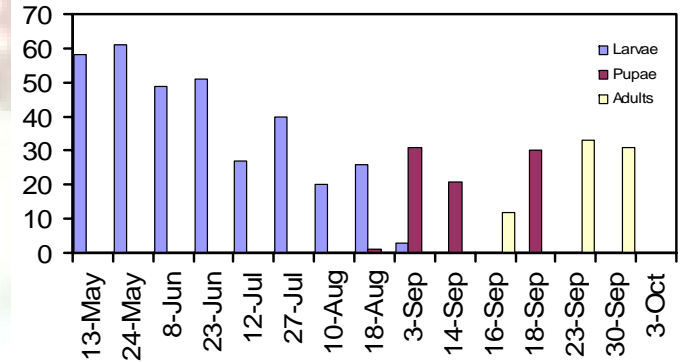


Table 1. Effect of treatments applied to 'Arapaho' blackberry plots on the numbers of RCB larvae in October 2003 and May 2004 in Arkansas.

Treatments Formulations	Rate Amt form/acre	No. of larvae per 5-plant plot	
		23-Oct-03	6-May-04
Untreated Check		27.8 a	19.6 a
<i>S.feltiae</i>	60,000 IJ/crown*	19.2 ab	16.2 a
<i>S.feltiae</i>	Infested cadaver	15.0 b	NT*
Novaluron 10EC	12 oz	11.4 bc	17.8 a
Guthion Solupak	1 lb	3.0 cd	11.8 a
Lorsban 4 E	32 oz	1.4 cd	16.8 a
Brigade WSB	1lb	0.2 d	13.2 a

* IJ = infective juveniles; NT = no treatment

Results

- On 23 October, the soil drench treatments of blackberry crowns with Brigade, Lorsban or Guthion produced significantly fewer numbers of RCB larvae per crown (> 9-fold difference) than did the *S. feltiae* nematode solution and the untreated check. Novaluron and the *S. feltiae*-infested cadaver provided intermediate control of the larvae. In contrast, none of the treatments applied on 6 May caused a significant reduction in the number of RCB larvae per crown (Table 1).
- The lifecycle of RCB was determined to last one year in Arkansas. The pupation period occurred from 18 August to late September (Figure 4). Adults emerged, mated on leaves (Figure 1. B) and laid eggs on the underside of leaves (Figure 1. C) from 16 September to early October. The eggs hatched during October (Figure 1. D). Larvae were observed to crawl down the cane and bore into the plant at 1" above the soil line. They spent the winter in the cane base. By early May, most larvae bored into the crown making it difficult to control with insecticide (Figure 1. E).
- One species of egg parasitoid in the Eulophid family was found emerging from RCB eggs collected in Arkansas (Figure 3).

Acknowledgements

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