

Evaluation of Coragen Insecticide for Control of Mint Root Borer in Central Oregon, 2013

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Abstract

Pheromone traps that attract male mint root borer moths were placed in nine fields in the Culver area of central Oregon on June 26, 2013. Two fields with high moth populations were selected for application of Coragen (chloroantraniliprole). Coragen is registered for control of cutworms, loopers and mint root borer in peppermint. Results indicate application of Coragen at predicted peak moth flight (July 11-17) provided the greatest control of mint root borer, with predicted peak egg laying (July 23-27) providing similar, though somewhat less, control. This provides a reasonable window of opportunity (10-12 days) for growers to make an effective application.

Introduction

Coragen (chloroantraniliprole) is registered for control of foliar feeding cutworms in peppermint and has shown to have control on mint root borer (MRB) eggs and early instar larvae. The advantage of this product is it is highly effective in controlling target pest species at low use rates, with minimal impact on beneficial species. Low toxicity, two week persistence and ovicidal properties makes Coragen insecticide a good component for integrated pest management programs in peppermint.

Previous year's research showed significant control compared to the untreated check provided by applications of Coragen at peak moth flight and a double application of Coragen applied at peak moth flight plus peak egg hatch. The double application of Coragen appears to have provided control of both eggs and first instar larvae. Single, later applications of Coragen at peak egg laying and peak egg hatch were not significantly different from the untreated.

The objective of this project is to generate a second year of data evaluating application timing and number of applications for Coragen to provide optimal MRB control at the egg and first instar larval stages.

Material and Methods

Pheromone traps that attract male mint root borer moths were placed in a total of 8 fields on June 26, 2013, 6 near Culver and 2 near Prineville. The IPMP MRB degree-day development model was used to predict peak moth flight and approximate egg hatch. Traps were monitored weekly and based on these numbers, two fields with high moth populations were selected for treatment applications and soil sampling. Field 8 located near Highway 97 east of Culver and Field 1 located on Gerke road north of Prineville were selected (Table 1). Despite high numbers Field 5 near Culver was not selected due to planned removal of field.

Plots 20' x 20' were arranged in a randomized block design and replicated four times. Coragen treatments were applied using a CO₂ backpack sprayer at 20 gallons water per acre (Table 2 & 3), with timing of insecticides determined by local degree days using the MRB development

model. The Culver location was commercially cut on August 14 and the Prineville location on August 17. Post-harvest applications were not applied at the Culver location due to a delay in watering back until September 18. This was a result of extensive thunderstorms that passed through the area during mid-August.

Square-foot samples 3-inch deep was collected from each plot, placed in a plastic bag and transferred to cold storage. Soil was sifted to check that larvae in the soil after rhizomes were removed for processing. Larvae were extracted using Berlese funnels for 4 days under 25 watts bulbs. Soil sampling dates at Culver were August 28, September 5, September 11, and September 20. Sampling dates at Prineville were September 4, September 10, September 19, and September 25.

Results and Discussion

The number of moths collected in pheromone traps was similar in the Culver and Prineville locations during weekly collections from July 3 through July 23. In general, the numbers of moths were down in 2013 compared to the 2012 season. Fields chosen for treatment with Coragen continued to be monitored during the weeks of July 30 and August 6, with no moths collected at either location. It appears from these data that the degree day model is accurately predicting what is being observed in the field.

Soil sample data indicate lower numbers of larvae than found during the 2012 season (Table 4 & 5). Despite these lower numbers, results support the effectiveness of Coragen compared to untreated plots. The exceptions are the late application at peak egg hatch (August 1) at Culver and the single post-harvest treatment (September 4) at Prineville.

These data support results from last year that indicate application of Coragen at 5 fl oz/ac (chloroantraniliprole at 0.07 lbs a.i./ac) at predicted peak moth flight (July 11-17) provided the greatest control of mint root borer, with predicted peak egg laying (July 23-27) providing similar, though somewhat less, control. This provides a reasonable window of opportunity (10-12 days) for growers to make an effective application. Later applications at predicted peak egg hatch (July 30-August 6) provide somewhat less control than the early treatments, and based on two years of data is considered too late to maximize control. Split applications appear to rely on the early treatment to provide similar results to the single, early application at peak moth flight (July 12-16), with little to no benefit from the post-harvest application. This corroborates an informal survey of commercial post-harvest application of fields where research was conducted during 2012.

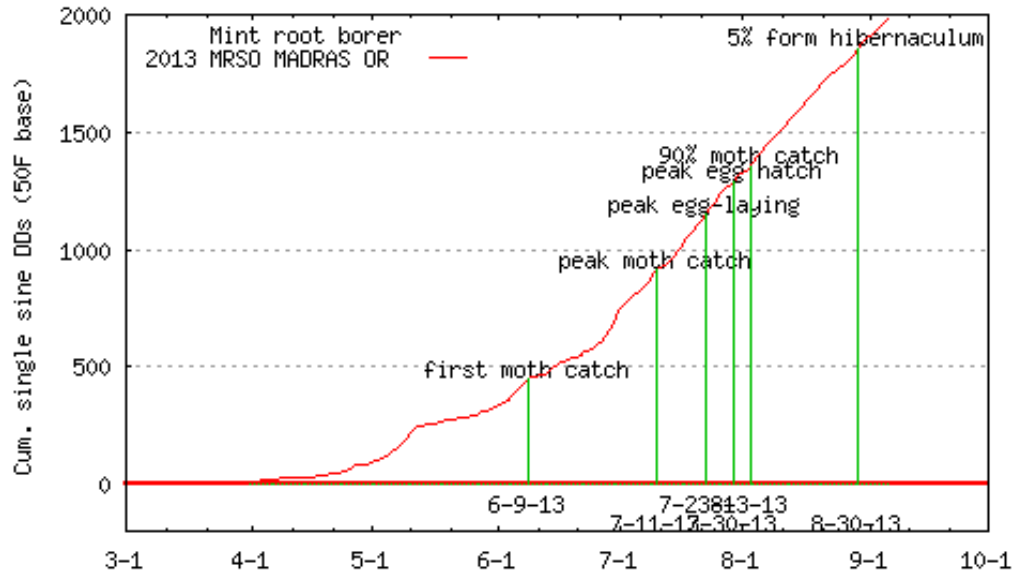


Fig. 1. Prediction model for Madras, Oregon, 2013. Predicted peak egg laying was July 23, peak egg hatch was July 30 and 90% moth catch was August 3.

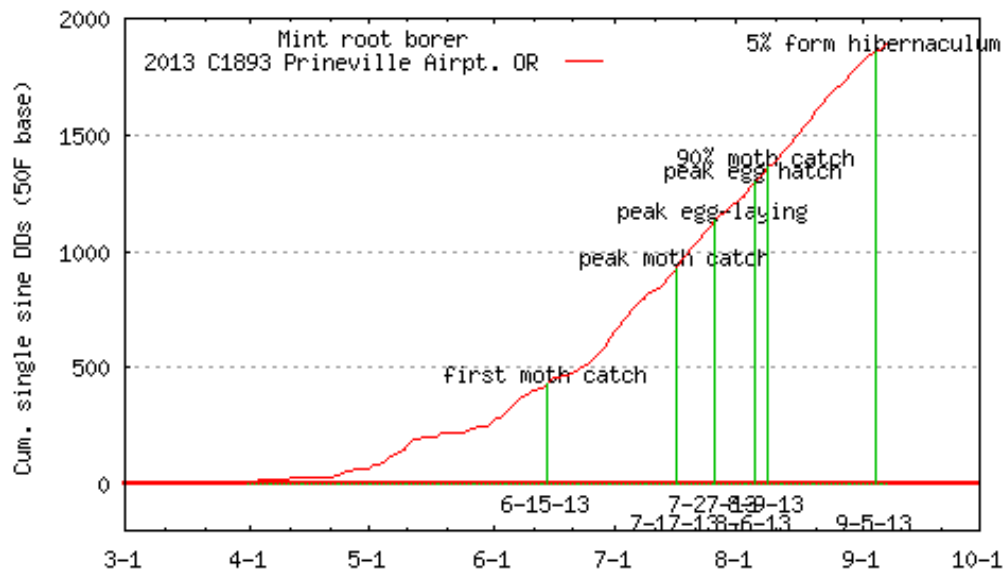


Fig. 2. Prediction model for Prineville, Oregon, 2013. Predicted peak egg laying was July 27, peak egg hatch was August 6 and 90% moth catch was August 9.

Table 1. MRB moths collected from pheromone traps placed in 8 fields on June 26, 2013.

Field	Location	Number of MRB Moths				Total
		3-Jul	10-Jul	16-Jul	23-Jul	
1	Northeast Prineville	12	6	5	5	28
2	Northwest Prineville	6	3	3	0	12
3	North Culver	11	5	2	4	22
4	Northwest Culver	9	6	1	0	16
5	West Culver	26	6	8	2	42
6	West Culver	12	9	3	0	24
7	Northeast Culver	6	9	1	0	16
8	East Culver	19	14	6	5	44

Table 2. Coragen treatment rate and timings based on accumulated degree-days at the Culver location.

Treatments	Application Rate (fl oz/acre)	Application Time (degree days)	Developmental Stage	Date Applied
1. Untreated	---	---		---
2. Coragen	5 oz	900	Peak moth flight	July 12, 2013
3. Coragen	5 oz	1100	Peak egg laying	July 23, 2013
4. Coragen	5 oz	1250	Peak egg hatch	August 1, 2013
5. Coragen	5 oz	900	Peak moth flight	July 12, 2013
+ Coragen	+ 5 oz	1250	Peak egg hatch	August 1, 2013

Table 3. Coragen treatment rate and timings based on accumulated degree-days at the Prineville location.

Treatments	Application Rate (fl oz/acre)	Application Time (degree days)	Developmental Stage	Date Applied
1. Untreated	---	---		
2. Coragen	5 oz	900	Peak moth flight	July 16, 2013
3. Coragen	5 oz	1100	Peak egg laying	July 26, 2013
4. Coragen	5 oz	1250	Peak egg hatch	August 5, 2013
5. Coragen	5 oz	900	Peak moth flight	July 16, 2013
+ Coragen	+ 5 oz	1250	Peak egg hatch	August 5, 2013
6. Coragen	5 oz	900	Peak moth flight	July 16, 2013
+ Coragen	+ 5 oz	Post-Harvest	Peak egg hatch	September 4, 2013
7. Coragen	5 oz	Post-Harvest	Peak egg hatch	September 4, 2013

Table 4. MRB larvae recovered from soil and rhizome samples at Culver (Field 8).

Treatments	Developmental Stage (degree days)	Mint Root Borer Larvae/Sq Ft Samples				
		Aug. 28	Sept. 5	Sept. 11	Sept. 20	Ave.
1. Untreated	---	1.0 a	1.0 a	0.8	0.5	0.8 a
2. Coragen	Peak moth flight (900)	0.0 b	0.0 b	0.0	0.0	0.0 c
3. Coragen	Peak egg laying (1100)	0.3 b	0.3 b	0.3	0.0	0.2 bc
4. Coragen	Peak egg hatch (1250)	0.5 ab	0.5 ab	1.0	0.3	0.5 ab
5. Coragen	Peak moth flight (900)					
+ Coragen	Peak egg hatch (1250)	0.0 b	0.0 b	0.3	0.3	0.1 bc
<i>LSD</i>		<i>0.7</i>	<i>0.6</i>	<i>NS</i>	<i>NS</i>	<i>0.4</i>

Table 5. MRB larvae recovered from soil and rhizome samples at Prineville (Field 1).

Treatments	Development Stage (degree days)	Mint Root Borer Larvae/Sq Ft Samples				
		Sept 4	Sept 10	Sept 19	Sept. 25	Ave
1. Untreated	---	1.5 a	1.3 a	2.0 a	1.0 a	1.4 a
2. Coragen	Peak moth flight (900)	0.5 b	0.3 b	0.3 c	0.0 c	0.3 d
3. Coragen	Peak egg laying (1100)	0.5 b	0.8 ab	1.3 ab	0.3 bc	0.7 bc
4. Coragen	Peak egg hatch (1250)	0.5 b	1.5 a	0.8 bc	0.5 abc	0.8 bc
5. Coragen	Peak moth flight (900)					
+ Coragen	Peak egg hatch (1250)	0.8 ab	1.0 ab	0.8 bc	0.5 abc	0.8 bc
6. Coragen	Peak moth flight (900)					
+ Coragen	Post-Harvest	0.3 b	0.8 ab	0.8 bc	0.0 c	0.4 cd
7. Coragen	Post-Harvest	0.8 ab	1.5 a	1.3 ab	0.8 ab	1.1 ab
<i>LSD</i>		<i>0.9</i>	<i>1.2</i>	<i>0.8</i>	<i>0.6</i>	<i>0.4</i>