

**EFFICACY OF CORAGEN AND AVAUNT INSECTICIDES APPLIED PRE-HARVEST
FOR CONTROL OF MINT ROOT BORER IN NORTHEAST OREGON**

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INTRODUCTION

Coragen (chloroantraniliprole) and Avaunt (indoxacarb) are registered for control of foliar feeding cutworms, but have been used little because they cost more than the other commonly used products. However, Coragen and Avaunt are systemic, have a longer residual than other products, and they have ovicidal properties. This combination could provide pre-harvest control of the Mint Root Borer (MRB) in the egg and/or first instar stage, instead of controlling it post-harvest.

OBJECTIVE

Test efficacy of Coragen and Avaunt when applied at different pre-harvest dates for control of mint root borers.

MATERIALS AND METHODS

Three sites were located in production peppermint fields near La Grande, Oregon. At each site, a randomized block design with five replications was set up on four separate treatment dates.

The four separate treatment dates were determined by using local data, and the degree-day model for MRB found on the IPMP website (mint.ippc.orst.edu). It was determined that the four application dates would coincide with the accumulated Degree-Days (DD) of 750 DD, 900 DD, 1100 DD, and 1250 DD. The peak MRB egg-laying time occurs around 1100 DD. In addition, one treatment had the insecticides applied twice, once before and once after the peak egg-laying period.

Experimental plots were 18' x 20' sections of production peppermint fields. Treatments were applied with a CO₂ backpack sprayer (20 GPA at 35 psi). A mentholated seed oil/organosilicone

surfactant blend called SYL-TAC was added at a rate of 1% V/V to each treatment. All Coragen treatments were applied at the maximum rate of 5 fl oz/ac while all the Avaunt treatments were applied at the maximum rate of 3.5 oz/ac.

The third experiment was not evaluated due to the MRB levels being too low.

For experiment one, on the third application date, it rained heavily approximately 2.5 hours after the treatments were applied. No other significant rain events or irrigations occurred within 24 hours of any application.

In experiment one, numerous MRB moths were observed on July 9, when the first treatment was applied. Only a few MRB moths were observed on the next three application dates.

Sampling for the MRB larvae took place about ten days after swathing for experiment one and 28 days for experiment two. Evaluation of the MRB larvae control was done by digging eight, 0.75 ft² soil/rhizome samples in each plot. The soil was shaken off the mint rhizomes and sifted through a 0.125" screen. The rhizomes were placed in Berlese funnels until dry and the total number of MRB larvae (combined data from soil sifting and Berlese funnel extraction) was recorded. The application rates and dates are listed in table one. Experiment one was swathed on 8/13/12 while experiment two was swathed on 8/11/12.

Table 1. Application dates and rates of Coragen and Avaunt applied to peppermint, pre-harvest in the La Grande, Oregon area. (Experiments one and two)

Trmt. #	Treatments	Rate/acre	Application dates	Accumulated degree-days in La Grande area using Imbler Agmet data and MRB degree-day model.
1	Untreated check			
2	Coragen 18.4% ai	5 fl oz	7- 9	737
3	Coragen 18.4% ai	5 fl oz	7-18	919
4	Coragen 18.4% ai	5 fl oz	7-24	1023
5	Coragen 18.4% ai	5 fl oz	8-4	1219

6	Coragen 18.4% ai	5 fl oz	7-18 +	919 +
		5 fl oz	8-4	1219
7	Avaunt 30 WG	3.5 oz	7- 9	737
8	Avaunt 30 WG	3.5 oz	7-18	919
9	Avaunt 30 WG	3.5 oz	7-24	1023
10	Avaunt 30 WG	3.5 oz	8-4	1219
11	Avaunt 30 WG	3.5 oz	7-18 +	919 +
		3.5 oz	8-4	1219

RESULTS AND DISCUSSION

The accumulated degree-days in 2012 were approximately three days behind the 30-year average. By comparison, the accumulated degree-days in 2011 were approximately 14 days later than the 30-year average. With 2012 being a nearly normal year for degree-day accumulation, the 2012 application dates were about 12 calendar days ahead of 2011.

No data was collected on the efficacy of cutworm control from either experiment. The growers treated all three fields containing the experiments with Orthene, eliminating most cutworms.

Experiment one clearly shows that the first three application dates, and the double application of Coragen, significantly lowered the MRB levels compared to the untreated check (table 2). This is the first documented control of mint root borer, pre-harvest, with any insecticide labeled for mint. The heavy rainfall that occurred 2.5 hours after the Coragen was applied in experiment one, had no apparent negative effect, on the control of the MRB. The last application date of Coragen and all of the Avaunt treatments did not lower the MRB larvae levels, compared to the untreated check.

It is curious that the MRB levels in the untreated check level are lower than all of the Avaunt treatments and last Coragen treatment. This may be due to sampling error caused by some of the untreated plots being sampled about four days earlier than the rest of the plot area.

This earlier sampling may have affected the extraction of the MRB larvae, from the rhizomes, in a negative way.

In experiment two, the MRB larvae levels were low, and unevenly distributed, as indicated by the Coefficient of Variation being high (126%). Yet two of the Coragen treatments provided

significantly lower MRB levels than the untreated check. Experiment two follows the same trend as experiment one, with all the treatments except the last application date, providing the most MRB control. In addition, the last application date provided the least MRB control in both experiments.

The double application of Avaunt is numerically lower than any other Avaunt treatment but is still not significantly lower than the untreated check. The Avaunt treatments generally provided little to no control of the MRB larvae.

Table 2 Experiments one and two.

Pre-harvest applications of Coragen and Avaunt insecticides for control of Mint Root Borer eggs/ first instar larvae. (La Grande, Oregon Summer 2012)

Trmt. #	Treatment	Accumulated Degree-days Imbler, Oregon	Application date(s)	Average live mint root borer (Per ft ²)	
				Exp.1	Exp.2
1	UTC			4.5 b	1.07 bc
2	Coragen	737	7-9	0.67 a	0.03 a
3	Coragen	919	7-18	0.13 a	0.17 ab
4	Coragen	1023	7-24	1.03 a	0.3 ab
5	Coragen	1219	8-4	7.67 cde	1.04 bc
6	Coragen	919 +1219	7-18 + 8-4	0.1 a	0.1 a
7	Avaunt	737	7-9	9.37 e	0.5 ab
8	Avaunt	919	7-18	6.5 bcde	0.6 ab
9	Avaunt	1023	7-24	8.17 de	1.53 c
10	Avaunt	1219	8-4	5.8 bcd	0.63 abc
11	Avaunt	919 + 1219	7-18 + 8-4	5.13 bc	0.2 ab

LSD	2.96	0.9
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Experiment one CV=52%, Experiment two CV=126%

Sample means were compared with Fisher's Protected LSD ($p=0.05$).

Means with the same letter are not significantly different (Petersen 1985).

CONCLUSIONS

Applying Coragen once at 5 oz/ac around 750 to 1000 accumulated DD, pre-harvest, provided significant control of the MRB. In addition applying it twice at approximately 900 and 1200 DD also provided significant MRB control. The single application of Coragen at 1200 DD appears too late to provide any significant control. This research shows that Coragen can control MRB in the egg and/or first instar stage before harvest. Avaunt appears mostly ineffective in controlling MRB eggs and/or first instar larvae at any date. This experiment should be repeated to verify if pre-harvest control with Coragen could be consistent.