

**EFFICACY OF CORAGEN® AND AVAUNT® INSECTICIDES, WHEN APPLIED
PRE-HARVEST, FOR CONTROL OF MINT ROOT BORER IN FURROW-IRRIGATED
MINT LOCATED IN WESTERN IDAHO.**

Bryon Quebbeman

Quebbeman's Crop Monitoring

2808 N. Fir, La Grande OR, 97850

541-975-9338

bryonq@eoni.com

INTRODUCTION

Coragen® (chlorantraniliprole) and Avaunt® (indoxacarb), are relatively new insecticides for the mint industry. Both of these insecticides are different from other common mint insecticides because they are effective ovicides as well as larvacides. They also have a significant amount of residual activity compared to some other mint insecticides. These properties provide the possibility of a new approach for Mint Root Borer (MRB) control by providing pre-harvest control. This could be very useful, especially in furrow irrigated mint where post-harvest MRB control can be difficult. Both of these insecticides also control foliar feeding cutworms. Controlling two mint pests at the same time provides the possible benefit of less insecticide applications. Both Coragen and Avaunt have very low toxicity levels and have short Restricted Entry Intervals (REI) and Pre Harvest Intervals (PHI) and are relatively safe on beneficial insects and mites compared to Orthene (Acephate) and Lorsban (Chlopyrifos).

Future restrictions on Orthene and Lorsban may also necessitate the use of Coragen and Avaunt.

A study was done in 2011 to test the effectiveness of Coragen and Avaunt for pre-harvest MRB control. The results were not conclusive but there was a trend indicating that the Coragen may help control MRB in the egg and/or first instar stage. The experiments in 2012 were designed to duplicate the 2011 experiments.

OBJECTIVE

Test the efficacy of Coragen and Avaunt, when applied at different pre-harvest dates, for control of mint root borer eggs and/or first instar larvae before they enter the rhizomes, in furrow-irrigated mint.

MATERIALS AND METHODS

Two identical experiments were conducted, in two established, production, furrow irrigated peppermint fields located near Wilder (experiment one), and Greenleaf (experiment two), Idaho. Plots were arranged in a randomized block design. Plots of 18'x 20' were replicated five times. Coragen and Avaunt were broadcast applied with a CO² powered backpack sprayer in 20 GPA of water. A mentholated seed oil/organosilicone surfactant blend called SYL-TAC was added at a rate of 1% V/V to each treatment.

The maximum rate of Coragen (5 oz/ac) and the maximum rate of Avaunt (3.5 oz/ac) were applied in all treatments of both experiments.

Treatment dates were determined by using local data from the Nampa, ID Agmet station and the degree-day model found on the IPMP website (mint.ippc.orst.edu). The degree data from the Nampa site was used for both experiments. The four application dates were chosen so they would coincide with the accumulated Degree-Days (DD) of 750, 850, 1000 and 1150 DD.

The peak egg-laying time occurs around 1100 DD, according to the model. These four dates were determined to give a good spread of times that should determine when the best time would be to apply the Coragen or Avaunt. In addition, one treatment had the insecticides applied twice, once before and once during the peak egg laying. Table 1 lists the actual application dates and corresponding accumulated degree-days for both experiments.

These two experiments were nearly identical to the two experiments conducted in 2011. The main difference between the two years was that the application dates occurred three to four weeks earlier in 2012 than in 2011. This was mostly due to weather in 2011 being unusually cool and so the 2011 treatments were delayed.

The mint was harvested around August 20 for experiment one and around August 3 for experiment two. After harvest, the MRB control was evaluated on Aug. 31 and Sept. 10, for experiments one and two respectively. Evaluation of the MRB control was done by digging eight, 0.75 ft² soil samples in each plot. The soil was shaken off the mint rhizomes and sifted through a 0.25" screen. The rhizomes were placed in Berlese funnels until dry. The number of MRB larvae found in the Berlese funnels were combined with those found when the soil was sifted.

RESULTS AND DISCUSSION

There were no significant differences between any treatment and the untreated check in either experiment. There is a slight trend for the double application of Coragen to lower the MRB levels in experiment one. The Avaunt did not appear to provide any control (table 1).

Table 1. Mint Root Borer levels after harvest from pre-harvest applications of Coragen or Avaunt, on two furrow irrigated peppermint experiments, located near Wilder (experiment one) and Greenleaf (experiment two), Idaho. (Summer 2012)

Trmt. #	Treatment	Accumulated degree-days (Nampa ID)	Application date(s)	Average live mint root borer larvae (per sq. ft)	
				Exp. 1	Exp. 2
1	UTC			5.9	4.2
2	Coragen 5 oz/a	766	6-20	7.0	3.6
3	Coragen 5 oz/a	875	6-25	4.6	4.7
4	Coragen 5 oz/a	963	6-30	5.4	3.9
5	Coragen 5 oz/a	1133	7-7	6.3	3.6
6	Coragen 5 oz/a	875 + 1133	6-25 & 7-7	3.6	2.9
7	Avaunt 3.5 oz/a	766	6-20	6.0	5.1
8	Avaunt 3.5 oz/a	875	6-25	8.2	3.5
9	Avaunt 3.5 oz/a	963	6-30	6.9	5.2
10	Avaunt 3.5 oz/a	1133	7-7	6.4	2.9
11	Avaunt 3.5 oz/a	875 + 1133	6-25 & 7-7	6.3	4.0
LSD				NS	NS

Coefficient of variation, experiment one=46.3%

Coefficient of variation, experiment two=38.9%

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

The 2011 experiments did not conclusively show that Coragen was effective, but there was a trend showing some control of the MRB with the Coragen only (data not shown). The results in 2012 show almost no effectiveness for Coragen. It is speculated that the earlier calendar date treatments in 2012, reduced the effectiveness of the Coragen by applying the product before the MRB eggs and/or larvae were present. In addition, the mint growth is very rapid in June due to

the long day length; this rapid growth may have caused the new mint growth to not contain the systemic insecticide.

It is also speculated that the degree-day development model in Idaho may inaccurately predict the developmental stages of MRB to occur earlier than they do. This speculation is supported by two years of sampling data that shows the percent of MRB found in the hibernaculum stage, occur significantly later than the Idaho development model predicts (table 2). The Idaho development model is only partly validated so it is very possible that it is not accurate.

A very similar trial to these trials was done in Northeast Oregon this year and Coragen had very positive results in controlling MRB larvae with pre-harvest applications of Coragen. The degree-day model in Northeast Oregon has correctly predicted the timing of the MRB entering the hibernacula stage.

Table 2. Comparison of untreated Mint Root Borer in the hibernacula stage at different dates, to the Idaho MRB degree-day development model for Idaho. Samples taken from various fields around the Wilder and Greenleaf areas.

Year 2011			Year 2012		
Sample dates	Actual percent mint root borer in hibernacula stage	Accumulated degree days*	Sample dates	Actual percent mint root borer in hibernacula stage	Accumulated degree days*
8-23	0	1856			
			9-10	0	2727
9-12	0	2241			
			9-26	13%	2924
10-4	39%	2610			
			10-18	66%	3087
10-24	91%	2700			

* Temperature data used from the Agmet station located near Nampa ID.

The Idaho MRB degree-day model states that 50% of the MRB should be in the hibernaculum stage at 2150 degree-days.

CONCLUSIONS

Two years of trials have shown that pre-harvest applications of Coragen and Avaunt do not provide significant control of Mint Root Borers in the egg and/or first instar stage.

Coragen appeared to have some promise in 2011 but not in 2012. The Idaho Mint Root Borer development model appears to be predicting the development stages of the Mint Root Borer earlier than they really occur, based on when the MRB actually enter the hibernaculum stage. This inaccuracy in the model may contribute to Coragen not providing significant control of the Mint Root Borers pre-harvest.

Avaunt did not show any promise in controlling the MRB either year, so no further study is needed on Avaunt.

Further studies should be conducted to test if pre-harvest applications of Coragen could control MRB if they are applied at later dates. It would be valuable information to know even if Coragen doesn't control the MRB eggs and/or larvae, pre-harvest, so growers do not apply Coragen, pre-harvest, thinking they are controlling Mint Root Borers.