

**EFFICACY OF CORAGEN® APPLIED BY TWO METHODS AND WATERED-IN
WITH DIFFERENT AMOUNTS OF IRRIGATION WATER,
FOR CONTROL OF MINT ROOT BORER, IN NORTHEAST OREGON**

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INTRODUCTION

Coragen insecticide (chloroantraniliprole) can be applied by chemigation or by ground sprayer, and then incorporated with overhead sprinkle irrigation, for control of Mint Root Borers (MRB). Some growers find it more convenient and accurate to ground apply the Coragen and water it in, than to chemigate it.

Coragen insecticide has been proven to be highly effective in controlling Mint Root Borer larvae when they are in the mint rhizomes. However, in the fall of 2010, and 2012, some mint fields in the La Grande, Oregon area, that had Coragen sprayed on them and then incorporated with irrigation, had poor to no control of MRB. It was speculated that too little water was applied on the first irrigation to incorporate the Coragen. This study was designed to test this idea.

OBJECTIVE

Compare the efficacy of Coragen, when applied with a ground sprayer and watered in with different amounts of water, to chemigating Coragen with different amounts of water.

MATERIALS AND METHODS

A single experiment was established post-harvest, in a production, wheeline-irrigated mint field infested with mint root borer larvae. This field was swathed on Aug. 13, 2012. The wheeline that irrigated the field had shutoff valves attached to the sprinklers over the plot area so that no water was applied from the wheeline.

The maximum rate of Coragen (5 fl oz/a) was applied to the dry soil on treatments two through five on Aug. 28, 2012. These four treatments were applied using a CO² powered backpack sprayer with 20 GPA of water. No surfactant or adjuvant was added to any treatment. An untreated border of two feet was left around each treatment. Plots were 18' x 20', in size, and were replicated five times, in a randomized block design.

Water from a nearby mainline was used to hand water each plot with watering wands, approximately 24 hours after the 5 oz/a Coragen was applied (table 1).

The simulated chemigation treatments were applied on Aug. 29, 2012. The simulated chemigation was accomplished by saturating the soil with water, applying the 5 oz/a Coragen with a CO² backpack sprayer, then immediately continuing watering (table 1). The total amount of water applied during this simulated chemigation included the water that was applied before and after the Coragen was applied.

The water for these chemigation treatments also came from the nearby main line and was applied with hand-held watering wands. The correct amount of water was determined by measuring the amount of water that came out of the watering wands for a measured amount of time. It was then determined how long a plot had to be watered to obtain the correct amount of water.

No more water from the wheeline was applied as of Sept. 13, 2012. However on Sept. 14 and 15, 2012, garden sprinklers were used to irrigate the entire plot area. This second irrigation was needed because the mint in the treatments that received less than 2 inches of water, were struggling to survive due to drought. One more irrigation was applied by the grower around September 27 with about 3.5 inches of water. There was no significant rainfall after harvest before the sampling was completed on October 10. The treatments, dates, and amounts of water applied are listed in table 1.

Table 1. Coragen treatment dates and amounts of water applied with different application methods. (La Grande, Oregon 2012)

| Trmt. # | Treatment | Amount of Coragen (18.4% ai) | Date Coragen applied. | Amount of water applied (Inches / acre) | Date water applied. |
|---------|----------------------|------------------------------|-----------------------|---|---------------------|
| 1 | Untreated check | | | 2.0 | 8-29-12 |
| 2 | Coragen applied, and | 5 fl oz | 8-28-12 | 0.75 | 8-29-12 |

| | | | | | |
|---|--|---------|---------|------|---------|
| | watered in later. | | | | |
| 3 | Coragen applied, and watered in later. | 5 fl oz | 8-28-12 | 1.0 | 8-29-12 |
| 4 | Coragen applied, and watered in later. | 5 fl oz | 8-28-12 | 1.5 | 8-29-12 |
| 5 | Coragen applied, and watered in later. | 5 fl oz | 8-28-12 | 2.0 | 8-29-12 |
| 6 | Coragen chemigated | 5 fl oz | 8-29-12 | 0.75 | 8-29-12 |
| 7 | Coragen chemigated | 5 fl oz | 8-29-12 | 1.0 | 8-29-12 |

Rhizome and soil samples were taken between October 4th and 10th, or 36 to 42 days, after the treatments were incorporated by water. Twelve, 0.75 ft² rhizome/soil samples were dug from 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 and the total number of MRB larvae collected from the Berlese funnels were combined with the larvae found from soil sifting.

RESULTS AND DISCUSSION

The Mint Root Borer populations were lower than expected, and the population densities were highly variable, as shown by the Coefficient of Variation being high at 116%. The low level of MRB larvae make it more difficult to clearly see the differences between the results caused by the treatments, and natural variation that occurs in the MRB population.

All treatments reduced the MRB levels significantly, at the $p=0.05$ level compared to the untreated check (table 2). In addition, none of the treatments were significantly different from each other (table 2).

There is not even a trend indicating that the amount of water applied after spraying on the Coragen made any difference in the effectiveness of the Coragen. There was also no trend indicating that chemigating is any more effective than broadcast spraying and watering the Coragen in a day later.

Table 2. Coragen applications of 5 fl oz/ac using different amounts of water to incorporate, different methods of applications and dates of water applications. (La Grande, Oregon area 2012)

| Trmt. # | Treatment | Date Coragen applied. | Amount of water applied (Inches/acre) | Date water applied. | Mean Number Live Mint Root Borer per ft ² . |
|---------|--|-----------------------|---------------------------------------|---------------------|--|
| 1 | Untreated check | | 2.0 | 8-29-12 | 2.8 b |
| 2 | Coragen applied, and watered in later. | 8-28-12 | 0.75 | 8-29-12 | 0.3 a |
| 3 | Coragen applied, and watered in later. | 8-28-12 | 1.0 | 8-29-12 | 1.2 a |
| 4 | Coragen applied, and watered in later. | 8-28-12 | 1.5 | 8-29-12 | 0.5 a |
| 5 | Coragen applied, and watered in later. | 8-28-12 | 2.0 | 8-29-12 | 0.3 a |
| 6 | Coragen chemigated | 8-29-12 | 0.75 | 8-29-12 | 1.0 a |
| 7 | Coragen chemigated | 8-29-12 | 1.0 | 8-29-12 | 1.0 a |
| | | | | LSD | 1.54 |

Coefficient of Variation=116%; Sample means were compared with Fisher's Protected LSD (p=0.05). Means with the same letter are not significantly different (Petersen 1985).

CONCLUSIONS

All Coragen treatments reduced the MRB larvae levels significantly after harvest, however the low number of MRB larvae and the variation make the results less conclusive than they appear.

The total amount of water applied (under 2 inches) after the Coragen was sprayed on, does not seem to impact the effectiveness of Coragen in controlling the MRB.

Chemigating does not appear to be any more effective in controlling MRB than spraying Coragen and watering it in a day later.

Further studies should be done to determine what factor(s) affect Coragen's ability to control MRB larvae after harvest.