

2010 Specialty Crop Block Grant Final Report

Project Title: Determining Effectiveness of Currant Borer Mating Disruption in Utah

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Project Summary

Production of black and red currants in the U.S. is limited due to infestation by the clearwing moth, currant borer (*Synanthedon tipuliformis*). It causes stunted plants, weak canes, shoot dieback, uneven bud break, and fruit yield reduction by up to 50%. There are very few insecticides available for control of currant borer, and often peak moth flight usually occurs during bloom, so chemical treatment is not always an option. A five-acre site in northern Utah (Paradise, Cache County) is one of the few currant-producing sites in this state. It is heavily infested with currant borer, and if left untreated, could result in losses up to \$250,000.

This study looked at the effectiveness of mating disruption on a five-acre block of black currants in northern Utah over a period of two seasons. Mating disruption uses high loads of pheromone to delay mating, and hence, prevent egg-laying. Using mating disruption to control this pest not only reduces pesticide use, but has been shown to be economically effective in Washington, Connecticut, Italy, New Zealand, Tasmania, and other locations.

Although this study targets one large operation and several small operations, Utah has an ideal climate for growing currants, and improved control options for currant borer could pave the way to increased production. Currants (red and black in particular) are hardy, high value crops that serve both the fresh and processed markets. Interest in growing currants has swelled among US small fruit growers due to the health benefits of the fruit, their ease of growth, and the potential for income. Growers in Utah can do very well with small plots geared to either the fresh market or value-added products such as syrup, jams, jellies, juice, or wine.

Project Approach

The test site was a heavily infested, five-acre black currant block located in northern Utah. An isolated 1-acre white currant block was used as the untreated control, located approximately ½ mile away. In mid-June, we applied twist-tie mating disruption dispensers onto currant stems at a rate of 300 per acre in the interior, and 400 per acre in a 20-foot perimeter area within the block. We also hung dispensers along an additional 10-foot border outside the block. No dispensers were hung in the control block. In 2010, the grower applied the insecticide Sevin for control of an additional pest, rose stem girdler.

In both spring (pre-treatment) and fall (post-treatment), we cut 100 canes from the treated block and 40 canes from the control block. We recorded cane injury level, number of larvae within each cane, and occurrence of predators or parasites. We also cut 30 canes from the adjacent raspberry field in the fall to determine if the raspberries could be asymptomatic hosts. We determined adult

moth population by using pheromone traps in the treated and control blocks. We hung five traps in the treated block, two in the control, and additional traps between the two test fields. We counted moths every 7 days. Ideally, the traps in the mating disruption block would have zero moths.

Like our results from 2009, results in 2010 were not as we had hoped. We expected to see a decrease in borer infestation in the mating disruption treated field whereas instead, the infestation increased from spring to fall by 27% (Figure 1). In 2009, we saw an increase in 50%.

Table 1 shows the differences in cane injury characteristics in 2009 and 2010. There were no significant differences in cane rating between years or between treatments.

Figure 1. Percentage of canes infested with currant borer larvae or pupae in the mating disruption (MD) treated and untreated fields in spring (pre-treatment) and fall (post-treatment) in 2009 and 2010.

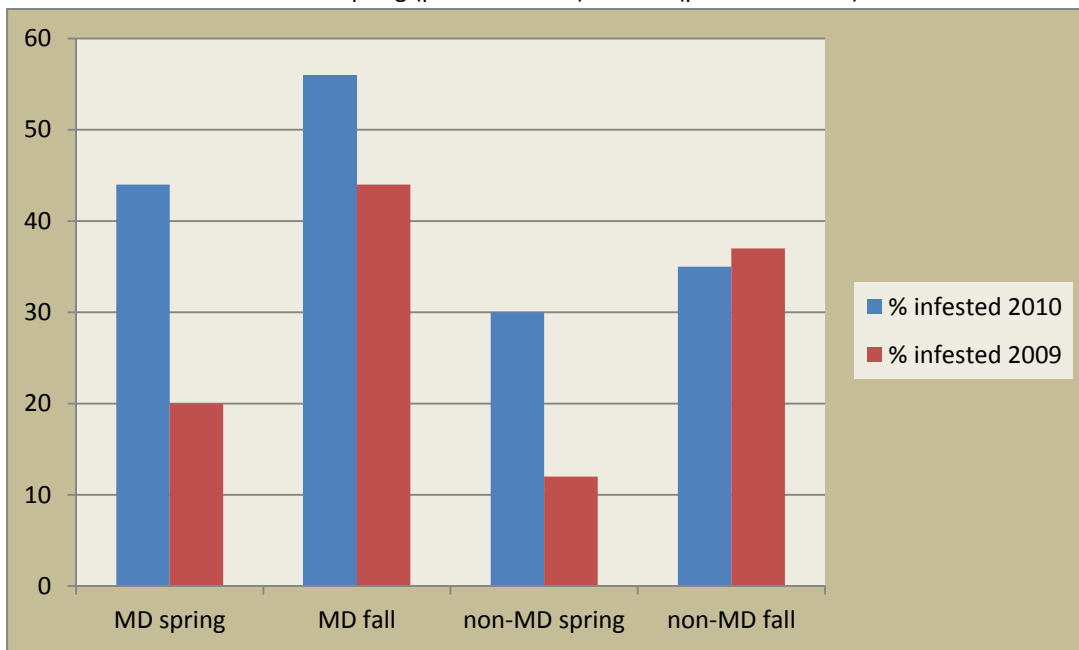


Table 1. Average characteristics of cut canes from the mating disruption treated field and untreated fields, in spring (pre-treatment) and fall (post-treatment) for 2009 and 2010.

Treatment	2010 Cane Rating	2009 Cane Rating	2010 # Exit Holes per Cane	2009 # Exit Holes per Cane
MD-spring	1.99	2.54	1.27	1.93
MD-fall	1.69	1.79	0.941	2.51
non-MD-spring	2.2	2.36	1.23	2.41
non-MD-fall	1.53	1.77	0.58	2.24

¹ cane injury on a scale of 1-4 (1=healthy and no obvious borer injury, 2=1-25% leaves injured or missing, 3=26-50% leaves injured or missing, 4=>50% of leaves injured or missing, or cane is dead)

Trap catch is an important indicator of whether the mating disruption dispensers are working. Most traps in the treated block caught zero moths throughout the season except for the outside traps which had stray captures. The traps in the control field and in the area between treatment fields caught anywhere from 30-100 moths per 7 days. These results suggest that the mating disruption dispensers were effective in preventing mating WITHIN the treated field. But the high trap catch numbers just several hundred yards away suggested that mated females were blown into the currant borer field. After females have mated, mating disruption has no effect on control.

The problem with the mating disruption failure and with this test site is twofold: the moth population is too high to be controlled by mating disruption alone, and daily breezes blow mated currant borer females from other infested areas into the treated field.

Goals and Outcomes Achieved

With this project, we achieved the following **goals**:

1. We have determined that currant borer mating disruption will not work on 5 acres where the initial population is high.
2. Through a separate grant, a colleague is working on getting this product registered in the U.S. Information from this project will be used in helping to develop the labeling for currant borer mating disruption.
3. Once the product is registered in the U.S., producers growing enough currant acreage to use mating disruption will be able to reduce pesticide use significantly and increase yield. Mating disruption is an organically approved product, and if they so choose, will allow these growers to fill a niche in the market to increase profitability. In addition new growers with enough acreage will not be hesitant to start currants knowing this control technology is readily available.
4. A horticulture student was trained by the project co-leaders to assist with dissecting the canes, taking measurements, counting larvae, identifying predators and parasites, and photography. He has since graduated and moved on to managing a greenhouse.
5. Our greater knowledge in currant borer biology and natural enemies can be used by Extension specialists and agents to assist growers in management practices and prevention of insect spread.

Beneficiaries

All agricultural producers in the state will have access to this information when this report is posted online at utahpests.usu.edu. In addition, growers attending the Utah Berry Growers Association annual meeting in January 2011 will receive a copy of the report and can see a poster presentation of the results (approximately 75 attendees). We will also report results to the Western Orchard Pest and Disease Management Conference in Portland, OR in January 2011, in which over 150 professionals attend. We will prepare a fact sheet that will be posted online, and provide results in our IPM pest advisory that is emailed weekly during the growing season to the berry growers in the state.

My colleague, Dr. Lorraine Los, at the University of Connecticut, will use Utah's results in training growers in her state. She has conducted several years worth of work on mating disruption for currant borer (with success), and has received grant funding to help defray new product registration costs. Results of Utah's project will be used to help develop the currant borer mating disruption label.

Lessons Learned

1. Even at application rates that are higher than recommended, currant borer mating disruption is not effective in fields that are within 1 mile of non-treated fields. There is evidence that moths can fly or be blown up to 1.5 miles away.
2. We need to more closely examine whether raspberries can serve as a secondary, asymptomatic host. Pheromone traps that were placed in neighboring raspberry fields caught between 52 and 97 moths per 7 days during peak flight.
3. When initial pest populations are high, it is best to use multiple tactics to reduce the population before using mating disruption alone, including insecticides and heavy pruning.

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