Michigan Grape & Wine Industry Council
2018 Research Report

REDUCING HARVEST LOSSES TO LATE SEASON INSECTS AND THEIR ASSOCIATED DISEASES IN MICHIGAN VINEYARDS

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GOALS & OBJECTIVES

This project had the overall aim of preventing losses to pre-harvest insect pests in Michigan vineyards. The goals were to test wasp trapping strategies, evaluate chemical control of a variety of harvest pests, and help determine the relationship between brown marmorated stink bug, spotted wing drosophila and native fruit fly infestations. This research is informing our late-season pest control recommendations to vineyard managers. We communicated our results through bi-weekly MSUE Vineyard Scouting Reports, Extension meetings, Fact Sheets, and in-season workshops.

The specific objectives of this project were to:

1. **Evaluate trapping strategies for controlling late season wasp infestations.**
2. **Determine the efficacy of short-PHI insecticides and test a border application strategy for control of pre-harvest insect pests.**
3. **Determine if the presence of BMSB and SWD increase the risk of native vinegar fly infestation and sour rot infestation at harvest.**
4. **Deliver information on harvest-time pest insects to the Michigan grape industry.**

PROJECT PERIOD

This project was conducted during 2018, with fieldwork occurring from May to October and extension meetings occurring through the whole year.

WORK ACCOMPLISHED DURING THE PERIOD

Objective 1. Evaluate trapping strategies for controlling late season wasp infestations.

At multiple vineyards in SW and NW Michigan, we compared different types of traps and baits for catching yellowjackets. These trials highlighted that the commercial Rescue trap baited with the eastern US blend was highly effective for trapping the wasps (Figure 1). Additionally, we tested a yellowjacket bait made by Agrisense that performed very well but this bait is no longer available, and we have not been able to find a supplier.

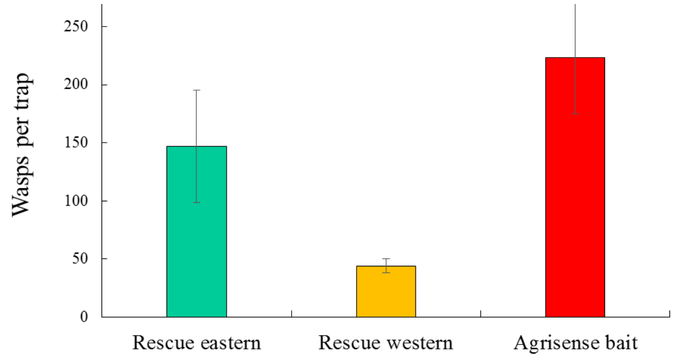


Figure 1. Average captures of yellowjackets in traps baited with different attractants.

The trapped yellowjackets were identified to species, revealing six primary species of yellowjackets present in Michigan vineyards. These were primarily the eastern yellowjacket (*Vespula maculifrons*).

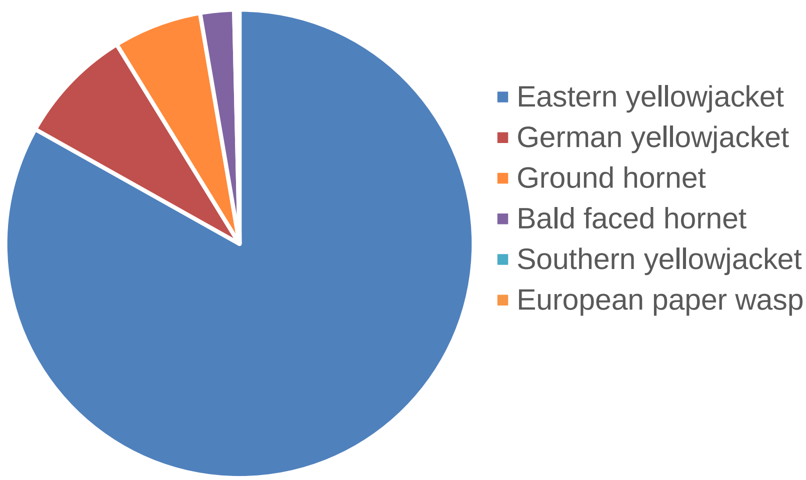


Figure 2. Relative abundance of yellowjackets trapped in Michigan vineyards.

This species is native to our region and is a species that nests in the ground. Its nests can have hundreds to thousands of worker wasps. They will aggressively defend their nests and can inflict painful stings. While in spring there is interest in feeding on insects thereby providing some natural biological control, in fall they will feed on clusters and can cause direct damage as well as being a safety hazard for pickers.

At multiple farms, we compared vineyards with no mass trapping for yellowjackets with vineyards that had a perimeter of yellowjacket traps, to test whether this approach would reduce wasp captures and also their activity and damage in the vineyards. In early spring, monitoring traps were placed at interior, edge, and perimeter locations of each of these vineyards. WE then added the mass trapping strategy around the edge of these vineyards with a focus on the side adjacent to the woods. Traps were deployed at a rate of 10/acre and were checked every week or two to make sure that they were still baited and actively trapping. Monitoring traps were also checked regularly, and wasps in these traps were identified and counted.

Vineyards were sampled close to harvest time, but there were very few insects found on the clusters. However, damage from these insects was apparent, with more than a 50% reduction in that damage in average where the traps were placed in the perimeter. Examining the vineyard by vineyard results, there was a big difference in the levels of damage among the vineyards, with the benefit of the traps being most apparent in the sites with the highest populations. This suggests that trapping may not be beneficial at all farms, and should be focused in those vineyards or areas of the farm where there have been previous issues with this pest, or for cultivars that are particularly susceptible.

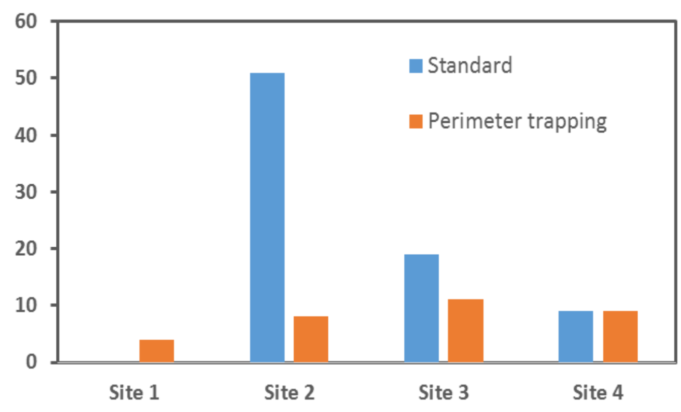


Figure 3. Site by site variation in the number of damaged clusters out of 40 sampled, at the 2018 harvest.

Objective 2. Determine the efficacy of short-PHI insecticides and test a border application strategy for control of pre-harvest insect pests.

A series of insecticides with 0, 1, or 3 day PHIs were tested in vineyards at the Trevor Nichols Research Center to compare their efficacy against harvest-time insect pests. For each of the following treatments, four vineyard plots were compared by observing insects in the field (which did not reveal much activity) and by sampling clusters just before harvest and rearing SWD from them. We tested Mustang Maxx (4 oz), Leverage 360 (3.2 oz), Venom (3 oz), Belay (4 oz), Pyganic (32 oz), and a combination of Delegate (5 oz) applied once at veraison followed by Mustang Maxx (4 oz).

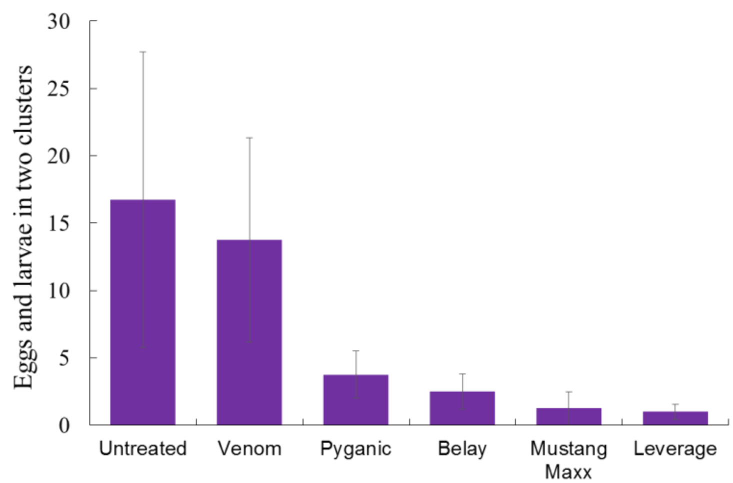


Figure 4. Infestation of grape clusters after treatment with different insecticides in the pre-harvest period.

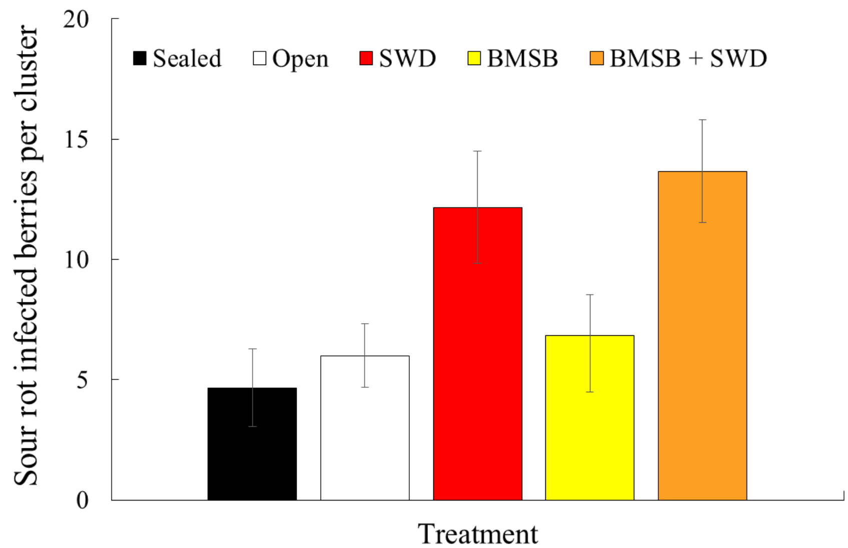
We found that Leverage and Mustang Maxx provided the greatest control of Drosophila larvae (both containing pyrethroids). Belay (a neonicotinoid with a 0 day PHI) was close behind, and Pyganic was a little weaker. We saw no efficacy from Venom against Drosophila larvae in this trial.

Testing this approach to keeping clusters free of infestation in commercial farms was not effective when tested at four SW Michigan vineyards. A program of Sevin, Malathion, Venom, and Mustang Max was applied, but this was selected before we have the results from the trial above. We saw little evidence for activity against SWD or the native Drosophila that were by far more common than the SWD in our samples. We are planning further research in 2019 to test a program containing the most effective identified treatments in the small plot trial described above.

Objective 3. Determine if the presence of BMSB and SWD increase the risk of native vinegar fly infestation and sour rot infestation at harvest.

A trial at the Trevor Nichols Research Center was conducted to compare the level of sour rot in clusters that were exposed to SWD, Brown Marmorated Stinkbug, or a combination of the two. Bags were placed onto the clusters containing these insects, or no insects, and we compared infestation in these clusters to the infestation in unbagged clusters.

This trial clearly showed the importance of SWD for increasing the risk of sour rots in clusters, with only those treatments with SWD having elevated levels of sour rot compared with those that were infested with BSGW or those that only had exposure to the background level of pest activity.



The results highlight the need for management of vinegar flies through cultural controls such as canopy management and cultivar selection. Coupled with the results from Objective 2, it is clear that we still need to better understand the interactions between these factors to develop Best Management Practices that are affordable for grape growers.

Objective 4. Deliver information on harvest-time pest insects to the Michigan grape industry. Results from this project were shared during summer and winter grower meetings, Great Lakes Expo, Southwest Hort Days, and the Northwest Orchard and Vineyard Show. We also employed the www.grapes.msu.edu website as a venue for distributing updates about vineyard pest populations. With the new extension educator hired in Berrien County, we will continue to deliver information on this project to the grape industry across Michigan.

RESULTS & CONCLUSIONS

Through this project, we have made advances in the type of traps to use for capturing yellow jackets and the baits that work best for attracting them. We have also found some promising findings related to perimeter trapping for these insects in Michigan winegrape vineyards, and we hope to continue this further in 2019. While some insecticides with the option for application late in the growing season are highly active in the small plot vineyard trials against Drosophila, we did not see the same level of activity in the commercial vineyards. It is expected that changing the insecticides tested based on this new information will lead to improved performance and hope to test that in 2019. The project has made a clear connection between drosophila infection and sour rot infection in clusters, highlighting the need for attention to the Drosophila community of insects along with the pathogens that are active at harvest-time. This could include a combination of non-chemical horticultural techniques to reduce sour rot with an option of insecticides in case the vinegar fly population increases.

This project has also supported delivery of information about management of late-season insect pests to the Michigan grape industry through summertime field days and through formal winter and spring extension events.

BUDGET NARRATIVE

This project was conducted in accordance with the approved budget, as outlined in the original grant agreement and funds were used to accomplish the objectives of the proposal. The grower cooperators provided in-kind contributions of labor, materials and equipment costs to manage their vineyards with border pesticide applications. This is estimated to be between $1,500 and $2,500 per acre, and we used approximately 20 acres for this project. Some pesticides were provided to the Isaacs lab by agrichemical companies for use in this research/demonstration project. We estimate this to be an additional $1,000 of in-kind contribution.

ACKNOWLEDGEMENTS

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