Michigan Grape & Wine Industry Council
2018 Research Report

MICHIGAN VINEYARD IPM EXTENSION PROGRAM

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GOALS & OBJECTIVES

This focus of this project was to demonstrate IPM techniques to the Michigan grape industry using a combination of demonstration vineyards, electronic scouting updates, formal presentations and hands-on workshops. This included using insect and disease scouting to provide timely information for growers to help them make management decisions. This project also provided training on how to use IPM tactics such as mass trapping to help reduce chemical inputs while still managing the vineyard effectively. A particular focus of this training was placed on detection and management of insect and disease problems in the period around harvest.

The specific objectives of this project were to:

1. **Demonstrate performance of scouting and reduced-risk management in commercial grape vineyards.**
2. **Deliver information on IPM and new control tactics to the Michigan grape industry.**
3. **Deliver training programs on harvest-time pest concerns in 2018.**

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. Demonstrate performance of scouting and reduced-risk management in commercial grape vineyards. Two demonstration vineyards were established at each of two Berrien County and two Van Buren County grape farms in May of 2018. In Berrien County Vignoles vineyards were used at one farm and Concord were used at the other. In Van Buren County we used Chancellor and Niagara vineyards. For each vineyard pair, one received the grower's "standard" program for insect and disease management (Leverage 360, Sevin, Intrepid, Imidan, Mustang Maxx, Baythroid, Penncozeb, Ridomil, etc.) while the other vineyard received an IPM program that included mostly reduced-risk pesticides (Intrepid Edge, Altacor, Phostrol, Sovran, Orius, etc.) for controlling key insect pests and diseases. Each of the growers has now incorporated reduced risk pesticides into their standard management practices, so some of these types of pesticides with reduced environmental impact were utilized in both programs. To compare the efficacy of the management programs, we scouted each vineyard every week for insect pests (rose chafer, grape leafhopper, potato leafhopper, grape berry moth and Japanese beetle) and diseases (Phomopsis, black rot, powdery mildew, downy mildew, Botrytis, and sour rot) until harvest began in September. During scouting we recorded insects, their damage and any disease

symptoms present on five clusters and five leaves on each of 5 vines on vineyard borders, and the same observations were made on 5 vines in the vineyard interior.

Overall, reduced-risk products consistently performed as well as conventional products. The similar and consistent results that we have recorded through multiple years of this project have helped to decrease the use of broad-spectrum, neurotoxic insecticides in favor of using reduced risk insecticides such as Intrepid and Altacor for grape berry moth (GBM) management. In addition to providing superior control of grape berry moth, these compounds are additional control options that can help manage insecticide resistance. Until the harvest period, grape berry moth was the chief insect pest concern in all of the demonstration vineyards, and during harvest there was a partial fourth generation of this pest. Very low abundance of other important grape insect pests such as leafhoppers and Japanese beetles were found in all vineyards, and numbers were similar between IPM and standard programs.

In 2018 we included additional harvest-time pests such as vinegar flies wasps, bees, ants and lady beetles in our sampling protocols. We used traps to monitor spotted wing *Drosophila* (SWD) and vinegar fly abundance at each of the demonstration farms, and the average SWD capture per week is shown in Figure 1. We caught the first flies on 19 June, which is 4 days earlier than the first capture in 2017. Across a range of crops, the date of the first SWD capture in Michigan continues to occur earlier each year. Thomas Todaro also set up sites for SWD trapping in Northwest Michigan, and he shared this information in the Northwest Michigan Grape Scouting Reports. As in previous years, the vineyards in this study experienced a rapid increase in spotted wing *Drosophila*, vinegar flies, bees, wasps and ants near harvest. We compared SWD and other vinegar fly fruit infestation between IPM and Standard vineyards by collecting and holding ripe clusters in plastic containers. Overall, many more native vinegar flies than SWD emerged from these clusters and emergence was similar between programs. The low number of SWD that emerged from collected clusters is somewhat surprising given the number of SWD that were captured in traps (Figure 1).

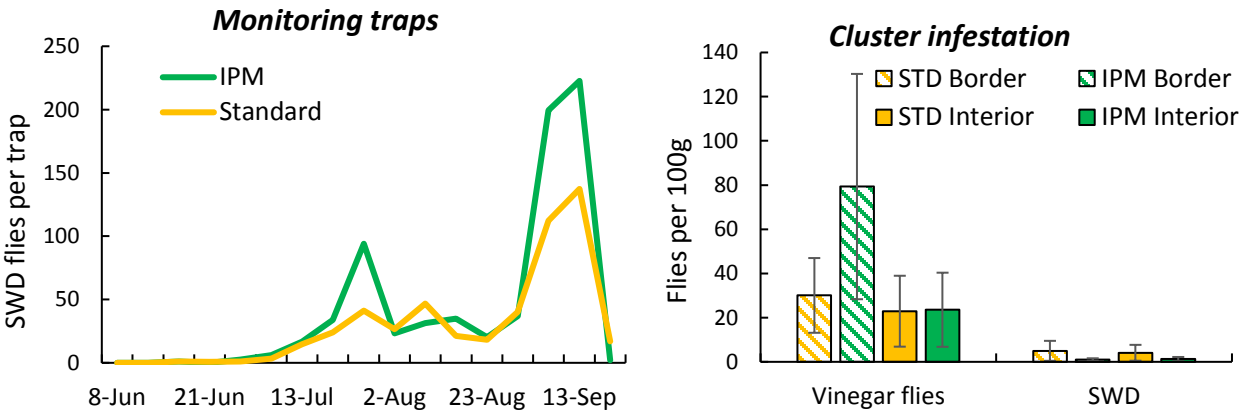

Figure 1. SWD captured in monitoring traps in vineyards managed using the IPM or Standard program (Left). Comparison of vinegar fly infestation between programs at vineyards in southwest Michigan (Right).

The number of brown marmorated stinkbugs (BMSB) in traps increased greatly in the month before harvest in the vineyards we monitored. The abundance of this pest has also increased in vineyards over the last three years. We have not seen evidence of BMSB feeding on grapes during our weekly scouting visits, but the recent expansion of BMSB populations has increased the risk that this invasive insect will cause damage in vineyards, and some winemakers in Berrien County are reporting difficulties with these at harvest time.

The Standard and IPM fungicide programs had similar efficacy against most grapevine diseases in all vineyards for much of 2018. Very wet conditions prevailed during the bloom period in southwest Michigan and lasted into late June and July, which likely slowed the growth of diseases and extended the efficacy of mid-season fungicide applications. However, rainy weather during ripening led to late-season incidence of foliar downy mildew and powdery mildew in all vineyards, and this wet weather also increased Botrytis and sour rot in wine grape clusters.

Phomopsis and black rot lesions were visible on leaves in Chancellor and Vignoles early in the season, but there was little evidence that these diseases colonized clusters, again showing that the IPM and Standard programs both provided equivalent control in these vineyards. The key disease issues in the wine grape vineyards that we scouted were sour rot and Botrytis (Figure 2), and the IPM and Standard programs both provided similar control of these pathogens.

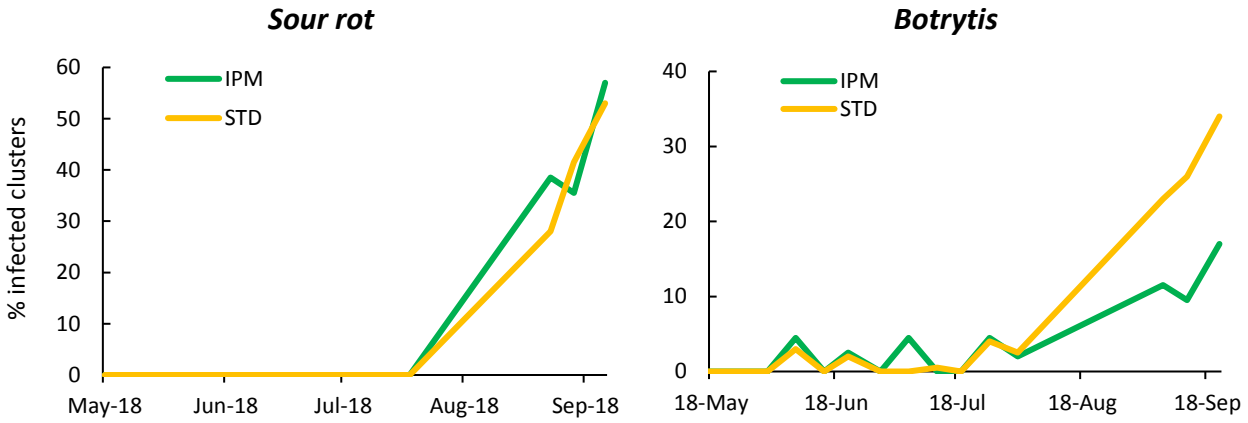

Figure 2. Late-season disease cluster infections in wine grape vineyards receiving either an IPM or Standard program in southwest Michigan in 2018. Sour rot (Left). Botrytis (Right).

The incidence of sour rot was much higher in Vignoles than in Chancellor, whereas there was a higher incidence of Botrytis in Chancellor than in Vignoles. Disease incidence increased rapidly before harvest, and this is likely due to frequent rainfall and resulted in humid nights for much of August and September. Downy mildew leaf lesions increased in these wine grape vineyards, but the infections did not lead to defoliation nor did it move onto the clusters.

Overall lower disease pressure was observed in the juice grape vineyards compared to that in wine grapes. Through most of the season only 1 to 15% of observed clusters had black rot symptoms and incidence was very similar in IPM and Standard vineyards. An increase in black rot infection was observed in clusters before harvest. This suggests that wet conditions that occurred early in the season when clusters were susceptible to black rot adversely affected fungicide applications in these vineyards. Phomopsis was the most common disease affecting leaves early in the year. In the middle of the season dry conditions help slow development of diseases, and few new infections were observed. In August and September, considerable rainfall

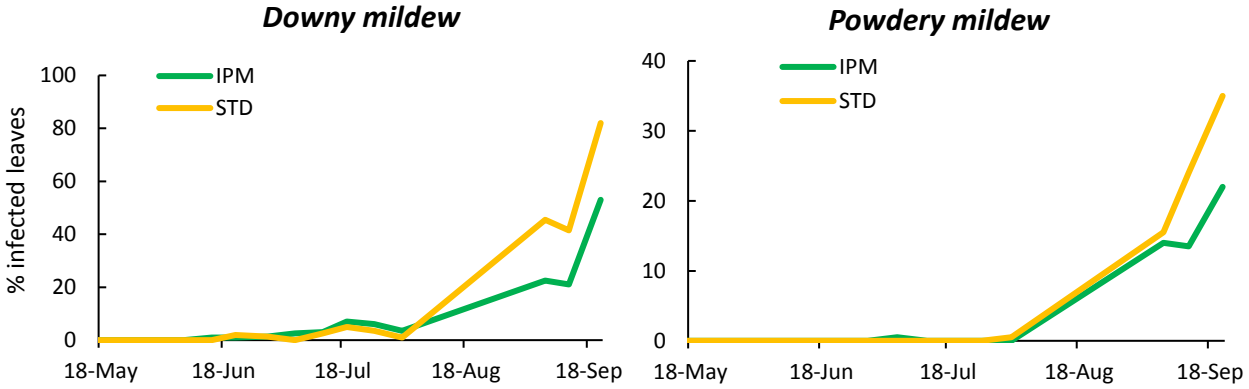

Figure 3. Foliar disease incidence in southwest Michigan grape vineyards receiving either an IPM or Standard program in 2018. Downy mildew infections on leaves (Left). Powdery mildew symptoms on leaves (Right).

in southwest Michigan contributed to a large increase in the incidence of downy and powdery mildew lesions in juice grape vineyards (Figure 3). Despite the appearance of leaf lesions, these diseases were well managed as the infections did not lead to defoliation and the clusters were not affected.

Objective 2. Deliver information on IPM and late season pest control to the Michigan grape industry. The data from weekly scouting in the demonstration vineyards used in Objective 1 were added to the weekly fruit updates that were distributed through MSU Extension Grape News and via the relevant extension educators. These weekly updates provided growers with detailed information on current insect and disease pressure in vineyards in southwest Michigan, and a similar report was written by Thomas Todaro to cover vineyards in the northwest. Growers were able to use this information to determine when and which pesticides to apply, and to know what to scout for in their own vineyards. The reports also featured timely articles on a wide range of topics including disease and insect control and various aspects of viticulture. These fruit updates along with pertinent events and articles with recommendations was sent out to MSUE's Grape & Wine Industry Constant Contact list.

The number of people subscribing to receive the weekly emails has grown from **2,313** in February 2018 to **2,879** in January 2019. Within www.grapes.msu.edu, the pages had over 22,000 page views, with an average of 1 minute 45 seconds on each page.

We also launched a Twitter account during 2018 that currently has 405 followers and continues to grow monthly. The account posted about the MSU grape/wine team's extension or research several times a week and retweeted other postings supportive of the Michigan wine industry.

We added a new feature in 2017, based on the suggestions from the MGWIC staff. Researchers who received funding from the Council recorded 10-12 minute presentations about their research and its applications for growers, and these have been posted online. These are being found and are being watched by people in the grape industry.

2017 videos with stats through January 22, 2019

1. Biology and management of invasive insect pests in Michigan vineyards by Keith Mason (362 pageviews, 150 plays)
2. Developing methods for use of own-rooted Vitis vinifera vines in Michigan vineyards by Tom Zabadal and Jenny Schoonmaker (340 pageviews, 196 plays)
3. Grape IPM Program by Rufus Isaacs (322 pageviews, 91 plays)
4. Impact and spread of grapevine leafroll virus by Annemiek Schilder (356 pageviews, 181 plays)
5. Leaf removal: A tool to improve crop control and fruit quality in vinifera grapes by Paolo Sabbatini (481 pageviews, 274 plays)
6. Strategic modernization of Enviroweather stations serving the Michigan grape and wine industries by Jeff Andresen (131 pageviews, 34 plays)

2018 videos with stats through January 22, 2019

- Biology and Management of Grape Mealybug (192 visits, 107 plays)
  Keith Mason, MSU Department of Entomology
- Control and Management of Sour Rot and Volatile Acidity in Vinifera Grapes Grown in Michigan (162 visits, 71 plays)
  Josh VanderWeide, MSU Department of Horticulture
- Michigan Vineyard IPM Extension Program (170 visits, 53 plays)
  Rufus Isaacs, MSU Department of Entomology
- Water Uses in Wineries (70 visits, 32 plays)
  Liesl Eichler Clark, 5 Lakes Energy

Objective 3. Deliver training programs on harvest-time pest concerns in 2018. Harvest-time pests were the topic of in-season and winter meetings in 2018. Keith Mason presented "Managing Pests of Ripening Grapes" in the grape program at Great Lakes Fruit and Vegetable Expo in December 2017. He also presented "Insect Update: Emphasis on Late Season Pest Control" at MSU SW Horticulture Days in February 2018. Rufus Isaacs presented on wasp trapping and late season pest management at the Northwest Michigan Orchard and Vineyard Show in Acme, Michigan in January 2018 and 2019.

In season meetings where results from this project were discussed included monthly meetings hosted by the Michigan Grape Society on June 21st, July 11th and August 8th.

A spring "Kick-Off" event organized by the Parallel 45 group on May 5th featured Rufus Isaacs presenting on wasp and late season insect management. The "First Friday" vineyard meeting series was continued in 2018. The NWMHRC Annual Open House was held on August 24th and featured talks by Paolo Sabbatini on canopy management, and by Thomas Todaro and Duke Elsner on harvest time insect pest management.

In southwest Michigan, fewer grower meetings were held than usual due to the departure of Brad Baughman from the MSU Extension Berrien County position and the cancellation of the 2018 SWMREC Viticulture Days in late July. However, we were invited to present at the Michigan Grape Society summer meetings which provided a venue for dissemination of information about insect management, and a chance to hear from growers about their IPM issues.

COMMUNICATIONS ACTIVITIES, ACCOMPLISHMENTS, AND IMPACTS

Results from this project have been shared during summer and winter grower meetings, Great Lakes Expo, Southwest Hort Days, and the Northwest Orchard and Vineyard Show. The information from scouting on this project was also presented in the Grape eNews newsletters that were distributed via email through the growing season. More details of these activities are given above in the sections on Objectives 2 and 3.

RESULTS & CONCLUSIONS

Growers have been able to see the performance of new pest management programs at the whole vineyard scale and these commercial sites have provided venues through the growing season for discussion of relevant issues in the plant pathology, entomology, and horticulture. Our ongoing extension program has helped improve vineyard management in Michigan and we have had highly positive feedback from growers on the information we have provided. Feedback from growers at post-harvest meetings indicate the following outcomes: increasing adoption of certain reduced-risk products such as Intrepid, Intrepid Edge, Altacor, Vivando and Prophyt; incorporating tactics like dormant season fungicides into spray programs; increased use of scouting to determine if sprays are necessary and use of the grape berry moth degree model to time sprays.

This project has supported the delivery of relevant and timely information to the grape industry regarding vineyard management. It has also supported the gathering of weekly scouting information used to present timely updates and recommendations in the Grape eNews distributed through MSU Extension. The scouting information has also been taken at vineyards where reduced-risk insect and disease management programs have been used, and this has allowed demonstration of their efficacy under commercial conditions, resulting in improved pest control and reduced dependence on broad-spectrum pesticides. Through the support of this project, we were also able to inform the industry about the increasing incidence of grapevine mealybug and the spread of grapevine leaf roll virus.

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. Our grower cooperators made in-kind contributions of labor, materials and equipment costs to manage their vineyards to the specifications of the IPM and Standard programs. This is estimated to be between $1,500 and $2,500 per acre, and we used approximately 30 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 $2,500 of in-kind contribution.

ACKNOWLEDGEMENTS

Many thanks to the growers, Jeff Lemon, Randy Schmaltz and Ed Oxley for their cooperation with this study, and for providing access to their vineyards. We also thank Rachel Labby, Therese Cosatantini, Alexander Apostle, Nolan Jahn and Zach Yarost for their work scouting vineyards, checking traps and assessing fruit for this project. Bayer CropScience, Corteva Agriscience, FMC and Gowan provided pesticides for use in this project.