

Michigan Grape & Wine Industry Council  
2017 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 2017.**

**PROJECT PERIOD**

This project was conducted during 2017, with fieldwork occurring from May to October.

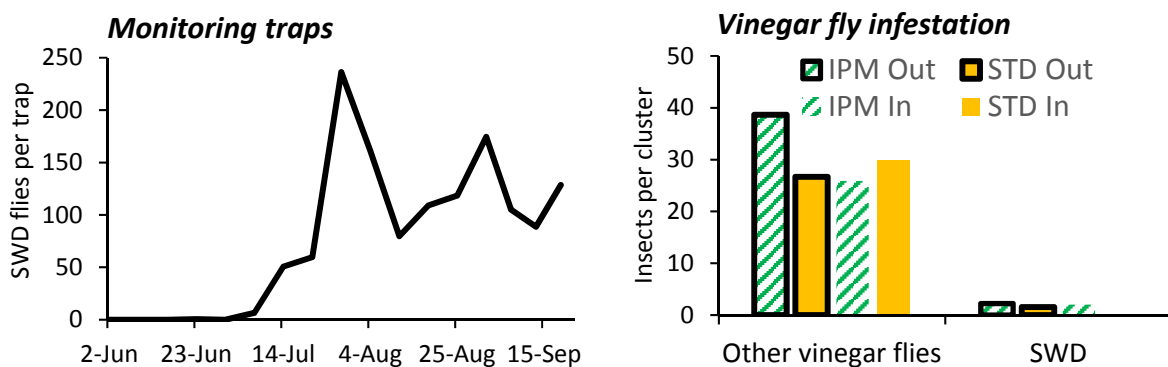
**WORK ACCOMPLISHED DURING THE PERIOD**

**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 2017. 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, Sevin, Intrepid, Imidan, Mustang Maxx, Penncozeb, Ridomil, etc.) while the other vineyard received an IPM program that included mostly reduced-risk pesticides (Intrepid, Venerate, 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 these types of compounds 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.

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 neurotoxic insecticides in favor of using reduced risk insecticides like 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.

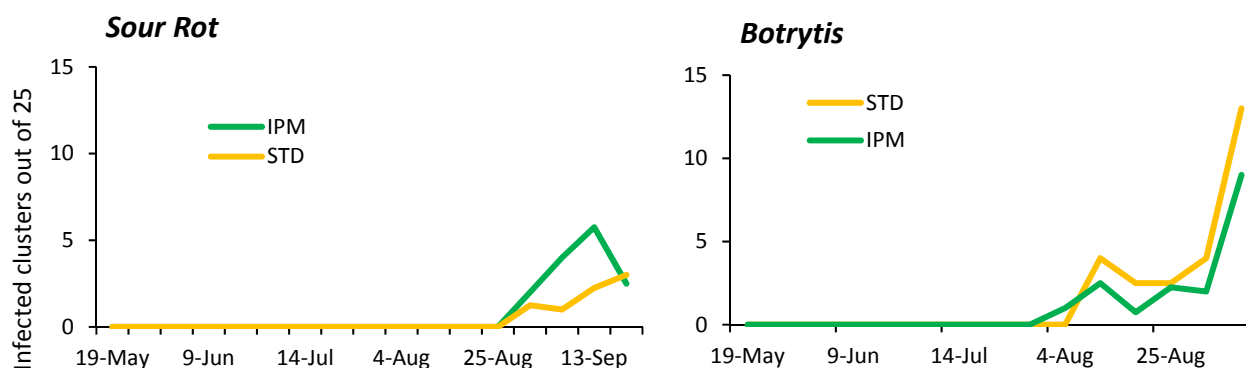
In 2017 we included additional harvest-time pests such as vinegar flies wasps, bees, ants and lady beetles in our sampling protocols. We used traps to monitor spotted wing *Drosophila* (SWD) and vinegar fly abundance at each of the demonstration farms, and the average SWD capture per week is shown in Figure 1. We caught the first flies on 23 June, which is one week earlier than the first capture in 2016. 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 September and October editions of the Northwest Michigan Grape Scouting Reports. As in 2016, 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). 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 may become a pest in grapes.



**Figure 1.** Captures of spotted wing drosophila flies in monitoring traps at our study sites (Left). Comparison of vinegar fly infestation between programs at grape farms in southwest Michigan (Right).

The Standard and IPM fungicide programs both kept diseases at low levels in all vineyards for much of 2017. The extended dry period that occurred in southwest Michigan from June to early August 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 downy mildew in juice grapes, and Botrytis and sour rot in wine grapes.

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 Botrytis and sour rot (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 2017. 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. Powdery mildew was not a problem in any of the vineyards we scouted in 2017.

Overall very little disease pressure was observed in the juice grape vineyards. Through most of the season only 1 to 6% 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 (Figure 3). 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, storm systems brought considerable rainfall to southwest Michigan and a large increase in the incidence of downy mildew lesions were observed 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

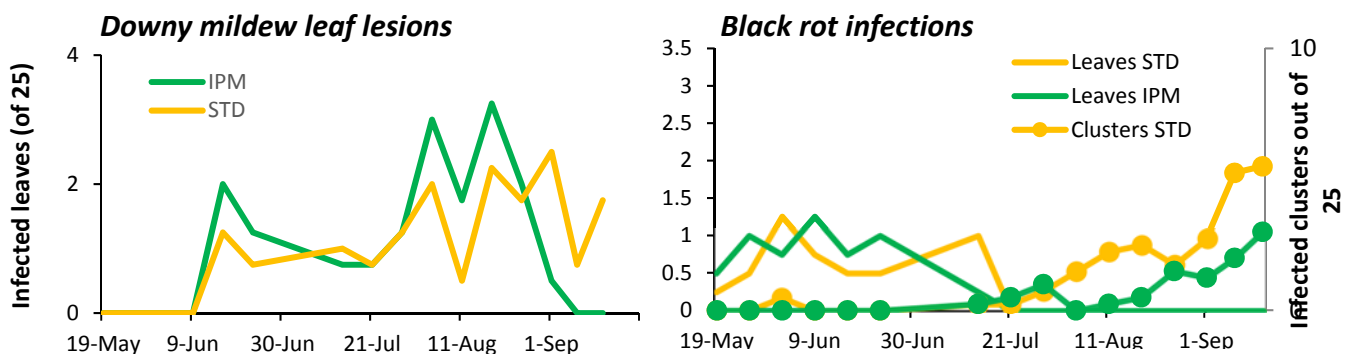
**Objective 2. Deliver information on IPM and cultural controls to the Michigan grape industry.** The data from weekly scouting in the demonstration vineyards used in Objective 1 were compiled into Vineyard IPM Scouting Updates that were distributed through MSU Extension

Grape News. These bi-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 Dr. Duke Elsner and Dr. 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. Twelve issues of the Vineyard IPM Scouting Update were produced from May to September, 2017, and these are now archived on [grapes.msu.edu](http://grapes.msu.edu). The Vineyard IPM Scouting Update 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 **1,875** in November 2016 to **2,313** in February 2018.

Within [www.grapes.msu.edu](http://www.grapes.msu.edu), the navigational pages (e.g., “Viticulture,” “Education,”) had 50,000+ pageviews. During 2017, articles containing the word “grapes” at the MSU Extension website received 42,200+ pageviews of which 37,500+ were unique pageviews. Average time spent was 4 minutes per page. Articles containing the word “vineyard” received 15,400+ pageviews of which 13,900+ were unique pageviews. The following are some of the most frequently viewed grape-related articles during 2017:

1. Hornworm caterpillars: The big cats of the vineyard by Duke Elsner  
[http://msue.anr.msu.edu/news/hornworm\\_caterpillars\\_the\\_big\\_cats\\_of\\_the\\_vineyard](http://msue.anr.msu.edu/news/hornworm_caterpillars_the_big_cats_of_the_vineyard) (7,496)
2. Protecting young grape clusters from powdery and downy mildew by Annemiek Schilder  
[http://msue.anr.msu.edu/news/protecting\\_young\\_grape\\_clusters\\_from\\_powdery\\_and\\_downy\\_mildew](http://msue.anr.msu.edu/news/protecting_young_grape_clusters_from_powdery_and_downy_mildew) (3,136)
3. Late-season fungicide sprays in grapes and potential effects on fermentation by Annemiek Schilder  
[http://msue.anr.msu.edu/news/late\\_season\\_fungicide\\_sprays\\_in\\_grapes\\_and\\_potential\\_effects\\_on\\_fermentation](http://msue.anr.msu.edu/news/late_season_fungicide_sprays_in_grapes_and_potential_effects_on_fermentation) (2,383)
4. Preparing for rose chafer management in vineyards by Rufus Isaacs  
[http://msue.anr.msu.edu/news/preparing\\_for\\_rose\\_chafer\\_management\\_in\\_vineyards](http://msue.anr.msu.edu/news/preparing_for_rose_chafer_management_in_vineyards) (1,023)

Tom Zabadal’s collection of videos on pruning and tying vines remain another outstanding source of traffic for [www.grapes.msu.edu](http://www.grapes.msu.edu). These have now have been viewed over 318,000 times. This is an increase of 41,000 over last year.



**Figure 3.** Disease incidence in juice grape vineyards receiving either an IPM or Standard program. Downy mildew infections on leaves in two juice grape vineyards in southwest Michigan in 2017 (Left). Black rot symptoms on leaves and clusters at the same vineyards (Right).

Researchers who received funding from the Michigan Wine and Grape Industry Council recorded 10-12 minute presentations about their research and its applications for growers. Here is a selection of those videos:

1. Biology and management of invasive insect pests in Michigan vineyards by Keith Mason [http://msue.anr.msu.edu/resources/biology\\_and\\_management\\_of\\_invasive\\_insect\\_pests\\_in\\_michigan\\_vineyards](http://msue.anr.msu.edu/resources/biology_and_management_of_invasive_insect_pests_in_michigan_vineyards) (224 pageviews, 126 plays)
2. Grape IPM Program by Rufus Isaacs [http://msue.anr.msu.edu/resources/grape\\_ipm\\_program](http://msue.anr.msu.edu/resources/grape_ipm_program) (172 pageviews, 69 plays)
3. Impact and spread of grapevine leafroll virus by Annemiek Schilder [http://msue.anr.msu.edu/resources/impact\\_and\\_spread\\_of\\_grapevine\\_leafroll\\_virus](http://msue.anr.msu.edu/resources/impact_and_spread_of_grapevine_leafroll_virus) (205 pageviews, 142 plays)
4. Leaf removal: A tool to improve crop control and fruit quality in vinifera grapes by Paolo Sabbatini [http://msue.anr.msu.edu/resources/wine\\_grape\\_leaf\\_removal](http://msue.anr.msu.edu/resources/wine_grape_leaf_removal) (226 pageviews, 195 plays)

### **Objective 3. Deliver training programs on harvest-time pest concerns in 2017.**

Meetings in 2017 began with the Northwest Michigan Orchard and Vineyard Show where Annemiek Schilder discussed results from the 2016 MI virus survey and other disease management issues, Doug Pfeiffer from VA Tech spoke on SWD in vineyards, and Rufus Isaacs presented on harvest-time insect issues. Harvest-time pests were the topic of in-season and winter meetings in 2017. Rufus Isaacs and Keith Mason demonstrated wasp trapping strategies and discussed late season pests at MSU Viticulture Day at SWMREC on July 26, 2017. Keith Mason presented “Managing Pests of Ripening Grapes” in the grape program at Great Lakes Fruit and Vegetable Expo in December 2017. 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. Keith Mason also presented “Insect Update: Emphasis on Late Season Pest Control” at MSU SW Horticulture Days in February 2018.

A spring “Kick-Off” at Parallel 45 Wines on May 5<sup>th</sup> featured Rufus Isaacs presenting on wasp and late season insect management. The “First Friday” vineyard meeting series was continued in 2017. In June the presentation on “Dealing with Sour Rot in the Vineyard” was given by Wendy McFadden-Smith, PhD., Brock University, Ont., Canada. July’s meeting featured “Foliar Fertilization Programs in the Vineyard” by Craig Cunningham of Cunningham Viticulture Services and a discussion of current vineyard pest management issues. The NWMHRC Annual Open House was held on August 24<sup>th</sup> 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, 4 grower meetings were held in 2017. The Season Kick-off meeting at SWMREC on April 18<sup>th</sup> included presentations on insecticide changes, fungal disease control, and climate change. Brad Baughman organized a series of grape grower and wine maker extension meetings, each followed by a social hour where growers and winemakers could meet and share their experiences and knowledge. The meeting on May 23 held at Fenn Valley Winery in Fennville, MI focused on grape berry moth control and harvest parameters. The meeting on June 21 at Karma Vista Winery in Coloma, MI featured presentations on control of leaf downy and powdery mildew in from bloom to harvest. The meeting on August 16 at Round Barn Winery in Baroda, MI focused on pre-harvest insect pest management.

## **COMMUNICATIONS ACTIVITIES, ACCOMPLISHMENTS, AND IMPACTS**

Results from this project have been shared during summer and winter grower meetings, including the SWMREC Viticulture Days, 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, 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. During 2017 we also organized and delivered multiple workshops covering insect and disease control and horticultural techniques for renovating vineyards that have suffered from low dormant season temperatures.

## **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 Chris Worst, Zach Yarost, Jeremiah Eaton and Nolan Jahn for their work scouting vineyards, checking traps and assessing fruit for this project. Marrone Bioscience, Bayer CropScience, Dow AgroSciences, DuPont Crop Protection and Gowan provided pesticides for use in this project.