

# FINAL PERFORMANCE REPORT

Michigan State University

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## **Final Performance Report**

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**EARLY DETECTION-RAPID RESPONSE PROGRAM FOR SPOTTED WING DROSOPHILA,  
A POTENTIAL NEW PEST OF MICHIGAN SPECIALTY CROPS**

## PROJECT SUMMARY

Spotted Wing Drosophila (SWD), *Drosophila suzukii*, (Fig. 1) is a small insect of East Asian origin that is similar to typical vinegar flies that are most active in fall. In contrast to these late-season nuisance pest of homes and fruit, SWD has significant potential for economic damage to Michigan's strawberry, cherry, blueberry, and grape industries. This is because it can lay eggs in intact fruit using its serrated ovipositor, unlike most vinegar flies that require wounds to access fruit tissues (Kanzawa 1939; Figure 1). Additionally, this species has a very high reproductive potential, completing a generation every 2-3 weeks during the summer. First detected in California in 2008, it has now been found in 26 states in the United States, including Michigan from the work conducted as part of this project.

Recent estimates for annual economic losses to SWD in the three west coast states total \$420 million. At the start of this project, we could not discount the likelihood that SWD would move to Michigan on fresh fruit from infested regions, or that it is already here, as yet undetected. The high economic impact also meant that it was imperative that a group is formed immediately comprised of Michigan research and extension personnel, regulatory agencies, and interested stakeholders to develop and implement an Early Detection-Rapid Response (EDRR) plan for SWD.

This project provided much-needed and timely support of our sampling efforts, to determine where the pest was within the state, to determine the crops it was most abundant in, and to coordinate responses for agricultural stakeholders.

## PROJECT APPROACH

This project supported the formation and activities of the SWD Response Team that has coordinated our monitoring for SWD that led to the initial detection and characterization of this pest's distribution. Over 300 traps were deployed and SWD has now been detected in 22 Michigan counties. This project has also supported development of new fact sheets and a new website for rapid dissemination of information about SWD that has seen very high traffic to the pages on monitoring and management. We have accomplished our main goals to monitor for this pest and determine distribution in the state, as well as to coordinate development and delivery of information to stakeholders. Our activities have also supported Michigan being invited to contribute to a multi-state coordinating committee on SWD and to a multi-state SWD funding proposal to USDA. Our industry stakeholder partners have been extremely supportive of this project, contributing time and ideas to the formation of the Response Team and the focus of our group on priority areas for investigation. In the case of MBG Marketing, the Cherry Committee, and the Michigan State Horticultural Society, their active participation has also been matched by some financial support of our work on this pest.

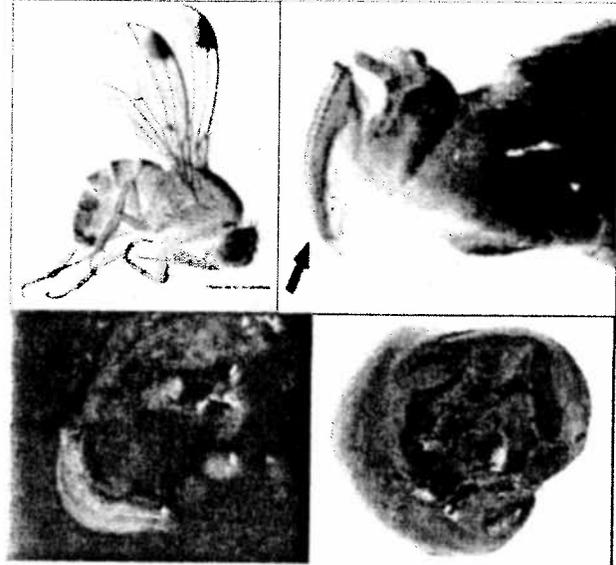


Fig. 1. Clockwise from top left: Male SWD adult fly, serrated ovipositor of adult female SWD, cherry infested with SWD, SWD larva in blueberry.

## GOALS AND OUTCOMES ACHIEVED

### **Objective 1. Surveillance: Deploy SWD monitoring traps in at-risk Michigan fruit crops during 2011 and report results weekly to the SWD Response Team.**

During 2011, over 300 monitoring traps for SWD were deployed across the lower peninsula of Michigan with a particular focus in areas of small fruit and tree fruit production. Traps were placed at strawberry, blueberry, raspberry, blackberry, peach, and cherry plantings, as well as at rest stops and urban gardens, and monitored by MSU research and extension staff. There were also many traps monitored by consultants and independent scouts using the methods presented by our team during extension meetings. During 2011, SWD were trapped at all types of habitats sampled as well as in wild non-managed areas adjacent to crop fields.

The SWD Response Team consists of MSU Extension and research staff, agency staff including those from MDARD, and industry stakeholders (see Objective 3 below). Reporting of monitoring results throughout the season to this group was achieved using a regular email update sent to the list. We also posted the monitoring updates at the SWD website that enabled the fruit industries to keep informed about the progression of this pest's populations and activity in the state.

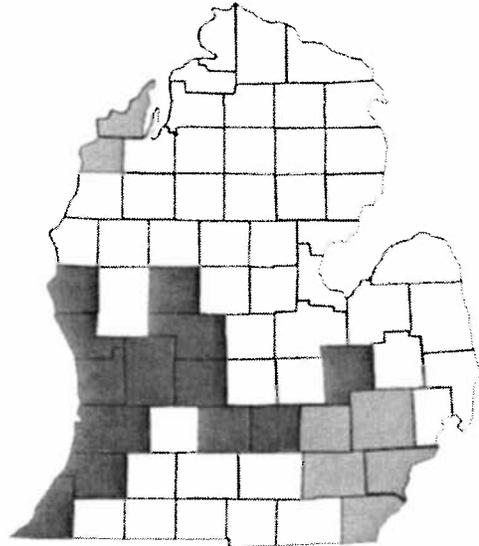


Fig. 1. Counties with positive detections of SWD in 2010 and 2011 (dark purple) and new detections in 2011 (light purple). Catches as of Nov 2011.

### **Objective 2. Education: Develop a standard set of Powerpoint slides, a fact sheet, and a website on SWD with information for Michigan agriculture. Deliver information at winter grower meetings.**

A set of Powerpoint slides was developed to provide Michigan extension educators and researchers with background information on the biology and ecology of this pest, as well as the distribution in Michigan from fall 2011 sampling, and a section on management options. This slide set was distributed to the Response Team, and it was also shared with commodity group leaders. The slides were also used as a basis for SWD Workshops that were held in the spring and fall of 2011 to educate growers, consultants, and scouts on the best response to this pest.

We worked with MSU Extension Communications Office to develop a pair of fact sheets on SWD. An English version (Bulletin E-3140) was developed first, and then a second version was developed in Spanish (Bulletin E-3140SP) to provide information about this new pest for the many Spanish-speaking members of the blueberry industry. Our group also collaborated with the North Central IPM Center to develop a fact sheet for regional distribution based on the MSU Extension publications:

Isaacs, R., Hahn, N., Tritten, B., and Garcia-Salazar, C. (2010) Spotted Wing Drosophila: A new invasive pest of Michigan fruit crops. Bulletin E3140. Michigan State University Extension.

Isaacs, R., Hahn, N., Tritten, B., and Garcia-Salazar, C. (2010) La Drosophila de las alas manchadas: una nueva plaga invasora en las frutales de Michigan. Bulletin E3140SP. Michigan State University Extension.

Isaacs, R., Hahn, N., Tritten, B., and Garcia-Salazar, C. (2011) Regional Pest Alert: Spotted Wing Drosophila, *Drosophila suzukii*. NorthCentral IPM Center, Champaign, Illinois.

In addition to the fact sheet, we have also developed management guides for organic and conventional blueberries, and for raspberry and blackberry growers, and these have been posted at our SWD website.

The SWD website was designed and developed with Joy Landis from the MSU IPM Program, and launched at [www.ipm.msu.edu/htm](http://www.ipm.msu.edu/htm) during spring 2011 to provide a central venue for information

delivery about this new pest. The site contains information on pest biology and management, the fact sheets described above, announcements of educational meetings, plus links to extension educators.

The MSU SWD sites has become the 'go-to' place for information on this pest in the Eastern US, coming second in a Google search only behind the main SWD site at Oregon State University. In the period from August 15 2011 – February 1, 2012, the site received 3,545 pageviews with 2,646 unique pageviews. The average time spent on a page was 2:45 minutes, indicating that people are reading the material. Our most popular pages are the home page and the recommendations page, and the monitoring and factsheet pages are also getting views. Our group has also been actively posting information at the news.msue.msu.edu website, and in the period from Aug 15, 2011 – Feb 1, 2012, these pages had 3,545 pageviews and 2,646 unique pageviews. The most popular articles, in order of most-viewed first, are:

- First capture of spotted wing Drosophila (ave time spent on page 1:55)
- First spotted wing Drosophila trapped in a commercial fruit crop (ave time 2:43)
- Spotted wing Drosophila catches increase – monitor and protect ripening (ave time 3:54)
- Spotted wing Drosophila catches are picking up (ave time 3:55)
- Comparison of fruit sampling methods (ave time 2:14)
- SWD activity is increasing – fall raspberries (ave time 4:03)
- MSU releases SWD management guide (ave time 1:35)
- MSUE SWD workshops (ave time 3:01)

Delivery of information at grower meetings has been an active component of Response Team activity this past season. Project Team members have presented over 30 talks on SWD to Michigan tree fruit and small fruit growers, commodity groups, and workshops. These talks have reached over 800 people, and have been presented by various extension educators and specialists. In April-June 2011, three hands-on training workshops were developed and delivered at the Trevor Nichols Research Complex, providing scouts, consultants, and extension educators with training in trap construction, trap checking, fly identification, and fruit sampling.

### **3. Coordination: Establish the SWD Response Team to coordinate SWD activities and to refine a complete Early Detection-Rapid Response plan.**

During early 2011, the Response Team was expanded to include almost 50 people representing research, extension, grower organization, and agency representatives. This group has met regularly since early 2010, and continues to meet via conference call or in person. The Early Detection-Rapid Response Plan was refined in early 2011 and has been put into effect during the growing season as described in the preceding sections. The next meeting of the Response Team is planned for late March 2012. During that meeting we will plan activities and approaches for sampling during the 2012 growing season.

### **General project accomplishments**

This project has supported the formation and activities of the SWD Response Team. We have accomplished our main 2011 goals to monitor for this pest and determine distribution in the state, as well as to coordinate the development and delivery of information to stakeholders. Our activity in this area has also supported Michigan being invited to contribute to a multi-state coordinating committee on SWD and to a multi-state SWD funding proposal to USDA.

### **BENEFICIARIES**

This project has directly benefited the hundreds of growers farming ~50,000 acres of crops that are susceptible to SWD in Michigan. By being proactive and developing awareness, training, and information for growers, we have prepared the fruit industries for the arrival of this invasive pest. The information delivered will help the fruit industries adapt their IPM programs for SWD. By delivering over 30 talks, preparing and publishing an English and Spanish fact sheet, presenting hands-on workshops, and delivering over 20 timely updates through the 2010 and 2011 seasons, we have raised awareness and knowledge to enable growers to combat SWD to protect the ~\$300 million of crop value that may be affected.

### **LESSONS LEARNED**

This project has demonstrated that SWD is present and broadly distributed in Michigan. This has allowed the SWD Response Team to prepare growers for managing this pest. We have learned that

SWD can be found in many different wild host plants as well as in crop fields. The coordination provided by the Response Team was invaluable for making sure the group was well aware of the status of the pest through the growing season, and this also helped us develop appropriate outreach programs that were very well received. This coordination has led to other collaborations and funding opportunities to bring resources for addressing key issues related to SWD. Our Response Team has also helped guide the release of appropriate information to the media about this sensitive issue.

**CONTACT PERSON**

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## ADDITIONAL INFORMATION

### A. Additional Information

#### Members of the Michigan SWD Response Team

##### **Michigan SWD Response Team**

###### ***Coordinator***

Rufus Isaacs, MSU Entomology (Small Fruit)

###### ***Industry stakeholder members***

Dave Trinko, MBG Marketing

Rolly Groenik, MBG Marketing

Shelly Hartman, Michigan Blueberry Advisory Committee

Bob Carini, Michigan Blueberry Advisory Committee

Dennis Hartman, True Blue Farms

Phil Korson, Cherry Marketing Institute

Allyn Anthony, Michigan Horticulture Society

Terry Holloway, National Grape cooperative

Linda Jones, Michigan Grape and Wine Industry Council

###### ***Research and Extension members***

Ernest Delfosse, MSU Entomology (Department Chair)

Keith Mason, MSU Entomology (Small Fruit)

Steven Van Timmeren, MSU Entomology (Small Fruit)

Craig Roubos, MSU Entomology (Small Fruit)

Katie O'Donnel, MSU Entomology (Small Fruit)

Larry Gut, MSU Entomology (Tree Fruit)

Mark Whalon, MSU Entomology (Tree Fruit)

Peter McGhee, MSU Entomology (Tree Fruit)

Mike Haas, MSU Entomology (Tree Fruit)

Julianna Tuell, MSU Entomology (Tree Fruit)

David Mota-Sanchez, MSU Entomology (toxicology)

Zsofia Szendrei, MSU Entomology (Vegetables)

Matthew Grieshop, MSU Entomology (Organics)

Eric Hanson, MSU Horticulture (Small Fruit)

Greg Lang, MSU Horticulture (Tree Fruit)

Paolo Sabbatini, MSU Horticulture (Grapes)

Larry Olsen, MSU Entomology and IPM Program

Mark Longstroth, MSU Extension (SW Michigan, blueberries)

Diane Brown-Rytlewski, MSU Extension (SW Michigan, grapes)

Bill Shane, MSU Extension (SW Michigan, tree fruit)

Bob Tritten, MSU Extension (SE Michigan)

Amy Irish-Brown, MSU Extension (West Central Tree Fruit)

Nikki Rothwell, MSU Extension (NW Region) and MSU AgBioResearch (NWMHRS)

Erin Lizotte, MSU Extension (NW Michigan, tree fruit)

Duke Elsner, MSU Extension (NW Michigan, grapes)

Amos Ziegler, MSU Entomology and database

Pat Bills, MSU Zoology and database

Joy Landis, MSU Entomology and IPM Program

Paul Jenkins, MSU Entomology and IPM Program

Howard Russell, MSU Diagnostics

Robin Osborne, MSU Communications

###### ***State and federal agency members***

Mike Phillip, Michigan Department of Agriculture and Rural Development

Robin Rosenbaum, Michigan Department of Agriculture and Rural Development

James Zablotny, USDA-APHIS PPQ Division

Seth Dibblee, Region 5 EPA, Chicago

Heather Anhalt, Region 5 EPA, Chicago

David Epstein, Office of Pest Management Programs, Washington, DC

The project-funded website is available online at [www.ipm.msu.edu/SWD.htm](http://www.ipm.msu.edu/SWD.htm)



# Integrated Pest Management Resources



MICHIGAN STATE UNIVERSITY

SWD home

## Welcome to MSU's Spotted Wing Drosophila site

This site contains information and links for growers and homeowners about a new invasive pest in Michigan, the Spotted Wing Drosophila.

### Background

The Spotted Wing Drosophila (SWD) is a vinegar fly of East Asian origin that can cause damage to many fruit crops. This small insect has been in Hawaii since the 1980s, was detected in California in 2008, spread through the West Coast last year, and was detected in Florida, Utah, the Carolinas and Michigan for the first time in 2010. Because the flies are only a few millimeters long and cannot fly very far, natural dispersion between states is unlikely. Human-assisted transportation is a more likely cause of the recent rapid spread.

### What crops are affected?

In other regions, SWD has been reported in most berry crops, grapes, cherries and many other tree fruits, with a preference for softer-fleshed fruit.

### Status in Michigan

In fall 2010, SWD was detected in Michigan for the first time as part of a widespread Early Detection and Rapid Response program. SWD flies were detected in 13 counties in the southern part of the state, and only after fruit harvest. In 2011 there is widespread monitoring underway for this pest in susceptible fruit crops and nearby habitats.



Above, a male Spotted Wing Drosophila fly.

### Quick links to:

- Fact sheets
- **Monitoring**
- Control recommendations by crop
- Educational meetings - schedule
- Recent presentations
- **Contacts** for more information
- Response team info

Funding for the SWD Response Team is provided by Project GREEN and the Michigan Department of Agriculture.



Video about monitoring for spotted wing drosophila.

**Search**

Scout our IPM resources

### Resources for managing pests

- ▶ Christmas trees
- ▶ Field crops
- ▶ Fruit
- ▶ Home and yard
- ▶ Nursery and landscape
- ▶ Turfgrass
- ▶ Vegetable

### Related pest diagnostic/management programs

- ▶ Diagnostic Services
- ▶ Soil/Plant Nutrient Lab
- ▶ Enviro-weather
- ▶ Regional IPM Center
- ▶ Pesticide safety
- ▶ Organic: New Ag Network
- ▶ Invasive species
- ▶ Sustainable ag & food systems

This is one of the fact sheets produced to make stakeholders aware of the pest and its management.

# Spotted Wing Drosophila

## A new invasive pest of Michigan fruit crops

Rufus Isaacs and Noel Hahn, Department of Entomology | MSU Extension Bulletin E-5140  
 Bob Fritten and Carlos Garcia, MSU Extension | New • October 2010

### Introduction

The Spotted Wing Drosophila (SWD) is a small vinegar fly with the potential to damage many fruit crops; it was first detected in Michigan in late September 2010. Unlike most other vinegar flies that require damaged fruit to attack, SWD causes damage when the female flies cut a slit and lay eggs in healthy fruit. This insect is a pest of most berry crops, cherries, grapes and other tree fruits, with a preference for softer-fleshed fruit. Given the propensity for this insect to spread and its potential to infest fruit, it is important to learn about monitoring and management of SWD to minimize the risk of larvae developing in fruit and affecting fruit marketability.

SWD, or *Drosophila suzukii*, was first discovered in the western United States in 2008 and moved quickly through the Pacific Northwest into Canada. In the spring of 2010, SWD was discovered in Florida on strawberries and detected later in the summer in the Carolinas. It has also been detected in Europe. Because the flies are only a few millimeters long and cannot fly very far, human-assisted transportation rather than natural dispersion is the most likely cause of the recent rapid spread.

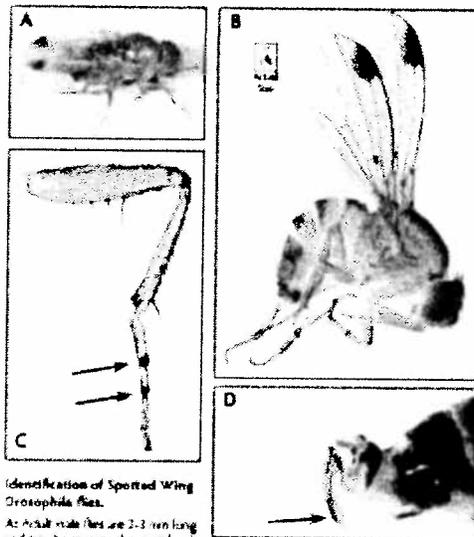
### Damage

Female SWD can cut into intact fruit using their serrated ovipositor to inject eggs under the skin. By being able to insert eggs into intact fruit, the larvae of SWD can be present during opening, leading to a risk of detection in ripe fruit after harvest. During egg-laying, sour rot and fungal diseases can also be introduced, further affecting fruit quality. There is a greater risk of fruit contamination at harvest from SWD compared with native species that lay eggs only in already-damaged and rotting fruit.

The adult SWD lives for about two weeks, and can lay more than 100 eggs in a day. This demonstrates their high potential for fruit infestation and spreading through a field if not controlled. Infested fruit do not show obvious symptoms of infestation at first, with only a small pin-point visible from egg-laying. Within a few days, the fruit flesh will start to break down, leading to discolored regions and eventual collapse of the tissues. At this point, the white larvae can be relatively easy to detect.

### SWD Management

There are three important components to effective SWD management: Monitoring, Identification, and Control.



Identification of Spotted Wing Drosophila flies.

As: Adult male flies are 2-3 mm long and may be seen on the outside of fruit. B: The male SWD has two distinctive dark spots on the wings (females do not have the wing spots). C: Male flies also have two dark bands on the forelegs. D: On the female SWD, the serrated ovipositor is a distinctive morphological feature, longer than other vinegar fly species and with two rows of serrations. Photos by Martin Hahn (A, C, D) and Carlos Arellano (B).

**Monitoring:** The first and most important step is to determine whether SWD are present. This can be done using a simple monitoring trap, consisting of a plastic 32 oz. cup with several 3/16" - 3/8" holes around the sides of the cup, leaving a 3" to 4" section without holes to facilitate pouring out liquid. The holes can be drilled in sturdy containers or burned with a hot wire or wood burner in the thinner plastic cups. Pour 1" to 2" of pure apple cider vinegar into the trap as bait. To help attract flies and ensure that trapped flies do not escape, a small yellow sticky trap is placed inside the trap. Traps are hung in the shade in the fruit area using a stake or a wire attached to the sides of the trap, and fastened to a branch or trellis.