

Spotted Wing Drosophila

A new invasive pest of Michigan fruit crops

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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.

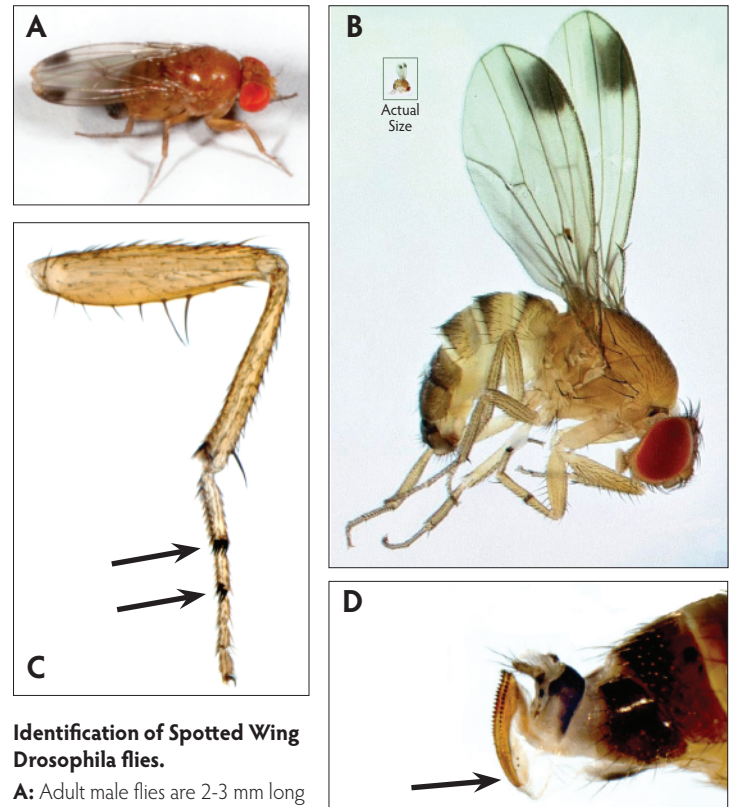
Damage

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 ripening, 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-prick 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. By this point, the white larvae can be relatively easy to detect.

SWD Management

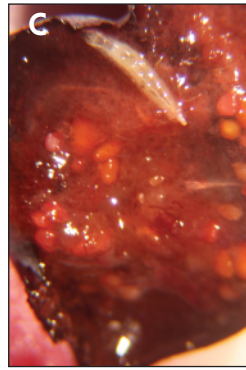
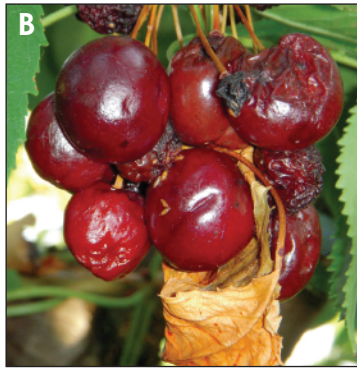
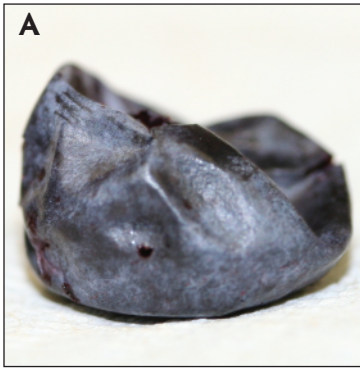
There are three important components to effective SWD management: Monitoring, Identification, and Control.



Identification of Spotted Wing Drosophila flies.

A: Adult male flies are 2-3 mm long and may be seen on the outside of fruit. **B:** The male SWD has two distinctive dots 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 serration. Photos by Martin Hauser (A, C, D) and Gorak Arakelian (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 zone using a stake or a wire attached to the sides of the trap, and fastened to a branch or trellis



Fruit infestation symptoms: **A:** Collapsed blueberry one week after infestation. **B:** Diseased cherry tissue associated with SWD infestation. **C:** SWD larvae are white and visible against the darker fruit. Photos by Vaughn Walton (A), Peter Shearer (B) and Tracy Hueppelsheuser (C).

wire. Check traps at least weekly for SWD flies, and change the vinegar. Pour the old vinegar into a bottle or away from the trap location, and place traps back near the crop with fresh vinegar. Continue monitoring through harvest and post-harvest.

Identification: Some native species of vinegar flies and other insects will be attracted to the traps. These need to be distinguished from SWD flies. Vinegar flies are small (2 - 3 mm) with rounded abdomens. Examine the wings of trapped vinegar flies using a hand lens. Some small native flies have dark patches on the wings, but will not have the distinctive dark dot that is present on both wings of SWD males. Female SWD are harder to identify, but this can be done by using a hand lens to examine the ovipositor (see photo on previous page). Keep a clear record of the number of SWD detected at each check. Given the importance of early detection, it is imperative that possible detections in new areas are clearly identified by sending them to the address below. If SWD are found in traps, start management activities immediately.



Monitoring trap for SWD. A plastic container with holes, containing apple cider vinegar as a bait, and a sticky trap to catch flies. Photo: Rufus Isaacs.

Control: There are some important cultural controls that growers can adopt to minimize the buildup of populations. These include removing overripe fruit, wild host plants such as wild grape, raspberry, blackberry, etc. from nearby fields, and ensuring timely crop harvest. If SWD are detected in fruit farms, active management programs should be implemented immediately, including the cultural controls described above, coupled with monitoring and control of adult flies using insecticides with knock-down activity (see below). Additional monitoring should be done to determine the approximate distribution of SWD across various fields.

Michigan fruit growers already use IPM programs to manage fruit flies (blueberry maggot, cherry fruit fly, and apple maggot) during the summer months, and these programs will provide some

protection against SWD. However, these fruit flies have only one generation a year, and a week between emergence and egg-laying. SWD lays eggs soon after emergence and will complete multiple generations under Michigan conditions. For these reasons, spray intervals should be tightened if SWD is detected to prevent infestation before harvest.

A number of registered insecticides have shown high activity on SWD in recent trials conducted in western states. These include organophosphate and synthetic pyrethroid insecticides, with lower activity and residual control from

spinosyn and organic pyrethrum class insecticides. Many of these trials have been in laboratory trials or field trials with different conditions than the humid Midwest. Selection of insecticides for SWD control should take into account the other pests present, harvest date, re-entry restrictions, as well as potential impacts on existing IPM programs, beneficial insects, and the environment. Refer to MSU Fruit CAT Alerts and Extension publication E-154 for the latest insecticide recommendations, and follow IPM newsletters for timely updates during the season. Remember to follow the label restrictions and rotate chemical classes to avoid resistance development. If this pest is present, the level of control will depend on the size of the SWD population, timeliness of application, coverage of fruit, and product effectiveness.

Follow Future Developments

There is active research and monitoring underway to minimize the impact of SWD on fruit production. As new information is available, it will be posted online at www.ipm.msu.edu/SWD.htm and will be distributed to fruit growers via MSU Extension programs.

Flies suspected of being SWD can be placed in a plastic zippered bag or small vial and sent for identification to:

Howard Russell, SWD Monitoring Program
Diagnostic Services
101 CIPS, MSU, East Lansing, MI 48824.

Include location/date collected and your contact information.

This fact sheet was produced with support from Project GREEN and the Michigan Agricultural Experiment Station. For more information, check the Michigan State University SWD Page online at www.ipm.msu.edu/SWD.htm or at the Oregon State University SWD website at swd.hort.oregonstate.edu

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