

Detecting Spotted Wing Drosophila (SWD) Larval Infestations in Fruit

with Notes on Insecticidal Options

Monitoring is Your First Step

The most important step in managing SWD is to determine whether they are present in your fields, and when adult SWD may become active.



Female Spotted Wing Drosophila

Photo by Tim Baker, MU Extension

The Spotted Wing Drosophila (SWD), *Drosophila suzukii*, is a serious new invasive pest. It attacks small fruit crops, some stone fruits (cherry, nectarine, peach), high tunnel tomatoes and wild hosts (including pokeweed, autumn olive, crabapple, nightshade, Amur honeysuckle and wild grape).

Raspberries, blackberries, blueberries and grapes are at the greatest risk. SWD flies look similar to the small vinegar flies that are typically found around or on fermenting fruits and vegetables. However, unlike native vinegar flies, the SWD females have a serrated egg-laying device

(ovipositor) to cut a slit into the skin of intact fruit to lay their eggs. This makes the SWD a more significant pest. An identification and monitoring fact sheet, FS-18-A-2013, has been developed by the Lincoln University Cooperative Extension (LUCE) Integrated Pest Management (IPM) program. It is available at: <http://www.lincolnu.edu/web/programs-and-projects/ipm>.

This guide sheet discusses how to detect larval infestations and how to manage the SWD based on the key IPM components listed below.

An SWD control program starts with monitoring. If the SWD is detected, chemical control is needed to keep fruit marketable. For commercial growers, some chemicals already used in your IPM program for similar pests should effectively control the SWD.



Blackberry fruit with SWD larvae on the surface. The brown, sunken areas of the fruit are caused by SWD larvae feeding, and secondary fungal and bacterial infections.



Cooperative Extension

by

Dr. Jaime C. Piñero, State Extension Specialist—Integrated Pest Management
900 Chestnut Street, Allen Hall
Jefferson City, MO 65101
(573) 681-5543
PineroJ@LincolnU.edu

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1. Monitor fields with traps, and check them regularly.
2. Check trapped flies to reveal the presence and number of the SWD.
3. If the SWD is found and fruit are ripening or ripe, apply effective insecticides registered for that crop to protect the fruit until harvest is done.
4. Continue monitoring to evaluate your management program. Now, check traps twice per week, and respond quickly if needed.
5. Use cultural controls where possible to reduce SWD food resources.
6. Stay informed. These guidelines are subject to change based upon new information.

Detecting Larval Infestations in Fruit

The following recommendations are largely based on guidelines provided by Michigan State University (MSU) and Oregon State University (OSU).

A first sign of SWD infestation in raspberries might be red patches left on the container as berries are picked. The fruit of raspberries and blackberries might also begin to collapse in areas where the larvae are feeding inside. Opening the berries might reveal the larvae within the fruit, but it is time consuming to check each berry. Fruit can be selected in two ways: either collect fruit at random or collect only fruit suspected to be infested (i.e., based on the presence of oviposition scars and/or soft spots on the fruit).

Two methods of SWD Detection

(1) Sugar-water method: Place fruit in a plastic Ziploc® bag; crush lightly to break the skin. Then add a sugar-water mixture (one-fourth cup sugar to four cups water). The SWD larvae will float in the liquid, and the fruit will sink. Detection of small

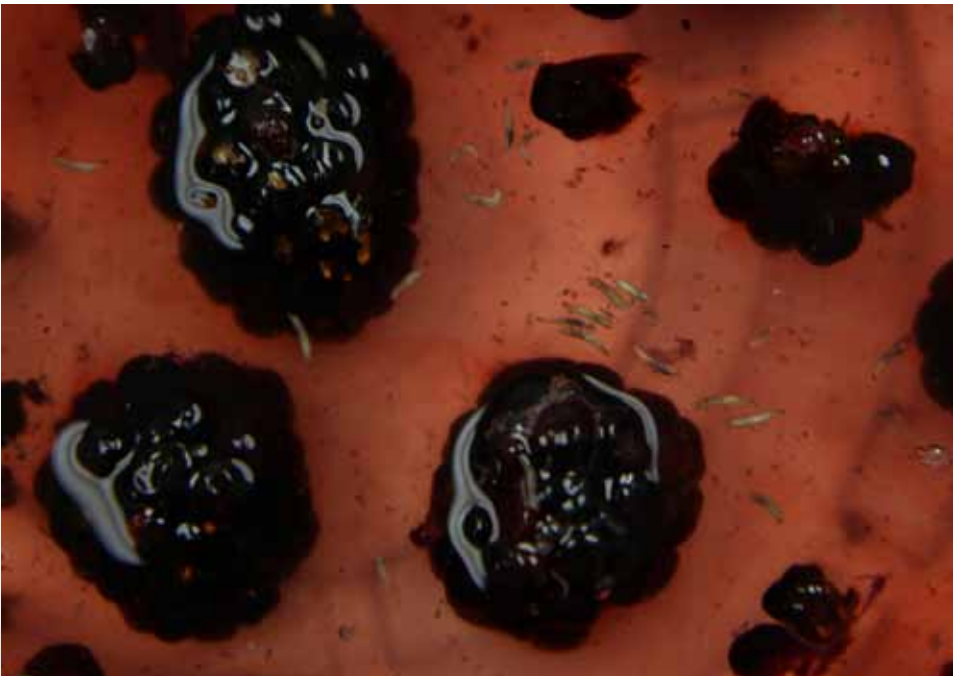
larvae might require the use of a hand lens. This works well with a light behind the bag to create backlighting.

(2) Salt-water method: A salt solution will irritate the larvae, causing them to wiggle out of the fruit. To prepare a salt-water solution, dissolve one-fourth cup plain salt in four cups warm water. Place fruit in a shallow white pan; cover with salt solution. Observe the fruit closely for at least 10-15 minutes to see larvae exiting the fruit from the egg-laying holes. Detection of small larvae might require the use of a hand lens and good lighting. This simple fruit sampling evaluates the effectiveness of pest control actions. It also helps to minimize the amount of SWD-infested fruit that would otherwise be marketed.

Insecticidal Control

Because this pest is so new to Missouri, there has been no research on insecticidal treatments to manage the SWD. Recommendations are based on findings from other states. Before you spray, confirm that you have the SWD in your area by hanging out traps or checking fruit. Sprays must be timed to kill adults before they lay eggs; sprays will not control larvae already in the fruit. Always read product labels to make sure pesticides are registered for use on the fruit or berry you are treating.

If monitoring indicates a need to spray, the application should be made about two to three weeks before berry harvest. Depending on the residual effectiveness of the insecticide, a second application might be needed five to 10 days later. In the case of indeterminate fruiting berries



Salt water irritates the larvae and causes them to wiggle out of the fruit.

Use of effective insecticides that are well timed and have good coverage can keep the SWD controlled through harvest. However, given the potential for rapid population increase by the SWD, especially during fall red raspberry season, active management through monitoring of flies and fruit infestation is critical.

Always follow the specific label restrictions for raspberry/blackberry crops. The level of control achieved will depend on the SWD population, timeliness of application, coverage of fruit and product effectiveness.

effective chemicals are organophosphates, pyrethroid and spinosyn (a large group of compounds produced from the fermentation of two species of soil-inhabiting rod-shaped bacteria) classes of insecticides. Under field conditions, insecticides with fast knockdown activity have performed well at protecting fruit and berries from the SWD. These include malathion, which is an organophosphate insecticide; the pyrethroids Danitol®, Mustang Max™ and Brigade®; and the spinosyns, Delegate® (spinetoram, a mixture of chemically modified spinosins) and Entrust® (organic). Delegate® 25WG and Radiant® SC are reduced-risk, broad-spectrum insecticides that have been labeled for control of the SWD in various crops in all states. Both products maintain most populations of beneficial insects. They also do not

flare mites and have short re-entry (four hours) and pre-harvest (e.g., one day for Radiant® on strawberries) intervals. Based on information from MSU, neonicotinoids, such as Provado® and Actara®, are considered weakly active on SWD flies; they are not recommended for control.

For commercial small fruit farmers – organic method: In bioassays conducted by MSU with Azera® and Pyganic®, these options performed less effectively than Entrust®. However, pyrethrum class insecticides can still be a valuable tool for organic growers because the Entrust® label requires rotation to another product for resistance management. Pyganic® or Azera® can very well fit that need. Entrust® is the only organic product with residual activ-

(those that continue to produce fruit), such as raspberries or strawberries, sprays might need to be repeated to keep populations low during summer and fall. You can use monitoring traps to help you decide if and when extra spraying might be needed. Be sure to wait the interval specified on the pesticide label before harvesting fruit. Thus far, an economic threshold for SWD has not been developed. MSU recommends a conservative approach: fly capture on your farm triggers protection of fields if berries are at a susceptible stage.

For commercial small fruit farmers – conventional method: A number of registered insecticides have been very effective against the SWD in laboratory trials, including some recent trials done at MSU. The most

How to make a monitoring trap for SWD



ity (five- to seven-day control). While it does not appear to provide residual control, Pyganic® applied at five-day intervals at the high labeled rate has shown to reduce the SWD populations in California. Organic growers in the Pacific Northwest have used two to three applications of Entrust® (spinosad) effectively to protect fruit in the pre-harvest period alternately with Pyganic® (pyrethrum). This extends the period of control and also reduces the chance of developing resistance.

For homeowners: The insecticide spinosad (e.g., Monterey Garden Insect Spray) is effective and has the least negative environmental effects of currently available products. Some spinosad products are sold to be applied with a hose-end sprayer, but a compressed-air sprayer will give more reliable coverage. Ferti-lome® Borer, Bagworm, Tent Caterpillar & Leafminer Spray (spinosad 0.5%) and Green Light® (spinosad 0.5%) are also labeled for use in bushberries and caneberries against

fruit flies. The organophosphate insecticide malathion is widely available and will also control the SWD. However, malathion is very toxic to bees and natural enemies of other pests in the garden; care must be taken to keep the application on the target plant and avoid drift and runoff. Improper application also can result in injury to cherry trees. Because of the potential negative impact of malathion in the garden, use it only where you are certain you will have an SWD infestation; this is either because you had a problem last year or after you have trapped and positively identified insects this season as the SWD.

Please refer to the LUCE IPM guide sheet GS-18-D-2013 “Management of Spotted Wing Drosophila with Emphasis on High Tunnel-grown, Fall-bearing Primocane Raspberries” and to the “2014 Midwest Small Fruit and Grape Spray Guide” available for free at <https://ag.purdue.edu/hla/Hort/Documents/ID-169.pdf> ■



SWD on raspberry fruit.

Photo by Tim Baker, MU Extension

Important Notes About Pesticides

- Registrations and recommendations change, so keep informed through SWD websites and your local Extension educator.
- For all pesticides, consider re-entry intervals (REIs), pre-harvest intervals (PHIs), surface water and buffers, and safety to pollinators and other beneficial arthropods (insects/spiders) when selecting a product.
- Remember to rotate classes of insecticides to delay possible development of insecticide resistance.
- To address pollinator safety, make early morning or late evening applications of all products.
- As with all uses of insecticide to control pest insects, the label is the legal document that provides the official guidance on the appropriate use pattern.
- Refer to the label and any supplemental labels for the full restrictions on use in your crop. A good place to locate all the most up-to-date information is through the CDMS website: <http://www.cdms.net/labelsmsds/LMDefault.aspx>. If new supplemental labels are developed allowing expanded uses for SWD control, those will be posted at this site. ■

No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.

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