

Managing Spotted Wing *Drosophila* in Florida Blueberries

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Spotted wing drosophila (SWD), *Drosophila suzukii*, is an invasive pest introduced to Florida in 2009. It is common in all of Florida's fruit-producing counties, and is active year-round, with peak activity from April to May when the blueberry harvest is highest. Although this is a significant pest of blueberries in Florida, it can be successfully managed with good cultural practices, proper monitoring, and appropriate pesticide applications.

SWD adult females lay their eggs primarily in ripe fruit, and the larvae hatch and eat the fruit from the inside, causing the fruit to collapse. Punctured holes in the fruit caused by egg-laying females can lead to secondary infections by fungal and/or bacterial pathogens, either in the field or post-harvest. The presence of SWD larvae and the resulting damage is unacceptable for the fresh berry market. Visible larvae or damage on the fruit will often cause entire loads to be rejected by packing houses or distributors.

The low tolerance for SWD in fruit requires appropriate management tactics to protect Florida blueberry crops. Integrated pest management (IPM) techniques should be used to manage SWD, including identification and monitoring, good cultural practices, and the application of appropriate labeled pesticides.

Identification

SWD are small (1/8 inch or 3–4 mm), with a yellowish-brown body, black stripes across the abdomen, and prominent red eyes. The male SWD can be recognized by a single, dark spot on the front margin of its wings that is lacking in most other *Drosophila* flies. (Fig. 1a). The female SWD lacks the dark wing spots, and has a large, serrated ovipositor (egg-laying organ) that is used to cut into ripe fruit to lay eggs just inside the fruit skin (Figure 1b). A single adult female can produce 300-600 eggs during its lifetime. SWD eggs produce white cylindrical larvae with black mouthparts (maggots) (Fig. 2b) that feed on soft fruit tissues before harvest, causing the fruit to degrade. The eggs also have attached breathing tubes that extend through the berry skin (Fig. 2a). Each generation can take as little as 8-10 days from egg to adult at warmer temperatures, and there can be multiple overlapping generations present during the blueberry harvest window.



Figure 1a. Male and female spotted wing drosophila. Credit: Arden R. Lambert and Lyle Buss, Entomology and Nematology Department, University of Florida, Gainesville, FL.



Figure 1b. Spotted wing drosophila female ovipositor. Credit: Arden R. Lambert and Lyle Buss, Entomology and Nematology Department, University of Florida, Gainesville, FL.



Figure 2a. Spotted wing drosophila eggs deposited under the skin of a blueberry fruit. Breathing tubes can be seen protruding from the blueberry surface. Credit: Lyle Buss, Department of Entomology and Nematology, University of Florida, Gainesville, FL.



Figure 2b. Spotted wing drosophila larva on blueberry fruit. Credit: Lyle Buss, Entomology and Nematology Department, University of Florida, Gainesville, FL.

Monitoring

The presence of SWD on a farm can be determined by observing adult flies captured in strategically placed traps. Monitoring should begin during the early stages of fruit development and continue through the end of harvest. Traps can be hung throughout the field (in the center of the bushes, in the shade, and away from morning sun) and along the field border. The traps should be checked at least weekly.

SWD traps are commercially available from different suppliers. Two of the most commonly used traps with lures are the Scentry (<http://scentry.com/monitoring-products/>) and Trece (<https://www.trece.com/field-notes/spotted-wing-drosophila/>) traps. Both have lures that are intended to mimic the SWD's food source. Both Scentry and Trece have a wet trap used for monitoring SWD. In addition, Trece has a red sticky card, which may catch SWD flies earlier in the season than the wet traps. One study has shown that the red sticky trap using the Trece lure was more effective at trapping the initial emergence of SWD (i.e., it trapped SWD earlier than the other traps included in that study). The same study showed that the Scentry wet trap captured more SWD overall, while also capturing many beneficial insects.

Monitoring for larvae in harvested fruit can be done by placing a sample of at least 15 berries in a strong salt solution (one cup of salt to one gallon of water). If any larvae are present, they will begin to emerge after around 30 minutes. A sugar solution or boiling can also be used.

If any adults or larvae are found by these monitoring methods, management actions should be taken immediately.

Cultural Practices

Good cultural practices are an important part of SWD management. These include:

Pruning – since SWD adults are sensitive to high temperatures and dry conditions, pruning to open the plant canopy can make the canopy less hospitable to SWD, and will help improve pesticide spray coverage.

Weed mat – SWD can pupate in the beds beneath blueberry plants. The use of weed mats on plant beds can be a barrier that prevents SWD from entering the soil, and completing its life cycle as adults. Also, tilling in the row middles can help reduce populations.

Harvest intervals and sanitation –using short harvest intervals (every 4-5 days when possible) and properly disposing of overripe or damaged fruit.

Alternate SWD hosts – removing alternate SWD hosts (e.g., wild blackberry, wild *Vaccinium* species, honeysuckle, pokeweed, beautyberry, nightshade, wild grapes, holly, etc.) from areas adjacent to production fields can help minimize SWD.

Postharvest cooling – fruit should be cooled to 35°F as soon after harvest as possible to maintain fruit quality and minimize the development of any SWD eggs and larvae inside the berries.

Biological Control

A larval parasitoid wasp of SWD, *Ganaspis kimorum*, is being evaluated for the biological control of SWD. It was approved in January 2022 for release in Florida and has been released in several natural areas adjacent to blueberry farms, with the long-term goal of controlling SWD in adjacent overwintering sites. Information on release protocols is still being developed.

Pesticides

Applications of registered insecticides should be made when SWD is detected. To date, no economic thresholds have been established for SWD. Some blueberry growers make preventive applications of insecticides, especially if SWD are detected in traps adjacent to production areas or have been present in previous years. Table 1 lists registered insecticides for use against SWD. These insecticides target adult flies; there are no insecticides available for egg or larval control inside fruit. Spray applications should be made in the early morning or late evening when SWD adults are most active, and good spray coverage is essential. If flies are absent, as indicated by a rigorous monitoring program, SWD pesticide sprays may be reduced. A rotation program using insecticides with different modes of action should be used to minimize the development of resistance. All label instructions for insecticides must be followed. If you are exporting fruit, carefully check the maximum residue limits for the importing jurisdiction.

Table 1. Suggested insecticides for managing SWD in highbush blueberries

Product Name	Active Ingredient
Mustang [®] Maxx	zeta-cypermethrin
Delegate [®]	spinetoram
Exirel [®]	cyantraniliprole
Malathion	malathion
Danitol [®]	fenpropathrin
Brigade [®]	bifenthrin
Imidan [®]	phosmet
Entrust [®]	spinosad
Assail [®]	acetamiprid
Apta [®]	tolfenpyrad

See the 2024 Blueberry Integrated Pest Management Guide (<https://edis.ifas.ufl.edu/publication/HS380>) for additional information.

Organic growers are at a higher risk of SWD infestation due to the limited number of chemical tools available for its control. Suggested organic insecticides include Entrust[®], Pyganic[®], Grandevo[®], Venerate[®], and Azera[®]. Always check with your organic certifier before applying any pesticides.