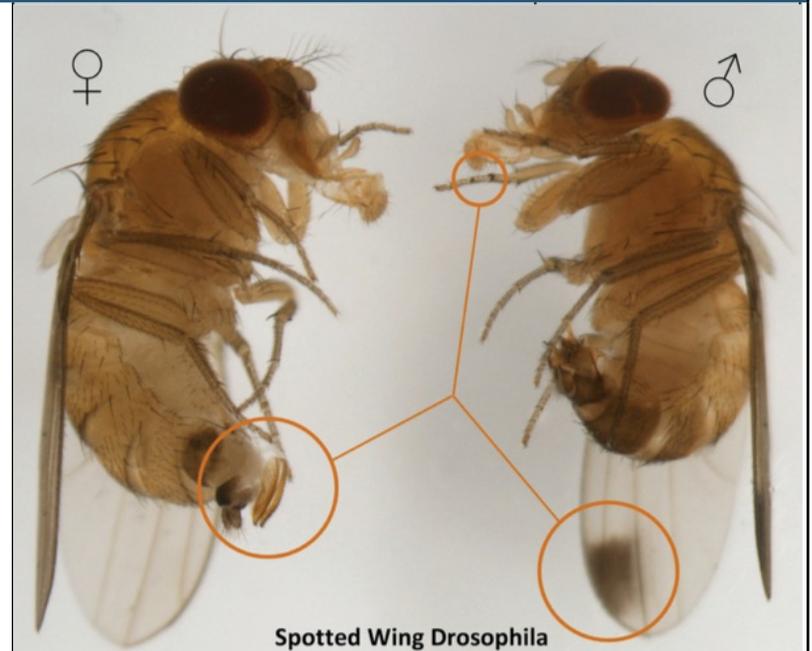


## SPOTTED WING DROSOPHILA (SWD) *Drosophila suzukii*

### Know your Pest

Spotted wing drosophila (SWD) is an insect pest of small stone fruit and berry crops. SWD is native to Asia and was first detected in the mainland United States in California in 2008.

SWD has now been found throughout the U.S. causing a crop loss of \$718 million annually.



### What do the adults look like?

Adult flies are smaller than 4mm, light brown in color with red eyes.

Male SWD have a dark spot on the leading edge of the wing, unbroken bands across the top of the abdomen, and two dark combs on each front leg pointing toward the tip of the leg. The wing spots are an easy to detect characteristic, though these markings are not always present on newly emerged males.

While harder to identify, females have a pronounced serrated ovipositor. This allows female SWD to use the saw-like organ to cut the skin of intact ripe or ripening fruit and deposit eggs inside the fruit.

# SPOTTED WING DROSOPHILA (SWD)

*Drosophila suzukii*

## Where do SWD lay their eggs?

They prefer underripe, developing soft-skinned fruit for laying eggs, including: raspberries, blackberries, blueberries, cherries, strawberries, and dozens of wild fruits found throughout the country. Most small-fruit crops become susceptible to SWD as they begin to turn color.

## What do the larvae look like?

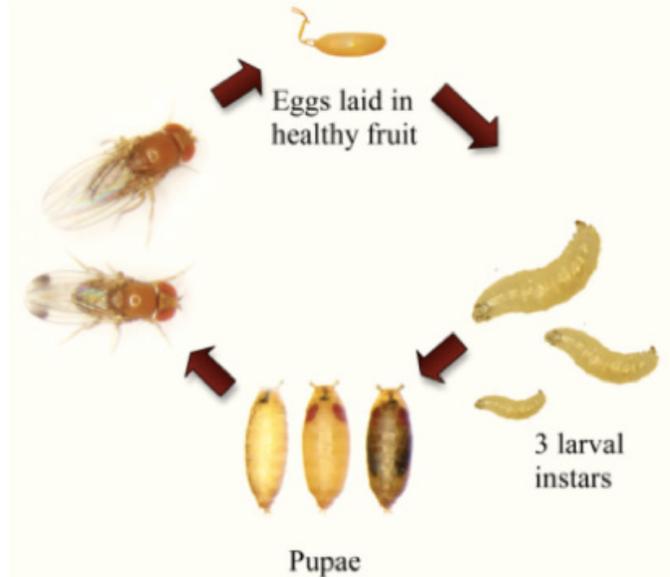
Larvae are 2-3mm in size and multiple larvae can be found feeding inside a single fruit. SWD pupae are brown and have a pair of distinct breathing horns on the rear end. SWD may pupate inside, on, or near fruit, or they may exit fruit and pupate in soil. Larvae feed inside the berries and develop through three larval stages within the fruit, causing the fruit to degrade. SWD injury can increase the risk of damage by other pests and fungal infections. Larger larvae are visible to the naked eye, and if they are detected in the fruit, distributors may reject the contaminated loads of fruit.

Development of SWD within fruit will occur between 43 and 89 degrees F, with optimum development at 84 degrees.

## Know your Pest

## What is its life cycle?

SWD lay their eggs inside the fruit, which then develop into first, second, and third larval instar phases before pupation. Pupae can develop partially or completely outside of the fruit before emerging as adults. A complete life cycle can occur in as little as 10 days. Females can lay over 300 eggs during the growing season, completing up to 13 generations in a single field season.



# SPOTTED WING DROSOPHILA (SWD)

*Drosophila suzukii*

## What factors influence its abundance? When does it emerge?

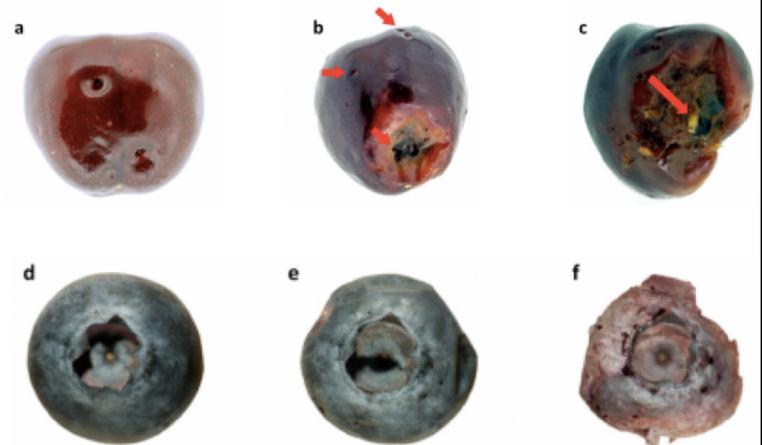
Adult SWD prefer relatively cool and humid environments. They are most active at dawn and dusk with temperatures ranging between 59 and 70 degrees F. In regions with mild winter climates, adults can be captured in traps year-round and can infest host fruit whenever they become ripe. Southern areas that experience midsummer highs above 90° F can expect SWD presence to fall during that time. In regions with harsher winters, SWD adults typically become active in mid-June to early July when temperatures are more suitable for population development. Where winter temperatures are consistently below freezing will not typically support SWD, though occasional winter morphs (late-season SWD thought to be more cold-tolerant).

## Know your Pest

SWD infestation development within cherry and blueberry:

- (a) Initial oviposition
- (b) Larval development
- (c) Pupation partially visible on fruit
- (d) Intact fruit
- (e) Partially sunken fruit indicating larval development
- (f) Degraded fruit

*Red arrows indicate the location where SWD eggs were laid.*



*Photo credit:*

*M. Hauser, California Department of Agriculture and A. Sial, University of Georgia*

## KEY STRATEGIES FOR ECOLOGICAL PEST MANAGEMENT

### Know when SWD is present.

#### Set up SWD traps.

A trap consists of a perforated container, a lure to attract SWD, and soapy water that SWD will eventually drown in. Traps and Lure recipes are available online or for sale. Check your traps weekly.

#### Sample Fruit for Larvae.

Pick 15-25 ripe fruit. Lightly squeeze each fruit. Mix fruit with a salt solution - 1 Cup salt in 1 gallon water) in a bag. Wait 30 minutes. Look for small white larvae floating on the top. Repeat from multiple locations in your field, especially near the field edge.

### Put time and space to your benefit.

#### Create a barrier.

A physical barrier such as exclusion netting or row cover tunnels can prevent flies from reaching the fruit. A mesh size of less than 1mm can provide 100% protection against SWD when applied adequately.

#### Time your planting to give your crop the upper hand.

Earlier fruiting cultivars of raspberry and blueberry have shown overall lower levels of infestations and may completely avoid infestation if harvest occurs before July.

#### Decrease the intervals between harvests.

Harvest every 1-2 days for optimal yield and minimal SWD infestation in fruits.

### Keep it clean.

#### Remove cull fruit.

Over-ripe and damaged fruit can act as a reservoir for SWD and other pests. Remove any over-ripe berries, and never leave waste piles of fruit in the open. Bag or freeze the fruit to kill any larvae.

#### Mulch.

Use plastic or fabric mulch to inhibit the development of infested fruit that has fallen on the canopy floor.

#### Prune the understory.

The interior plant canopy of most fruit crops provide the preferred microenvironment for SWD, possibly making it easier to hide within the plants they infest. Pruning to decrease the canopy may discourage SWD populations.

#### Harvest.

When harvesting, be sure to bring berries into coolers as soon as possible. Cool harvested berries to 35°F to stop further development of immature SWD inside fruit. to increase mortality of larvae inside fruits, keep fruit refrigerated for three days. Freezing fruit will kill all stages of SWD.

# KEY STRATEGIES FOR ECOLOGICAL PEST MANAGEMENT

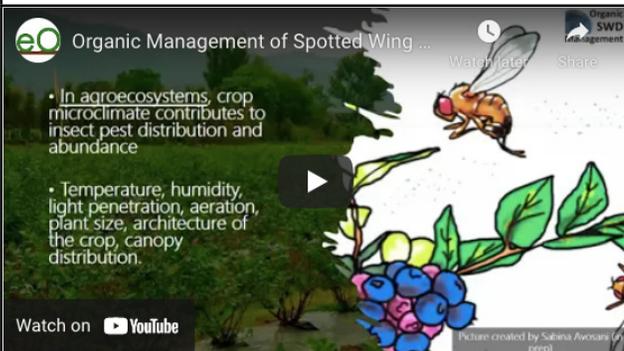
## Encourage the populations of beneficial insects.

### What beneficial insects can keep the populations down?

Earwigs, damsel bugs, spiders, ants, and minute pirate bugs are known predators in the field. Carabid beetles, crickets, green lacewing larvae, and rove beetles have been found among infested fruits, and also fed on SWD in lab studies.

### Plant in your borders to increase the population of natural enemies.

Natural SWD enemies migrate from woodlots, fence rows, and other noncrop areas to cultivated fields each spring. Ground covers can supply pollen, nectar and a degree of protection from weather for these predators. Preserving uncultivated areas with native flowering species contributes to natural biological control and supports beneficial insect populations.



### Organic Management of Spotted Wing Drosophila

An amazing 2021 webinar to learn more about SWD research and management innovations.

<https://eorganic.org/node/34578>

### Sources

**eOrganic - Spotted Wing Drosophila: Biology, Behavior and Organic Management** - <https://eorganic.org/node/23509>

**Michigan State University - Spotted Wing Drosophila in Organic Berry Crops** - <https://www.canr.msu.edu/ipm/uploads/files/SWD/SWDOrganicBerryCrops.PDF>

**Michigan State University - Integrated Strategies for Management of Spotted Wing Drosophila in Organic Small Fruit Production** - [https://www.canr.msu.edu/resources/integrated\\_strategies\\_for\\_management\\_of\\_spotted\\_wing\\_drosophila\\_in\\_organic](https://www.canr.msu.edu/resources/integrated_strategies_for_management_of_spotted_wing_drosophila_in_organic)

**University of Wisconsin - Organic management of spotted wing drosophila in berry crops** - <https://fruit.wisc.edu/2018/06/01/organic-management-of-spotted-wing-drosophila-in-berry-crops/>

**University of Georgia - Organic management of spotted-wing drosophila (SWD) in small fruit production systems** - <https://smallfruits.org/2020/07/organic-management-of-spotted-wing-drosophila-swd-in-small-fruit-production-systems/>

**Check Out the OFRF National Organic Research Agenda (NORA)**

<http://www.ofrf.org/research/nora>