

Biology and Management of Spotted Wing Drosophila

Surendra K. Dara

Strawberry and Vegetable Crops Advisor, University of California Cooperative Extension
San Luis Obispo and Santa Barbara Counties

Spotted wing drosophila (SWD), *Drosophila suzukii* is a pest of several small fruit in California and other states. SWD belongs to the group of flies that are generally known as vinegar flies or lesser fruit flies. It was initially known as cherry fruit fly in 1930s and is now referred to as spotted wing drosophila. SWD can be distinguished from other *Drosophila* spp. based on the following traits:

- Females have a hard and dark (sclerotized) ovipositor with prominent serrations or saw-teeth that enable the fly to lay eggs in intact ripening fruit.
- Antennae with branched bristle-like part called arista.
- Males have a distinctive dark spot at the tip of each wing and two dark bands on each front leg.



Origin and distribution: It is traditionally known to be a pest in Asia, but it is now reported in Neo Tropics, North America, and Europe. In the US, it has been reported in Hawaii, Washington, Oregon, California, Utah, Minnesota, Michigan, Missouri, Louisiana, West Virginia, Pennsylvania, North Carolina, South Carolina, and Florida.

Host range: They generally infest thin-skinned fruit and prefer temperate climate. Host range includes apple, blackberry, blueberry, cherry, dogwood, grape, mulberry, peach, persimmons, plum, raspberry, and strawberry. Non-crop hosts that support SWD populations include

barberry, brambles (wild raspberry and blackberry), buckthorn, cotoneaster, currant, dogwood, elderberry, fig, honeysuckle, laurel, mulberry, nightshade, oleaster, orange jasmine, pin cherry, pokeweed, purple flowering raspberry, spicebush, sweet box, and yew.

Biology: SWD prefer 68-86 °F and overwinter as adults. Various sources suggested 5-10 generations per year. Eggs are translucent to milky-white. Females lay an average of 384 eggs at 7-16 per day and there can be 1-3 eggs per oviposition site. Multiple females may deposit eggs in the same fruit. Eggs hatch in 2-72 hours and larval stage lasts for 3-13 days. Larvae milky-white with a legless body tapering towards the anterior end (towards the head). Mouthparts are dark and sclerotized. Pupation takes place inside the fruit or in the soil and lasts for 3-15 days. Pupae are reddish brown and have two spiracles (breathing tubes) at the anterior end. Adults are small (2-3 mm) flies. Life cycle takes anywhere from 21-25 days at 59 °F to 7 days at 82 °F. Females can start laying eggs within 1 day after their emergence and can lay more than 400 eggs in their lifetime. Based on the degree day (DD) calculations, egg, larval, and pupal stages require 20.3, 118.1, and 200 DD.

Damage: Other fruit flies usually infest overripe and fallen fruit, but SWD infests fresh fruit because of its powerful ovipositor. Adults feed on fallen fruit but lay their eggs under the skin of intact fruit. Softening and collapse of the tissue results from larval feeding inside the fruit. Oviposition holes can be seen on the fruit with close observation. In addition to the direct damage, SWD makes the infested fruit vulnerable to other pests and diseases. Monitoring SWD is very important to avoid harvesting and marketing infested berries.

Monitoring: Use traps made with apple cider vinegar or yeast-sugar solutions for early detection of SWD. There are numerous studies using a variety of containers and attractants. Pherocon traps and lures are commercially available for SWD monitoring.

Management: A variety of organic and conventional management options are available.

Cultural – Discard fallen and unmarketable fruit in the field to prevent infestation. Remove wild hosts in the vicinity that might harbor SWD populations.

Botanical – Pyrethrins and azadirachtin products are used in multiple studies.

Chemical – Research indicates that organophosphates, pyrethroids, and spinosyns are among the chemicals that can be used against SWD. Remember to rotate chemicals among different mode of action groups to reduce the risk of resistance development.

Microbial – Entomopathogenic fungi (*Beauveria bassiana* or *Isaria fumosorosea*) and bacteria-based products such as Grandevo (*Chromobacterium subtsugae*) and Venerate (*Burkholderia rinojensis*) against adults, and entomopathogenic nematodes (*Heterorhabditis* spp. and *Steinernema* spp.) against pupae that form outside the fruit can be used.

Additional resources:

<http://ipm.ucanr.edu/PMG/PESTNOTES/pn74158.html>

<http://www.omafra.gov.on.ca/english/crops/facts/swd-wildhosts.htm>

<http://www.ipm.msu.edu/uploads/files/SWD/em9113.pdf>

http://entnemdept.ufl.edu/creatures/fruit/flies/drosophila_suzukii.htm

<http://pest.ceris.purdue.edu/map.php?code=IOAPUA>

http://www.ipm.msu.edu/invasive_species/spotted_wing_drosophila/factsheets



A version of this article can be viewed at: <http://ucanr.edu/SWD>