

### Integrated Pest Management (IPM) for Successful Management on Organic Farms and in Home Gardens

#### BIOLOGY

Spotted wing drosophila (SWD) is an exotic pest that has recently been found in California, Oregon, Washington, and Florida, as well as in Hawaii. It resembles other drosophilid species (fruit flies or vinegar flies) in appearance, but unlike other members of the family which attack only overripe, damaged or decaying fruit, SWD attacks healthy fruit as it ripens on the plant.



Photo: B. Gerdeman, WSU

Adult SWD flies are about 1/8 inch long, with red eyes and a yellow-brown body. Darker bands may be visible on the abdomen. Male flies have a distinctive dark spot on the leading edge of the wing near the tip. SWD is the only fruit fly species in our area with this spotted wing, making identification of males relatively simple. Females lack the spotted wing, but have a large, sawlike ovipositor on the tip of the abdomen that is used to deposit eggs in fruit.

SWD lays its eggs just beneath the surface of ripening fruit. Scars left by oviposition may appear as indented, soft spots on the fruit surface. Small white- or cream-colored larvae hatch within a few days and feed in the fruit, causing the fruit to soften and collapse around the feeding site. At maturity, the larvae may be up to 1/8 inch long. Larva may pupate inside or outside the fruit.

Fruit is damaged by females ovipositing eggs and by larval feeding within the fruit. Further damage may be caused by secondary pathogens (fungi and bacteria) which attack the damaged fruit. Most soft-skinned fruits are vulnerable to attack by SWD, including peach, plum, cherry, grapes (table and wine), strawberry, blueberry, and cane fruits. It has also been found in Asian pear, fig, and hardy kiwi. See SWD under Common Insects for an additional image of the larval stage.

The length of the life cycle depends on temperature and varies between 8 and 11 days, resulting in 4-10 hatches each year in the Pacific Northwest. Adult SWD are most active at cool temperatures (around 68 °F). For more information on SWD including monitoring and identification, see the WSU Entomology web page <http://mtvernon.wsu.edu/ENTOMOLOGY/pests/SWD.html>.

#### MANAGEMENT

**Monitoring Adults.** Make a simple monitoring trap from clear plastic containers with lids or plastic water bottles. Drill several 3/16- to 3/8-inch holes about 1 inch below the top of the container. Attach a wire or string for hanging, pour in about 1 1/2 inches of apple cider vinegar, and add 1-2 drops unscented dish soap/detergent. Secure trap about 3-5 feet off the ground next to or in a cherry tree, preferably in a shady, cool location. When cleaning and refilling the traps, dispose of used vinegar away from the trap site. Begin your trapping early, when daytime air temperatures are 50 °F or greater for several days and/or when fruit is young. Check traps 2 or 3 times a week during the fruit ripening period for male SWD flies; you may need to use magnification to better see the spots on the wings. Numerous

species of drosophilids and other insects will also be attracted to the traps. Learn to identify *D. suzukii* males - if in doubt, contact your local Extension office.

Vinegar traps are for monitoring purposes only and will not provide control of SWD. Additional information for SWD monitoring with vinegar traps may be found on the WSU Extension Entomology website (<http://mtvernon.wsu.edu/ENTOMOLOGY/pests/FS049E.pdf>). Remember, chemical control is not necessary if SWD is not present. Also, trap counts do not necessarily provide a good indicator of fruit infestation, as adult SWD appear to bypass the traps when fruit is ripening.

**Monitoring Larva in Fruit.** Once fruit begin to ripen in your area, begin testing fruit for SWD. Currently, traps are not a reliable tool for determining SWD activity in your crops, so fruit monitoring is advised. Collect fruit from your plants, selecting those that appear to have oviposition scars or are soft and bruised. Place the fruit in a salt solution in a shallow pan, cover with a screen to keep fruit submerged. Make the salt solution by mixing together 1 tablespoon of salt dissolved in 1 cup of water; use enough solution so that fruit are fully submerged and there is a 1/2 inch of solution above the fruit. Within 10-15 minutes larvae will wiggle out of the holes in the fruit and float to the top of the solution. Larvae may not be visible without a hand lens.

The larval stage of SWD is very difficult to identify; if you find larvae you will need to do a separate test with freshly collected fruit. Place the second sample of potentially infested fruit in a small clear plastic container with a lid at room temperature. Adult flies will emerge within 7 to 10 days. Refer to the WSU fact sheet SWD Monitoring, Identifying and Fruit Sampling (FS049E) (<http://mtvernon.wsu.edu/ENTOMOLOGY/pests/FS049E.pdf>) for more information above how to identify adult SWD.

**Sanitation.** Remove infested and fallen fruit from the tree and ground. Dispose of infested fruit in a sealed container, or bury at least 6 inches deep in an area that will not be disturbed. Composting infested fruit in on-farm or home compost piles is not likely to be effective at destroying larvae and pupae.

**Chemical sprays.** SWD females will begin laying eggs within cherry fruit as soon as the fruit begins to soften and show color (light straw color), and they can lay eggs through fruit harvest. Begin monitoring for SWD early in the fruit development stage and continue through harvest. If a SWD adult is found in a trap in your orchard or an orchard very close to you during this period, apply a protective pesticide containing one of the following products: spinosad, malathion (not allowed for organic production), or pyrethroid (such as esfenvalerate or pyrethrin). If you are an organic producer or only want to use pesticides allowed for organic production, check the label and check with your certifier prior to pesticide use. Before using any pesticide, make sure that cherry is listed on the label and always read and follow the pesticide label for application instructions and timing. Homeowners should not make foliar applications to trees over 10 feet tall but should consult a commercial pesticide applicator.

All of the pesticides listed above have a residual effect (provide protection) for approximately 7-10 days after application. Observe the pre-harvest interval (PHI) for each product (time between application and fruit harvest) and refer to the label of each product for specific times. If you are using these pesticides to manage other cherry pests, if possible time pesticide applications so that SWD will also be controlled. The following are PHIs for pesticides commonly used for SWD: Esfenvalerate - 14 days; foliar-applied imidacloprid and spinosad - 7 days; malathion - 3 days; and pyrethrins - 1 day. These pesticides are

toxic to bees. To reduce risk to bees, make pesticide applications in the evening after bees are done working for the day.

All of the pesticides listed above will only kill adult SWD but will not kill eggs, larvae, or pupae inside the fruit. Good spray coverage of the foliage and ripening fruit is essential; only use foliar formulations and not soil drenches. SWD are active for several months, therefore multiple pesticide applications may be needed. To help prevent development of pesticide resistance in SWD, do not make multiple applications of the same active ingredient, instead alternate between different active ingredients.

SWD management options are currently being researched and will be updated as more information becomes available. For information updates, refer to the WSU Entomology (<http://mtvernon.wsu.edu/ENTOMOLOGY/pests/SWD.html>) and Hortsense (<http://pep.wsu.edu/hortsense/>) websites.