Drosophila suzukii

Spotted Wing Drosophila (SWD) infest Berry and Stone Fruits in Pacific Coastal States

Identification | Life Cycle | Damage | Monitoring | Management

INTRODUCTION TO THE SPOTTED WING DROSOPHILA

The Spotted Wing Drosophila (SWD), a new invasive pest found in Oregon in 2009, is now reported in over 30 states, Mexico, Canada, and Europe. The fly originated from SE Asia. With 175+ species of *Drosophila* in North America, commonly known as vinegar flies, SWD is a major threat to small and stone fruit crops. They can cause a great deal of damage to intact ripening fruit on the plant, as opposed to overripe and fallen fruit most other *Drosophila* species infest. Another consequence of high *D. suzukii* numbers is an increased reliance on insecticides. Sound management tools are currently being developed such as monitoring, sanitation practices, timing of treatments, and mass-trapping. By understanding the pest's life cycle, biology, influences in the landscape, criteria for host preference, and other relevant information, the best practices to manage a pest population can be identified.

IDENTIFYING THE FRUIT PEST, SPOTTED WING DROSOPHILA

Adult SWD flies resemble small vinegar, fruit, or pomace flies often found in the kitchen or around composting fruit outdoors. They are slightly larger than the common vinegar fly with a body length of 2-3 mm, with red eyes and a yellowish-brown amber-colored body. If you look closely, there are continuous brown bands around the abdomen. Key characteristics which distinguish SWD from other *Drosophila* flies, are black spots on the leading edge of adult male wings; and females have a prominent serrated, saw-like ovipositor which she inserts into ripe fruit to lay eggs.

SWD Identification – key characters

2-3 mm

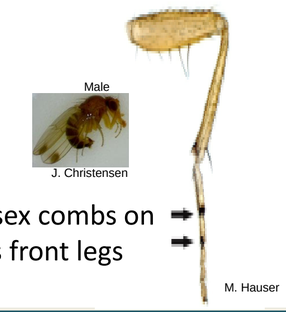
Male

Black spot on male's wings, spot can be a light and a smoky-looking color

Female

Posterior end

She inserts her saw-like device (ovipositor) into ripening fruits and lays eggs; typically ovipositor is tucked under her posterior.



2 black sex combs on male's front legs

CHECKING FRUIT FOR LARVAL PRESENCE

Larval Extraction Method and/or Baggie Assessment

These methods can be used to check fruit for infestation of SWD larvae throughout the season

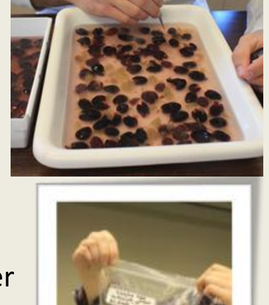
- Collect suspicious ripening to ripe fruits.
- Crush fruit in sealed plastic bag.
- Prepare a solution of SALT *or* SUGAR (keeps larvae alive longer, but it's sticky) one day in advance. Pour in baggie.

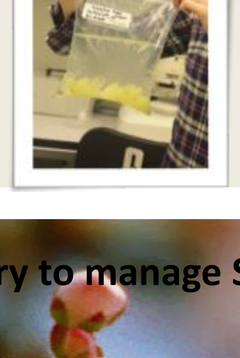
Plain Salt: Dissolve 1 full cup salt in 1 gallon warm water

Light Brown Sugar: 2.5 cups brown sugar : 1 gallon water

- Shake and observe; or transfer contents into shallow white pan. Make sure solution is covering crushed fruit.
- SWD larvae should float to the top and separate from fruit pulp. Immediately look for moving white larvae (1-5mm) .
- Allow time for larvae to exit, at least 15 minutes.
- Detection of small larvae may require the use of a magnifier lens or Opti-visor. Good lighting is necessary.

* Suspect fruit can be added to a plastic bag , sealed and allowed to sit on counter at room temperature. Larvae will most likely exit fruit in plastic bag, if present, because of heat and gases released from fruit.



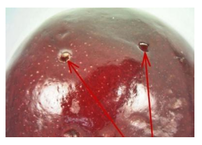


1 generation takes 8-16 days; est. 3-7 generations in Oregon 2012

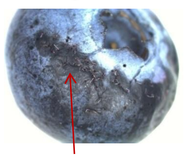
RECOGNIZING FRUIT DAMAGE

After a female lays ≈ 1-3 eggs in a fruit, she leaves a tiny scar or spot on fruit surface. Over 60 larvae have been found in one piece of fruit. The female can lay 350+ eggs over her lifetime (avg. 20-30 days). The fruit may collapse, wrinkle or soften after 2-3 days and can mold around scarring site. Larvae will feed inside fruit and eventually larvae will develop into brownish-yellow pupae with two respiratory horns for breathing within fruit.

SWD Fruit Damage



Look for oviposition scarring/holes, bruising, softening



Look closely for two hair-like egg filaments sticking out of fruit

Fruits affected by SWD*

Raspberries
Blackberries
Blueberries
Cherries
Strawberries

*Dependent on management practices and environmental conditions

MONITORING TRAPS FOR ADULT FLIGHT

Begin monitoring early in season when air temp. is consistently higher than 50°F or fruit begins to color.

Assembling

- Use a clear or red plastic 16-32 oz. cup with lid and transform into a fly trap.
- Drill several 3/16-inch holes around the side of the cup, keeping 3 inches of pour space for changing bait solution.

Bait (currently working on more attractive baits)

- Add ~2 inches of pure apple cider vinegar with a drop of non-fragrant soap or make up a Yeast solution:
  - 1 Tbsp. of active dry baker's yeast, 4 Tbsp. sugar, 12 oz. water

Placing

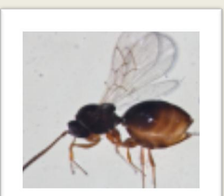
- Hang trap near fruit level inside cool shady canopy of plant.
- Place as many traps in your susceptible crops as you can reasonably maintain. Pay particular attention to high risk areas (Diverse field edges with ample shade and refuge) (e.g., 1 trap/5 acres or 3 traps per crop).

Servicing

- At least once a week, filter liquid and count male flies only.
- If trained, count females caught in liquid.
- To help identify SWD, use a 30x hand lens or Opti-Visor.
- Replace bait solution once a week.

SURVEY FOR BENEFICIAL ORGANISMS

Beneficial predators, pathogens, and parasitoids for managing SWD in agro-scapes and wildlands are being identified in Oregon. To the right is a Cynipid parasitoid (wasp) found in 2009.



SWD MANAGEMENT PLAN*

- **Monitor for adult flight** (baited traps) to detect seasonal fly activity before fruit colors. Can set up traps early on borders.
- Check out **degree-day model** (OSU-IPPC-PIPE website) to help predict SWD events such as expected spring activity/egg-laying.
- Check fruit for larvae using one of the **extraction methods.**
- **Harvest fruit** in a timely manner to avoid SWD egg-laying.
- **Control flies** before they lay eggs - timing of control is important.
- **Clean up** dropped, infested fruit left hanging on plant, or fallen on the ground to reduce breeding sites for SWD.
- If possible, **net fruit** to avoid egg-laying adults.
- **Trap and kill flies** by placing numerous traps after harvest or early spring before fruit ripens in wildlands and on borders.
- Rotate pesticide classes – **avoid resistance.**
- Observe **pre-harvest and re-entry intervals** (PHI & REI)
- Use **insecticides registered** for crop (if fly numbers are high and other methods are not providing adequate control).
- **Follow the pesticide label, it is the law.**

*Check SWD website for most current recommendations.

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Developing partnerships across the country to manage SWD for the benefit of fruit growers

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