



Spotted wing drosophila (*Drosophila suzukii*) larval sampling

What is spotted wing drosophila (SWD)?

Spotted wing drosophila (*Drosophila suzukii*) is an invasive pest of soft skinned fruit which has been detected throughout the United States in the last three years. Female SWD preferentially lay their eggs in ripe and ripening fruit, unlike nearly all other *Drosophila* species. The resulting larvae feed on the fruit, causing direct damage, and may also be present at harvest, contaminating the product and shortening storage time. SWD have been recorded feeding on a wide range of soft-skinned fruit; however, they appear to be most significant as pests in blackberries, raspberries, blueberries, cherries, and summer or fall fruiting strawberries.

How can I identify SWD?

Adult SWD are small (2-3 mm) light brown flies. Male SWD have a distinctive spot on the end of either wing and dark bristles in bands around the base of the last segment on their front legs (called sex combs). Female SWD lack spots on their wings but can be distinguished by a relatively large, blade-like ovipositor (egg laying device) at the end of their abdomen.



Non SWD ovipositor (left) and SWD ovipositor (right). Note that these flies have been stored in ethanol. Normally, the ovipositor would be concealed just inside the abdomen.

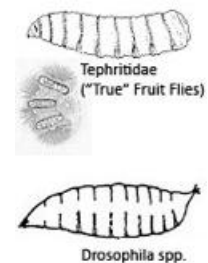


Non SWD wing (top) and male SWD wing (bottom). Not all small brown flies with spots on their wings are SWD. SWD have a single spot on the end their wing, bisected by the second vein.

SWD larvae and pupae cannot be visually distinguished from other *Drosophila* species, but *Drosophila* species can be distinguished from other insects which may be present in ripe fruit. Sampling only apparently sound, otherwise marketable fruit minimized the likelihood that non SWD larvae will be detected. Rotting or externally damaged fruit may contain native *Drosophila* species.

Drosophila larvae are up to 3 mm long, do not have legs or a clearly defined head, and are tapered on both ends. They have two dark “mouth hooks” at the front. It is possible that blueberry maggot, cherry fruit fly, or apple maggot larvae could be present in blueberries, cherries, or apples respectively, but these “true fruit fly” (Tephritidae) larvae are larger than SWD and have a flat rear end. They will not be present in blackberries or strawberries. We have posted more information on distinguishing SWD from other species here:

<http://strawberries.ces.ncsu.edu/2013/04/identifying-insects-in-strawberries/>



Drosophila spp.

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How do I sample for SWD in fruit?

There are several sampling methods for *Drosophila* larvae. It is not clear which is most efficient in detecting larvae, nor is it clear how fruit must be sampled and how many samples must be taken to determine if SWD is present at detectable levels. There is currently a zero tolerance policy for SWD larvae in marketed fruit, so any detection using these sampling methods is cause for grower concern. Ideal fruit sample sizes are not known at this time, but we recommend a minimum of 30 fruit each be sampled from each field or variety being harvested at each harvest; more and larger samples are likely better. A hand lens or other magnification may be needed for small larvae.

1. Salt extraction: Place fruit in a flat container in a thin layer. A dark container or a clear container against a dark surface works best. Pour salt water (1c salt per gal of water) over fruit. After 10-15 minutes, larvae will exit fruit. It may be helpful to use hardware fabric weighted with bolts or something similar to keep fruit separate from floating larvae. If no larvae are visible, gently crush fruit to ensure salt water has diffused inside. Large, dense fruit, like strawberries may need to be cut into smaller pieces. Larvae are more visible when moving and immersion in salt water will eventually kill them.



SWD larvae from salt test of infested blueberries.
Photo via Dean Polk, Rutgers University

2. Sugar flotation: Place fruit into a sealed, clear plastic bag and gently crush. Add sugar water (1/4 c sugar per gal of water). Larvae will float to the surface, while fruit remains at the bottom.

3. Direct observation: Fruit can be crushed or cut and larvae directly observed. This method will also likely miss small larvae.

4. Rearing flies out : Holding larvae and pupae until adult flies emerge is currently the only definitive way to confirm they are SWD. Infested fruit should be held in a tightly sealed, but vented container. We rear flies in plastic food storage containers lined with sand and a hole cut in the lid and sealed with fine organdy mesh. We then place a yellow sticky card in the container to catch flies as they emerge. Fruit should be held at room temperature for up to 14 days. Ensure that the rearing container is tightly sealed to prevent secondary infestation by native *Drosophila* species.

Where can I learn more about SWD?

Read us @ entomology.ces.ncsu.edu

Follow us @ [NCSmallFruitIPM](https://twitter.com/NCSmallFruitIPM) on Twitter

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