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Spotted wing drosophila (*Drosophila suzukii*) biology and management in North Carolina strawberries

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.

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 devise) 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. See here for links to images of non SWD flies which also have spots on their wings: http://bit.ly/MfnKcy

How can I determine if SWD is present on my farm?

You can monitor adult SWD with traps baited with either apple cider vinegar or a yeast and sugar slurry. See here for a step by step trapping guide: http://bit.ly/KSK1x5 However, both of these lures are inefficient compared to ripe fruit , so they should only be used to determine SWD presence or absence in an area. Growers, extension agents, and researchers are also monitoring SWD throughout the southeast. You can find their trap capture data, updated weekly, at the SWD Volunteer Monitoring Network (SWD*VMN) site: http://bit.ly/MfsM9J Fruit should be carefully monitored for SWD larvae. You can learn how to sample fruit from this factsheet: http://bit.ly/ME93Df It is impossible to distinguish SWD larvae from other *Drosophila* species, so it is important that you only sample sound, otherwise marketable fruit. *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. If fruit is overripe or otherwise damaged, other insects may also be present. See here for information on distinguishing *Drosophila* larvae from other insects potentially present in strawberries: http://bit.ly/KY7IXc

Right: Two *Drosophila* larvae in a strawberry. Note lack of legs and a head capsule.

Left: Sap beetle larvae may be present in damaged or overripe fruit but have distinct head capsules and three pair of legs

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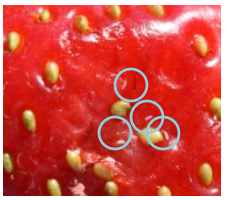

Drosophila eggs on the surface of a strawberry. SWD eggs are often inserted under the fruit surface.

How do I manage SWD on my farm?

Ripening and ripe fruit are susceptible to SWD attack, but they do not appear to be attracted to unripe fruit. SWD infestation can reach 100% if left unchecked. If adult SWD are present on your farm, aggressive management is warranted.

***Aggressive management entails**:*

1. Excellent sanitation: fruit should be harvested frequently and completely. Any unmarketable fruit should be removed from the field and either frozen, "baked" in clear plastic bags placed in the sun, or hauled off site to kill or remove any larvae present.
2. Water management: leaking drip lines should be repaired, and overhead irrigation should be minimized.
3. Insecticide treatments: treatments should be applied at least every seven days and repeated in the event of rain. Effective insecticides with pre harvest intervals amenable to picking schedules should be selected, and insecticide modes of action should be rotated between each treatment. See here for a list of the registered insecticides in NC strawberries and their likely efficacy against SWD: http://bit.ly/OU4vmi There are some organic tools available for SWD, but they may be less persistent than conventional materials. Organic growers should also be careful to avoid exceeding maximum applications per season.
   In a single year field trial, we have found **spinetoram** and **bifenthrin** to be effective at reducing SWD infestation in strawberries when applied weekly. Malathion was less effective than these two materials in this experiment.
4. Regular fruit sampling: at least 100 fruit per block per harvest should be observed for infestation.

If selling fruit wholesale, growers should communicate with their purchaser before beginning a new management program to ensure that pesticides registered for use in the United States are acceptable for all markets where their fruit is destined.

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