UK COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF KENTUCKY — COLLEGE OF AGRICULTURE

ENTFACT-229

Spotted Wing Drosophila, Biology, Identification and Monitoring

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Spotted wing Drosophila (SWD), *Drosophila suzukii,* is a serious pest of soft-skinned fruit and was detected in two locations in Kentucky in 2012 and confirmed by the USDA APHIS. SWD is a new fruit fly pest of soft fruits and berries. Unlike other fruit flies, SWD causes damage when the female flies cut and lay their eggs in healthy fruit. This results in small larvae in the fruits at harvest. A survey sponsored by Kentucky Horticulture Society in 2013 found it to be widespread in Kentucky. There have been numerous reports of infested blueberries, raspberries, blackberries and grapes.

SWD attacks a number of different fruiting crops and weeds, but raspberries, blackberries, blueberries, and some grape varieties are among the most susceptible crops that we grow commercially in Kentucky. It has also been reported to attack strawberries, cherries, tomatoes, and peaches in other states. SWD will also lay eggs in and complete development in several weedy or wild hosts including poke weed, mulberry and honeysuckle.

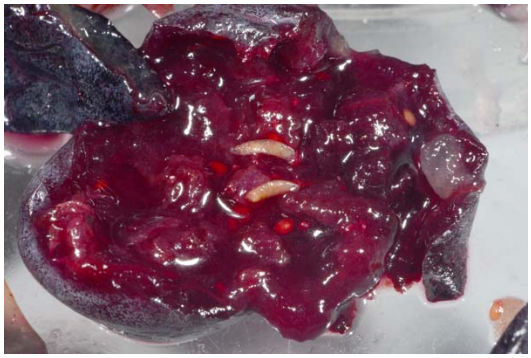

Figure 1 SWD larvae in a blueberry.

Damage

Fruit flies (also called vinegar flies) are often associated with damaged, overripe, or rotting fruits and vegetables. This is not the case with SWD. What makes the SWD different is that the female has an enlarged, serrated ovipositor (egg layer) that enables her to lay eggs under the skin of ripening fruits that are otherwise free of damage. Generally, soft-skinned fruit become vulnerable to attack as they begin to soften and turn color during the ripening process. This is in the final 7 to 10 days before harvest. The larvae tunnel and feed under the skin of the fruit and can reach a length of 4 mm. There is often a sunken area at the site of egg laying and damaged fruit may appear to collapse from the internal damage and rots. Fruit that may appear sound at harvest can show signs of infestation within 1 to 2 days. Small ¼ inch larvae may be observed in the fruit or crawling out of harvest containers.

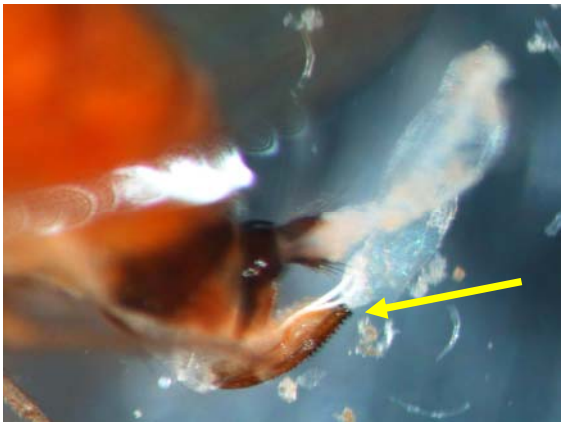

Figure 2 Tip of the female SWD abdomen with the arrow pointing out the enlarged and hardened ovipositor.

Biology

Adult SWD emerging in the fall overwinter and become active in the spring to mate. They lay their eggs in susceptible fruit during the spring, summer and fall months. The female SWD inserts her serrated ovipositor into ripening fruit and deposits 7 to 16 eggs a day and up to 300 eggs in her lifetime. Depending on the weather the life cycle can be 8 to 14 days with a mid-season life span lasting 3 to 9 weeks. SWD are most active at temperatures above 68°F but will decrease laying eggs in temperatures above 86°F. Eggs deposited in the fruit hatch in 2 to 72 hours; pupation can take place both inside and outside the fruit and last 3 to 15 days. There may be 10 or more generations per year in Kentucky. This combined with the female's

ability to lay hundreds of eggs may result in very high populations by the end of the season. Early season crops like June-bearing strawberries often escape SWD injury or be exposed to smaller populations, while late summer and fall ripening crops like blackberries and raspberries ripen when SWD populations peak and have a very high risk of infestation. SWD overwinter as adults.

Identification

Adult SWD have a body length of 2 to 3.5 mm, an amber body color with distinct dark banding of the abdomen, red eyes, and clear wings. The adult male has a dark spot on each wing near the tip and two small but distinct dark 'bands' on each front leg. The spot on the wings may not be apparent on newly emerged male SWD. The female is harder to identify as it is her ovipositor, unbroken banding of the abdomen, and sharp appearance to the cross vein in the wing that distinguishes her from other fruit flies. The dark bands with each abdominal segment are unbroken with the female and the cross vein is clear and distinct.

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Figure 3 Male spotted wing Drosophila with the characteristic wing spot.

Trapping for SWD

Trapping and pest monitoring has been the basis of IPM programs for decades. However, SWD traps have not been good predictors of population sizes nor do trap captures necessarily occur before fruit infestation. Therefore, traps are useful in determining if SWD is present on your farm, but at this time, treatments should be timed to host susceptibility (meaning fruit that is beginning to color, and ripe fruit) rather than in response to trap captures. Commercial growers of blackberries, raspberries and blueberries in SE states have found that trapping does not reliably provide sufficient

Figure 4 Spotted wing drosophila female displaying enlarged ovipositor, characteristic body color and abdominal banding.

warning of SWD to begin sprays. Growers producing these crops for wholesale fresh markets must meet zero tolerances for SWD. This situation is understandably frustrating to growers and to entomologists.

Despite the limitations with trapping, it can be used to detect SWD presence/absence on a farm and measure the relative level of activity. Trapping should begin 2 to 3 weeks before the start of harvest. Traps are placed in a dense part of the canopy of the crop as the female SWD prefer to rest during the day in dark, dense locations. The trap is made of a one-quart, clear deli container with about one inch of bait solution to which one drop of dish soap has been added (otherwise the SWD may be able to walk on the surface of the vinegar). Sixteen ¼ inch holes are punched below the rim to allow the SWD to enter the traps, but we prefer a pair of 3.5" by 1.5" windows covered with 1/8" screen. Use multiple traps on each farm, they can be in the same crop or different crops. It is possible to move the traps between different fields as the season progress, say from strawberries to blackberries to grapes for example. Traps need to be checked weekly and bait solution is changed weekly. Be sure to dispose of the bait solution outside of the planting.

Testing of trap design and bait mixtures is ongoing, but inexpensive homemade traps are the most commonly used. Initially traps were baited with apple cider vinegar, but yeast and sugar baits and

other baits have been shown to catch flies 1 to 2 weeks earlier than just apple cider vinegar. Yeast and sugar baits are made by combining 2 Tbsp yeast and 4 Tbsp sugar and 32oz of water. Prepare fresh bait solutions weekly.

These baits will attract a large number of fly species and several unimportant fruit fly species. It is critical to accurately identify the collected specimens with a powerful hand lens or dissecting microscope. The male SWD are recognized by the single black spot on each wing and the two dark combs on the front legs. The females are recognized by their amber color, the enlarged ovipositor which is hardened and pointed, and the clear and sharp cross-vein in the wing.

SWD treatments should begin a week before the start of harvest with highly susceptible crops, particularly blackberries and raspberries. Fields need to be retreated on a weekly interval through the end of harvest with a recommended insecticide (sprays should be reapplied after a rain). Producers need to follow pre-harvest interval restrictions for the respective insecticides carefully.

Floatation Method

All growers are strongly encouraged to use the fruit floatation method to sample small fruit weekly to ensure their SWD management program is effective. Only samples of fruit that appear undamaged should be tested for SWD. To sample fruit for SWD larvae a simple floatation method can be used. Place about 30 to 40 ripe, apparently undamaged fruit into a gallon bag. Add 1 to 2 cups of sugar syrup (mixture of ½ cup sugar mixed into 1 quart of water) to the bag and seal the bag. Thoroughly mash the berries, then let the berries settle to the bottom of the bag, any small, white larvae present should float to the top.

This method does not work with damaged, rotten or overripe fruit as these are likely already infested with other non-economic fruit fly larvae. SWD larvae are indistinguishable from other fruit fly larvae.

Revised: 1/14