Spotted Wing Drosophila: A Key Pest of Small Fruits in New Jersey

Fact Sheet 1246

Cooperative Extension

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Spotted wing drosophila (SWD), *Drosophila suzukii* Matsumura, is an invasive vinegar fly that can damage many fruit crops including blueberry, grape, cherry, raspberry, blackberry, and strawberry. Native to Southeast Asia, SWD was first detected in the continental U.S. in 2008, since then it has become established in many states across the country and was first found in New Jersey on July of 2011. Unlike the majority of its fruit fly relatives, SWD has the potential to be a major pest because the female of the species is equipped with a large serrated ovipositor which can saw through the soft skin of many ripening small fruits in order to lay eggs. The larvae rapidly develop within the fruit. SWD infestation causes puncture wounds, softening, wrinkling, collapse of the fruit, and contamination with larvae.

Identification

SWD flies are small (2.5-3 mm; ~0.1 inches), light yellow or brown, and with red eyes. Males have a distinctive black spot on each wing near the tip and two black 'bands' on the front legs (Figure 1). Females are slightly larger than males and possess a large serrated ovipositor (Figure 1).

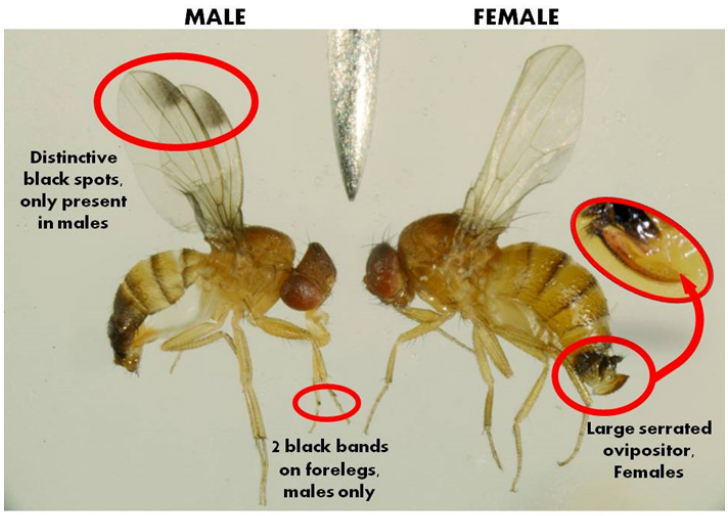

Figure 1. Male and female spotted wing drosophila (Photo courtesy of John Obermeyer, Purdue University).

The eggs (Figure 2 on the next page) are white and oval with two filaments at one end. Eggs are laid on the surface or interior of the fruit. The larvae (Figure 2) are legless, white, and cylindrical with two finger-like projections (spiracles) at one end and black mouthparts at the other end. The pupae (Figure 2) are football shaped, transparent initially and then become darker brown with red eyes, and have two projections on the head end.

Life Cycle

SWD overwinters as an adult and becomes active in the summer to mate (Figure 2). SWD flies lay their eggs in susceptible, ripening fruit during summer and fall. A primary difference in biology between SWD and other vinegar flies is that SWD attacks fruit during ripening. The female SWD can deposit up to 350 eggs during her lifetime (Figure 2). Depending on the weather, the life cycle can take 8 to 14 days, with a mid-season life span lasting 3 to 9 weeks (Figure 2). SWD flies are most active at temperatures between 68-86 °F. Eggs hatch in 12 to 72 hours. Larvae develop inside the fruit for 5-7 days until pupation; pupation can take place both inside and outside the fruit and lasts 4-15 days.

In New Jersey, SWD is commonly found in late June/early July with fruit infestations occurring at similar times. For fruit production, this means that early varieties of blueberries (e.g. Duke), southern cherries, June-bearing strawberries, and early summer raspberries are generally not attacked by SWD, but should still be monitored. Summer varieties of all berry crops should be considered susceptible to SWD and monitored. Late blueberries, blackberries, and fall raspberries are highly susceptible to SWD in New Jersey due in part to the large population that is present during ripening. Wine grapes in New Jersey have not been significantly impacted by SWD although where previous damage has occurred (i.e. through bird injury), SWD infestations will occur.

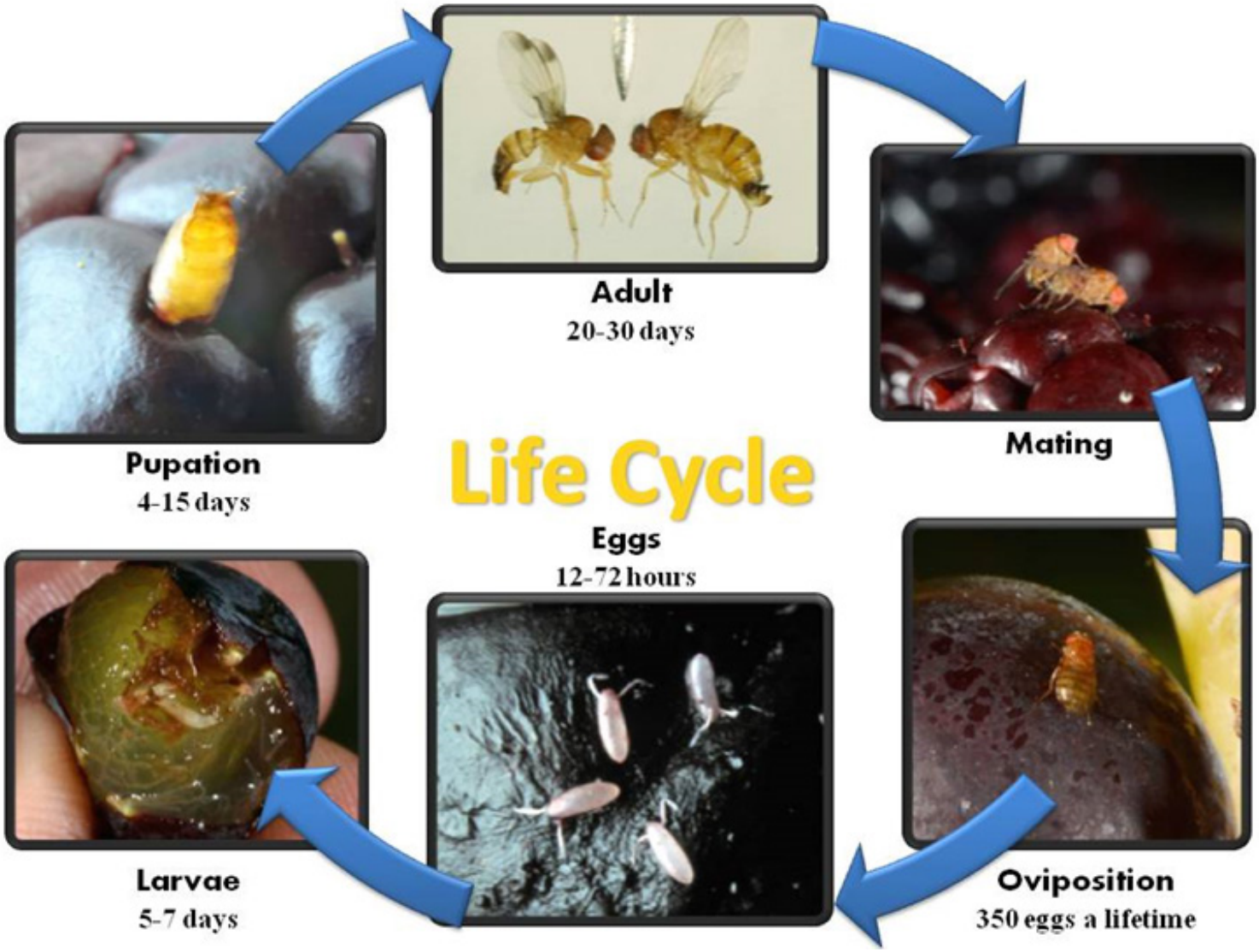

Figure 2. Spotted wing drosophila life cycle (Photo courtesy of John Obermeyer, Purdue University).

Monitoring

Early detection is important for SWD management. Traps used for monitoring should be placed in the field at least two weeks before fruit ripening and should be monitored weekly. Traps should be placed at bush level close to the developing fruit, preferably along the edges of the field that have wooded borders. Traps may be purchased or simply made by hand. The newest trap designs involve cutting two round holes on both sides of the upper portion of a clear 32 oz. deli cup, a piece of mesh material is then glued in place over those holes (Figure 3), and a lure can be hung from the lid over a solution of apple cider vinegar with a drop of scentless soap.

There are two commercial SWD lures available for purchase: Pherocon SWD lures and traps are available through Trécé and Scentry SWD lures and traps available through Great Lakes IPM. A yellow sticky card can also be employed inside the trap. Inspect the trap solution and the yellow sticky card for SWD males and females (Figure 4 on next page). Male SWD are more easily recognizable on yellow sticky cards because of their prominent spots. The female however, is less distinct because the serrated ovipositor may be receded into the abdomen. Pressing lightly on the abdomen may help pop the ovipositor out. Once SWD has been detected you may wish to simplify your inspection by only counting males, which are representative of the total population.

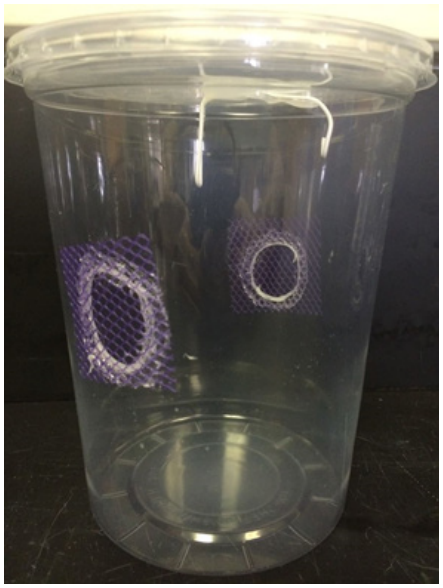

Figure 3. Example of trap for monitoring SWD

Figure 4. Spotted wing drosophila on yellow sticky card (Photo by John Obermeyer, Purdue University).

Salt Flotation Test

To inspect fruit for SWD larvae a simple salt flotation test can be performed (Figure 5). This is a good method for evaluating the effectiveness of your SWD management program and ensuring the quality of your product. It can also be used to determine when to initiate management programs. Salt water will irritate any larvae present out of the fruit and they will float to the surface of the salt water. Cover all berries, screen, and weights with the saturated salt solution so any larvae are free to float to the top and be seen. After 10 minutes it is safe to assume no more larvae will surface.

Figure 5. Steps in the salt flotation test.

Control

Sanitation is important to SWD management. Like its relatives, SWD also enjoys rotting fruit. SWD populations increase dramatically following harvest due to the presence of fallen and overripe fruit which represent a significant food source and a site for reproduction. Fruit should be harvested completely, rows kept clean, fallen berries covered and culled fruit disposed of or buried.

Currently, SWD management relies heavily on the use of insecticides. There are several insecticides which have been labeled for the control of SWD including spinosyns, pyrethroids, anthranilic diamide, carbamates, and organophosphates. Insecticide applications should be made when the fruit becomes susceptible (i.e., when fruit starts to change color). Insecticides with different modes of action should be rotated in order to decrease the risk of SWD developing insecticide resistance. SWD are prone to desiccation so they are likely to seek out shaded areas with high humidity such as the undergrowth and canopy, indicating that applications at dusk with full foliar coverage will be the most effective.

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