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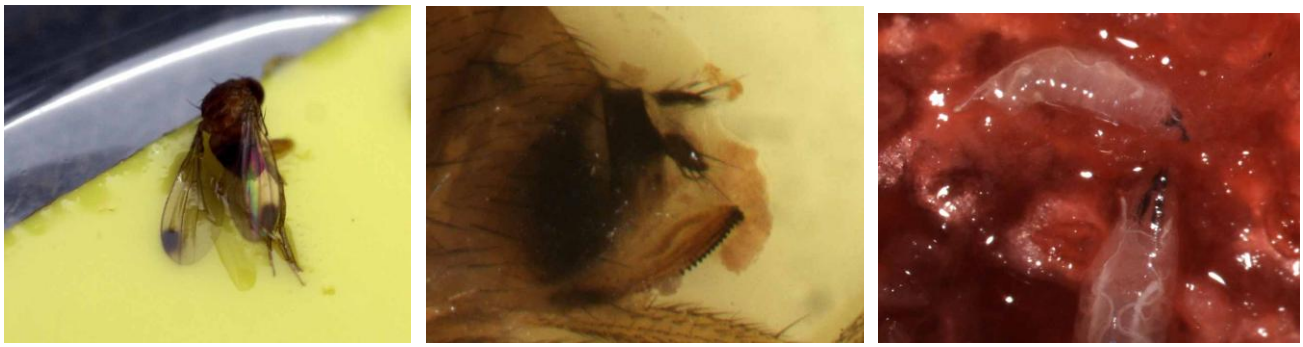
Identification and Management of Spotted-Wing Drosophila in Virginia Berry Crops

Authored by Douglas G. Pfeiffer, Professor and Extension Entomologist, Department of Entomology, Virginia Tech



Figures 1-3. Spotted-wing drosophila male showing black spots near wing-tip, serrated ovipositor of female and larvae.

Introduction

Since its introduction and spread in the continental US from 2008-2012, spotted-wing drosophila (SWD), *Drosophila suzukii* (Matsumura), has presented a huge problem for berry growers. SWD is a difficult pest to control. Complete crop losses from SWD injury have been seen, and berry growers should be prepared to deal with this pest. For additional information, see the spotted-wing drosophila page in The Virginia Fruit Web Site.

Hosts

Hosts include caneberries, blueberries, strawberries, grapes and cherries. Caneberries and blueberries are at greatest risk. Grape is not an ideal host, with lower attack and survival rates than other berry crops. Nevertheless, attacks by SWD can give rise to larval infestation and resulting sour rot. Among tree fruit crops, cherries are an important host.

Description

The adult fly looks similar to native vinegar flies, with the main exceptions of a black spot on the leading edge of the wing in the male (Fig. 1), and the large ovipositor on the underside of the female's abdomen (Fig. 2). This large, serrated ovipositor allows the insect to insert eggs into the flesh of a ripening fruit. Eggs are white, elongate oval, inserted under the skin of the berry, with long respiratory filaments from one end.

Larvae are translucent maggots 2-3 mm long, with black mouth hooks visible at the anterior end (Fig. 3). Respiratory projections are present on the posterior end, giving an appearance of being pointed at each end. Puparia (covering of the actual pupa) are brown, elliptical, about 3 mm long, with respiratory projections from the hind end.

Biology

There are up to 13 generations. A life cycle can be completed in 8-14 days, but adults can live up to 9 weeks. Females use the atypically large ovipositor to insert eggs under the skin of ripening fruit; each female lays 7-16 eggs/day. These respiratory horns may be seen protruding from an oviposition site with magnification (Fig. 4). Eggs hatch in 1-3 days, and larval feeding on the flesh causes a collapse of localized tissue after another 2 days, followed by growth of fungal or bacterial organisms.

Figure 4. Respiratory filaments on a spotted-wing drosophila egg projecting from an oviposition puncture in a blueberry.

Monitoring

In general, traps are not powerful enough to serve as a control. Traps should be used to detect activity, and when flies are detected, make sure that other control measures are in place. Several commercial traps are available (Trece and Scentry). Traps using homemade baits of either yeast or apple cider vinegar may be used for monitoring. Traps using apple cider vinegar (ACV) alone are attractive to flies, but a combination of ACV and red wine (60:40) is more attractive than ACV alone. Traps should be checked at least weekly. Most of the *Drosophila* flies collected will not be SWD, so the flies collected must be checked carefully.

Control

This pest can be difficult to control, and because of the high risk of insecticide development, a combination of approaches should be used when possible.

Chemical Control: Control measures are directed against the adults; there are no effective controls for larvae in the fruit. *As vulnerable fruit approach ripeness, weekly spray applications should be made.* Because of the high number of offspring and number of generations, there is a high risk of development of insecticide resistance. Consequently, insecticides with different mode of actions should be rotated to prolong the effective life of insecticides. Organophosphates (malathion and phosmet) are effective (check labels for registrations on specific crops), as are pyrethroids (be wary of induction of secondary pests). Spinosyns offer an additional mode of action, with spinetoram having greater efficacy than spinosad. Organic insecticides are available, though generally with less efficacy and residual activity. See the table linked here for a list of insecticides available for SWD on the most vulnerable crops. Included are the maximum number of applications (or amounts of material) allowed per season and the IRAC mode of action class. This is important in designing rotations - it will be helpful to reserve materials effective against SWD until properly timed for that pest. Check our VCE Pest Management Guides for small fruit and grapevines for specific recommendations.

For control recommendations see:

- VCE Pest Management Guide for Commercial Horticultural Crops (see Small Fruit and Grape)
- VCE Pest Management Guide for Home Grounds and Animals (see Home Fruit)
- Southern Region Blueberry Recommendations
- Southern Region Caneberry Recommendations

Cultural Control

Netting of 80g weight has been effective in controlling injury by SWD. Lighter grades (larger mesh) are not effective. While netting is initially expensive, it is cost effective because it may be used for several years.

Harvest fruit promptly and thoroughly to eliminate breeding sites. It is important to harvest all fruit, including those in the interior and lower parts of the plant canopy. This can be problematic in pick-your-own operations.

When berries are harvested, it will be helpful to get them as cool as possible, as soon as possible. There is complete mortality of larvae in fruit held for 96 hours at 35˚F, and below 40˚F, eggs and larvae don't develop. In most cases, such uniform holding conditions are not maintained; fruit cooling should be considered a component of SWD management and not a sole control tactic.

Biological Control

Because of the ability of SWD to encapsulate and kill the eggs of our native parasitoid wasps, biological control has not been successful. An exotic parasitoid specific to SWD, *Ganaspis*

kimorum, has been released and is spreading in the mid-Atlantic and western states.

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