

Current Recommendations for Managing Spotted Wing Drosophila (SWD), *Drosophila suzukii*, in PNW Caneberries* (May 26, 2011)

L. K. Tanigoshi¹, B. S. Gerdeman¹, G. Hollis Spitler¹, J. DeFrancesco², D. J. Bruck³ and A. J. Dreves⁴

¹Dept. of Entomology, WSU Mount Vernon Northwestern Washington Research & Ext. Center

²North Willamette Research and Extension Center, Oregon State University

³USDA-ARS Horticultural Crops Research Laboratory, Corvallis, Oregon

⁴Dept. of Crop and Soil Science, Oregon State University

Integrated Management of SWD in Caneberries:

- Monitor fields and surrounding area with baited traps (see below).
- If SWD is detected, treat crop with effective registered insecticides posted on the WA website: <http://www.mountvernon.wsu.edu/ENTOMOLOGY/main/index.html> or at the central website: http://swd.hort.oregonstate.edu/files/webfm/editor/Caneberry_sw_d_pesticides_for_OR_and_WA_4-21-11.pdf
- Rotate chemistries with different resistance management groups.
- Evaluate your management program by using traps to monitor for presence of flies.
- Sample fruit for larval infestation using the larval extraction method listed below.
- Destroy leftover fruit on the plant or fruit that falls on the ground when practical, to reduce breeding sites and food supply. A post-harvest clean-up spray to reduce SWD population is not recommended.
- *Stay informed. The following recommendations are subject to change based upon updated information. Follow the SWD Websites: <http://www.mountvernon.wsu.edu/ENTOMOLOGY/main/index.html> and <http://swd.hort.oregonstate.edu>.

Monitoring Traps:

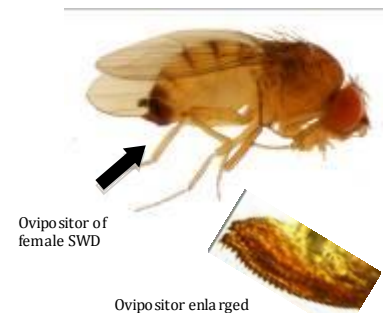
Use a 16 or 32 oz plastic cup or “clear” deli container with several (7-10) 1/8 to 3/16-inch holes drilled or punched around the top edge of the cup for fly entry. Leave a 3-inch pour space on one side of the container to decant vinegar. Add ≈1 to 1 ½ inches of pure apple cider vinegar (not artificially-flavored), 1-2 drops of unscented dish soap and snap the lid in place. Hang trap on plant or on stake 3-5 ft above the ground within the shady, cool caneberry canopy. Entrance holes should be clear of leaves and fruit to allow easy entry by flies. Check traps for flies and replace vinegar weekly. Don't pour the spent vinegar on the ground. Remove it from the field and dispose elsewhere.



Male SWD

Trap contents can be filtered over a fine screen or coffee drip filter placed in a hand-held colander and examined with the naked eye or with a 10X-14X hand lens for easy viewing of male flies. Refer to the identification guide for *D. suzukii*: http://swd.hort.oregonstate.edu/files/webfm/editor/ID_D_suzukii_060210_sm.pdf

Female SWD are more difficult to distinguish than males and require magnification to see the ovipositor (egg-laying appendage). Several non-economic vinegar flies possess more rounded ovipositors and may be easily mistaken for SWD.



Ovipositor of female SWD

Ovipositor enlarged

Larval Extraction from fruit:

Collect suspect fruit (e.g., oviposition scars, soft and bruised areas) to determine if fruit is infested with SWD larvae. A salt solution will irritate the larvae causing them to wiggle out of the holes in fruit.

Salt-Water solution: dissolve 1/4 cup plain salt in 4 cups warm water.

- Place fruit in a shallow pan and cover with salt solution.
- Watch the fruit closely for at least 10-15 minutes to observe larvae exiting the fruit out of egg-laying holes.
- Detection of small larvae may require the use of a hand lens and good lighting. If a quantitative sample is necessary, count quickly while the larvae are still moving.



Chemical Control:

Fruit appears to be susceptible from first green-pink color through harvest. Traditional clean-up application of Brigade®/Capture® 3 days before first machine harvest will control leafroller larvae, other insect contaminants and egg laying SWD on ripening and maturing fruit. This first protective spray should provide 5-7 days of control. If subsequent trap captures of SWD occur in the field when fruit is ripening, then follow with 7 day rotations of the organophosphate (Malathion®), pyrethroid Mustang Max® (zeta cypermethrin) providing approximately 7-10 and 10-14 days of control, respectively, and Delegate® (spinetoram) which provides 5-7 days of control. These spray applications for SWD will also control harvest populations of aphids, leafhoppers, root weevils and western raspberry fruitworm. Entrust® (spinosad) is the only organic product with residual activity (5-7 days control). Another organic product, Pyganic® has no residual but applications at 5 day intervals at the high labeled rate have reportedly reduced SWD populations in California. Results from 2010 laboratory studies on the residual activity of various insecticides can be found at:

<http://www.mountvernon.wsu.edu/ENTOMOLOGY/main/index.html> and at the central SWD website: http://swd.hort.oregonstate.edu/files/webfm/editor/SWD_Pesticide_Update_June_2010.pdf.

Water volumes of 40 to 100 gpa for these foliar applications are common and dependent on plant size and amount of canopy foliage present. Consider REI (restricted entry interval), PHI (preharvest interval), MRL (maximum residue level), surface water and buffers, and safety to pollinators and other beneficial arthropods when selecting a product. Remember to rotate classes of insecticides to delay possible development of insecticide resistance. To address pollinator safety, make early morning or late evening applications of all products. Refer to PNW591, <http://extension.oregonstate.edu/catalog/pdf/pnw/pnw591.pdf> for more detailed information on how to reduce bee poisoning from pesticides.

Sanitation Practices: Consider including sanitation or clean-up practices in your management program, when practical. Destroy leftover fruit on the plant to reduce fly's breeding sites and food supply. This will prevent SWD from utilizing the fruit. Properly dispose of and/or destroy infested fruit that falls on the ground. Various sanitation methods were tested in 2010 and will continue in 2011. Two sanitation methods that proved to be the most consistent and efficacious in killing SWD larvae in fruit are:

- **Solarizing:** Tightly seal 1-2 mil clear plastic sheeting over fruit in sunny location, *or*
- **Bagging:** Place infested fruit in a clear or black plastic bag and seal.

Other Considerations: A higher number of SWD females compared to male flies were captured in traps early in the season of 2010. Therefore counting only males may result in false negatives and failure to treat for SWD when they may actually be present. Track SWD numbers in your area by following the statewide monitoring and mapping program: <http://berrygrape.org/maps/or-county-map/>. Both male and female flies are being recorded at this site.