

Fruit Insects

Department of Entomology

SPOTTED WING DROSOPHILA (*Drosophila suzukii*)

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Introduction

Spotted Wing Drosophila (SWD) are small invasive vinegar flies which can damage many fruit crops. 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 Indiana in the fall of 2012. Unlike the majority of its harmless relatives SWD has the potential to be a major pest of many fruit crops including; blueberry, grape, cherry, raspberry, blackberry, peach, plum and strawberry. The female of the species is equipped with a large serrated ovipositor which can saw through the soft skin of many ripening fruits where she lays her eggs. The larvae rapidly develop within the fruit.

inside the fruit causing it to collapse. SWD pupate inside or outside of the fruit, pupal casings can often be found imbedded in the skin of fruits. The speed of development is dependent on temperature.



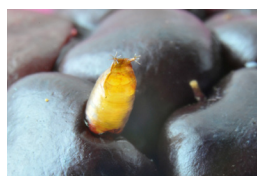
Figure 1. SWD damage in blackberries. SWD infestation causes puncture wounds, softening, wrinkling, and collapse. (Photo by John Obermeyer, Purdue University)

Life Cycle

Eggs are laid on or inside of fruit; a female can lay as many as 350 eggs in a lifetime. The larvae feed and develop



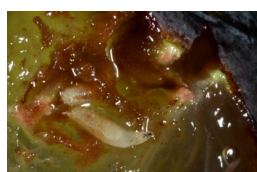
Adult 20-30 days



Pupation 4-15 days



Mating



Larvae 5-7 days



Oviposition
350 eggs a lifetime



Eggs 12-72 hours

Figure 2. Life cycle diagram. (Photos by John Obermeyer, Purdue University)

Spotted Wing Drosophila

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Identification

SWD are named after the characteristic black spots found on the wings of males. Males also have 2 black bands on their forelegs. Females do not have spots or bands; they can be identified by the large serrated ovipositor that they use to lay eggs within fruit.

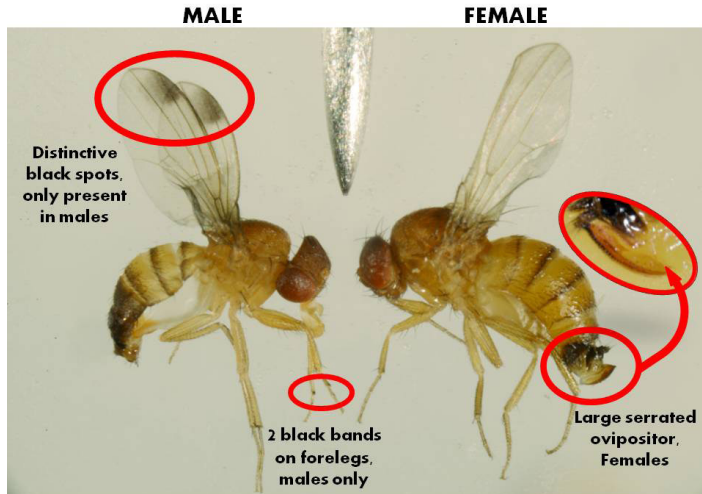
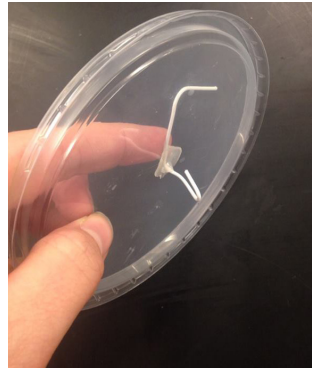


Figure 3. SWD identification. (Photo by John Obermeyer, Purdue University)

Monitoring

Early detection is important to the management of SWD. Traps used for monitoring should be placed in the field at least 2 weeks before fruit ripening and monitored every week. Traps should be placed at bush level close to the developing fruit, preferably along the edges of the field that have wooded borders. Inspect the trap solution and the yellow sticky card for SWD males and females. Once SWD has been detected you may wish to simplify your inspection by only counting males which are representative of the total population.



To make a monitoring trap you will need a 32 oz. deli cup with lid. Use a soldering iron or a drill with a 3/16 inch drill bit to place 12 holes into the top of the cup. Place 2 holes at the very top on opposite sides; these will be used to hang the trap. Evenly space the other 10 holes around the top inch of the

cup, $\frac{3}{4}$ of the way around. Leave 1 side intact so the contents can be poured out when full. Tread a nylon cord through the top 2 holes to make a handle.

Tread a paper clip through a small hole in the center of the lid and glue it in place. Use this to hang a yellow sticky card.



Mix up attractive solution with 3 cups water, 8 Tbs. sugar, 2 Tbs. yeast and 2 drops unscented dish soap.

Fill trap with 150 ml of attractive solution, this recipe makes enough for 4 traps. The yeast solution is actively fermenting, so make as needed and use immediately.

Your trap is now ready to hang. (Photos by Caryn Michel and John Obermeyer, Purdue University)





Figure 4. Male SWD are more easily recognizable on yellow sticky cards because of their prominent spots. The female however is less visible because the serrated ovipositor may be retracted into the abdomen. Pressing lightly on the abdomen may help pop the ovipositor out for inspection. (Photo by John Obermyer, Purdue University)

Salt Float

To inspect fruit for SWD larvae a simple salt float can be performed. This is a good method of evaluating the effectiveness of your SWD management program and insuring the quality of your product. Salt water will irritate any larvae present into emerging from the fruit and they will float to the surface of the salt water.

To do this you will need a 9x13 in. baking pan and a piece of ¼ in. hardware cloth cut to fit inside. Lay 1 quart of berries



Figure 5. Salt float method. (Photos by Caryn Michel and Dean Polk)

Sanitation

Sanitation is important to SWD management. Like its relatives, SWD enjoy 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.

Chemical Control

SWD management relies heavily on the use of insecticides. There are several insecticides which have been labeled for the control of SWD. 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 dawn and dawn application with full foliar coverage may be the most effective. The following insecticide information is courtesy of Rick Foster, Purdue University. Contact your local extension agent for complete spray recommendations.

Insecticides for Spotted Wing Drosophila in Caneberries						
Product	Rate/Acre	Class	Efficacy	PHI (days)	Interval Between Sprays (days)	Seasonal Use Limits
Malation 8F	2 pints	Organophosphate	***	1	7	4 Sprays
Brigade WSB	8-16 oz.	Pyrethroid	****	3	7	32 oz.
Mustang Max 0.8 EC	4 fl. oz.	Pyrethroid	****	1	7	24 fl. oz.
Danitol 2.4 EC	16 fl. oz.	Pyrethroid	****	3	14	32 fl. oz.
Delegate WG	6 oz.	Spinosyn	****	1	4	19.5 fl. oz.
Entrust SC*	4-6 fl. oz.	Spinosyn	***	1	5	29 fl. oz./6 Sprays
Pyganic 1.4 EC*	64 fl. oz.	Pyrethrin	**	0.5	0	None

* = OMRI approved

Insecticides for Spotted Wing Drosophila in Blueberries						
Product	Rate/Acre	Class	Efficacy	PHI (days)	Interval Between Sprays (days)	Seasonal Use Limits
Malation 8F	2.5 pints	Organophosphate	***	1	7	2 Sprays
Imidan 70W	1.33 lb.	Organophosphate	****	3	No Restriction	5 Applications
Lannate SP	0.5-1 lb.	Carbamate	****	3	5	4 Applications
Brigade WSB	5.3-16 oz.	Pyrethroid	****	1	7	80 oz.
Mustang Max 0.8 EC	4 fl. oz.	Pyrethroid	****	1	7	24 fl. oz.
Danitol 2.4 EC	10.67-16 fl. oz.	Pyrethroid	****	3	14	2 Applications
Delegate WG	3-6 oz.	Spinosyn	****	3	6	6 Applications
Entrust SC*	4-6 fl. oz.	Spinosyn	***	3	6	29 fl. oz./6 Sprays
Pyganic 1.4 EC*	64 fl. oz.	Pyrethrin	**	0	0	None

* = OMRI approved

Insecticides for Spotted Wing Drosophila in Grapes						
Product	Rate/Acre	Class	Efficacy	PHI (days)	Interval Between Sprays (days)	Seasonal Use Limits
Malation 8F	1.88 pints	Organophosphate	***	3	14	2 sprays
Imidan 70W	1.33-2.125 lb.	Organophosphate	****	7-14	As necessary	6.25 lb.
Brigade WSB	8-16 oz.	Pyrethroid	****	30		16. oz.
Mustang Max 0.8 EC	2-4 fl. oz.	Pyrethroid	****	1	7	24 fl. oz.
Danitol 2.4 EC	10.67-21.67 fl. oz.	Pyrethroid	****	21	7	42.67 fl. oz.
Delegate WG	3-5 fl. oz.	Spinosyn	****	7	4	19.5 fl. oz.
Entrust SC*	4-8 fl. oz.	Spinosyn	***	7	5	29 fl. oz./5 sprays
Pyganic 1.4 EC*	64 fl. oz.	Pyrethrin	**	0	0	None

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Insecticides for Spotted Wing Drosophila in Strawberries						
Product	Rate/Acre	Class	Efficacy	PHI (days)	Interval Between Sprays (days)	Seasonal Use Limits
Brigade WSB	16 oz.	Pyrethroid	****	0	7	16 oz.
Danitol 2.4 EC	10.67-21.67 fl. oz.	Pyrethroid	****	2	7	42.67 fl. oz.
Radiant SC	6-10 fl. oz.	Spinosyn	****	1	4	19.5 fl. oz.
Entrust SC*	4-6 fl. oz.	Spinosyn	***	1	5	29 fl. oz./5 sprays
Pyganic 1.4 EC*	64 fl. oz.	Pyrethrin	**	0	0	None

* = OMRI approved

Tables courtesy of Rick Foster, Extension Entomology, Purdue University

READ AND FOLLOW ALL LABEL INSTRUCTIONS. THIS INCLUDES DIRECTIONS FOR USE, PRECAUTIONARY STATEMENTS (HAZARDS TO HUMANS, DOMESTIC ANIMALS, AND ENDANGERED SPECIES), ENVIRONMENTAL HAZARDS, RATES OF APPLICATION, NUMBER OF APPLICATIONS, REENTRY INTERVALS, HARVEST RESTRICTIONS, STORAGE AND DISPOSAL, AND ANY SPECIFIC WARNINGS AND/OR PRECAUTIONS FOR SAFE HANDLING OF THE PESTICIDE.

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