



# Spotted Wing Drosophila

## Part 4: Management

Spotted wing drosophila (SWD) is a vinegar fly that can lay eggs in fruit as it ripens; thus, larvae (maggots) may be present in the fruit by harvest. Growers should monitor for this pest when fruit begins to ripen, correctly identify it, and take judicious steps for treatment when needed.

In the pest's brief history in the United States, SWD populations have been highest in late summer and early fall. Therefore, late season fruit crops, such as fall raspberries, late season blackberries, and day-neutral strawberries, have suffered the most damage in Pennsylvania and Maryland. Utilizing all means of management—including cultural and chemical options—is recommended. The most suitable strategies for any farm will vary with the crop and circumstances.

### Cultural Management

#### Harvest Practices

Harvest thoroughly. All ripe and cull fruit should be removed from the planting. Paying someone to remove old fruit may be worth the cost. In pick-your-own plantings, consider rewarding customers for removing unmarketable berries as well as sound ones.

In crops that are harvested many times, such as raspberries, keep harvest intervals short and pick the fruit as soon as possible. In some raspberry plantings, this strategy alone has arrested problems with SWD—even without applying insecticides—as long as the entire planting was kept clean. On other farms, this strategy alone has been insufficient, which may be related to the presence of other host crops.

#### Disposal of Unwanted Fruit

Dispose of unwanted fruit in a way that will keep fruit flies from feeding on it or from hatching from it. SWD and other fruit fly species will continue to multiply in cull fruit, so remove cull fruit from the field and destroy it or bury it a minimum of 2 feet deep. Crushing the fruit does not hamper SWD emergence from it.

SWD can easily multiply in and emerge from fruit that is below critical temperatures in compost piles. In fact, SWD development may be accelerated in warm areas of the pile. Thus, composting fruit is currently not recommended. However, research in Oregon has found that sealing fruit in plastic bags or on the ground with plastic and then exposing it to full sun for at least a week kills all eggs and larvae.

### Field Management

SWD will multiply on wild fruit (raspberries or blackberries in hedgerows, mulberries, wild cherries, etc.) as well as cultivated fruit, and thus wild stands of these hosts can be reservoirs of SWD. Wild plants also serve as sources of diseases, and even though they may provide refuge and food for pollinators, their removal is generally recommended.

Renovate June-bearing (short-day) strawberry fields promptly. Though SWD has not been problematic on June-bearing strawberries yet, SWD could multiply on strawberries that remain in the field after harvest. Early cultivars could be renovated sooner than late cultivars.

### Trapping

Traps are typically used to detect adult SWD and determine whether control measures are needed, not for control (see the Penn State Extension fact sheet “Spotted Wing Drosophila, Part 3: Monitoring”). However, research in Japan has indicated that intensive trapping (60–100 vinegar traps per acre) decreased SWD numbers. A commercial manufacturer of SWD traps recommends using traps at the end of the season to mop up late season SWD that could overwinter.

### Exclusion

Screening may protect individual plants or crops in protected culture such as high tunnels or greenhouses. In Japan, using extremely fine mesh with openings less than 0.98 millimeter (0.039 inches) wide (18 mesh or finer) protected blueberries. If screening is used, venting can be problematic. Some means of increasing air flow such as using fan will be required, as will pollinator introduction if the crop is in bloom.

### Biocontrols

Several predatory insects feed on SWD adults and pupae, but not yet in sufficient quantities to provide significant control. A tiny predatory wasp that parasitizes SWD pupae is present in the Pacific Northwest and Mid-Atlantic region and therefore may be found in other regions as well. Research is needed to understand whether and how this species may be utilized in long-term SWD management.

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Trade Name	Active Ingredient	Preharvest Interval (days) <sup>a</sup>				Effectiveness	Length of Residual Activity
		Raspberries	Blackberries	Strawberries	Cherries		
<b>Pyrethroids and Pyrethrins (IRAC Activity Group 3A)</b>							
Brigade	bifenthrin	3	3	0	X	Excellent	7 days
Danitol	fenpropathrin	3 <sup>b</sup>	3 <sup>b</sup>	2 <sup>b</sup>	3 <sup>b</sup>	Excellent	7 days
Baythroid	beta-cyfluthrin	X	X	X	7 <sup>b</sup>	Excellent	7 days
Mustang Max	zeta-cypermethrin	1 <sup>b</sup>	1 <sup>b</sup>	X	14 <sup>b</sup>	Excellent	7 days
PyGanic <sup>c</sup>	pyrethrins	0	0	0	0	Good <sup>d</sup>	0–2 days
<b>Spinosyns (IRAC Activity Group 5)</b>							
Delegate	spinetoram	1 <sup>b</sup>	1 <sup>b</sup>	X	7 <sup>b</sup>	Excellent	5–7 days
Radiant	spinetoram	X	X	1	X	Excellent	5–7 days
Spintor	spinosad	1	1	1	7	Excellent	5–7 days
Success	spinosad	1 <sup>b</sup>	1 <sup>b</sup>	1	7 <sup>b</sup>	Excellent	5–7 days
Entrust <sup>e</sup>	spinosad	1 <sup>b</sup>	1 <sup>b</sup>	1	7 <sup>b</sup>	Excellent	5–7 days
<b>Organophosphates (IRAC Activity Group 1B)</b>							
Malathion	malathion	1	1	3	3	Excellent	>7 days
Diazinon	diazinon	X	X	5	21	Excellent	>7 days

- "X" = the material is not labeled for use on the crop.
- 2(ee) labels have been issued for use against SWD on this crop.
- May be used in organic production. For PyGanic, the REI is 12 hours even though the PHI is 0 days.
- Provides knockdown of nonresistant populations but has little or no residual activity.

## Chemical Management

At present, pesticide spray recommendations target adults to minimize the number of eggs laid and thus larvae in fruit. Pesticides in three activity groups—pyrethroids (IRAC activity group 3), spinosyns (activity group 5), and organophosphates (activity group 1B)—have shown fairly good efficacy against SWD adults. Neonicotinoids have not been very effective against adults, although they may have some effectiveness against eggs and larvae in the fruit. More research is necessary before recommendations can be made for the control of immature stages.

Using pesticides in different chemical classes is a must; resistance development is very likely since many generations of SWD occur per year. In fact, resistance to natural pyrethrins has already been reported in West Coast SWD populations.

Applying sprays without knowing whether SWD is present is not recommended, as populations of beneficial predatory insects and pollinators may be needlessly decimated. See the Penn State Extension fact sheet "Spotted Wing *Drosophila*, Part 3: Monitoring" for more information.

Using materials for which a FIFRA 2(ee) label for SWD management has been issued is prudent, as rates for SWD control will be listed on the label and effectiveness of the product has been established. Most states also allow use of other products that do not have SWD listed on the label, as long as the use pattern (crop, rate, timing, etc.) is the same as for other pests listed, label restrictions do not preclude the use, and a recommendation for use has been made by a company or individual. However, some other states (New York, for example) allow products to be targeted against only pests listed on the label and therefore must have a 2(ee) exemption. Laws and their interpretations are subject to change.

The table above lists insecticides that have been effective against SWD for the four crops at greatest risk of damage from SWD: raspberries, blackberries, strawberries (day-neutral varieties), and cherries. Materials with a long preharvest interval may be used immediately postharvest to knock back populations that will feed on any remaining overripe or dropped fruit.

Residual activity has sometimes been reported to be shorter than what is listed above, so a close watch of traps for return of adults will be needed. All materials listed work on SWD primarily by contact, so spray coverage should be thorough. Use a higher volume of water than usual or include a spreader/sticker surfactant to increase coverage.

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