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How do I manage Spotted Wing Drosophila (SWD) in my garden?

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Spotted wing drosophila (SWD), an invasive insect originally from Asia, showed up in California in 2008 and has since been reported in most states as well as parts of Canada. SWD was first reported in the Northeast in 2011. Since 2012, adult SWD have been causing wide-spread injury to some berry crops in NY where management measures are not being used.

SWD becomes particularly abundant in NY during the second half of the summer (August and September). Raspberries and blackberries are particularly susceptible, especially fall-bearing cultivars. Late-maturing blueberries are also vulnerable. So far, June-bearing strawberries have escaped economic injury, although day-neutral strawberry varieties, during late summer, are vulnerable. Elderberries, cherries, and peaches are also susceptible. SWD is able to utilize grapes to some extent but they do not appear to be a preferred host. However, if grapes have cracks, bird damage, hail damage, etc. they can be heavily infested with both SWD and other species of fruit fly. Note that SWD also infests and may build up in a number of wild hosts that produce fruit in mid to late summer, including dogwood, bush honeysuckle, buckthorn, autumn olive, and pokeweed. For a list of hosts consult www.fruit.cornell.edu/spottedwing/cropshosts.html.

SWD appear similar to other vinegar flies. Adult flies are 2-3 mm in length, with red eyes and a tan-colored body with darker bands on the abdomen. Males have characteristic single spots at the leading edge of the tip of the wing and two dark bands made of hairs on their front legs. Females lack wing and leg spots, but are distinguished by a robust, serrated ovipositor (visible under magnification). Larvae are white, nondescript and legless. For more information on the biology and management of SWD, consult the fact sheets on spotted wing drosophila (SWD) listed below:

- Spotted Wing Drosophila, A new, destructive pest on berries, cherries, peaches and plums nysipm.cornell.edu/invasives_exotics/swd_bro.pdf
- Spotted Wing Drosophila, Part 1: Overview and Identification: pubs.cas.psu.edu/FreePubs/PDFs/ee0042.pdf.
- Spotted Wing Drosophila, Part 2: Natural History: pubs.cas.psu.edu/FreePubs/PDFs/ee0043.pdf
- Spotted Wing Drosophila, Part 3: Monitoring: pubs.cas.psu.edu/FreePubs/PDFs/ee0044.pdf.
- Spotted Wing Drosophila, Part 4: Management: pubs.cas.psu.edu/FreePubs/PDFs/ee0045.pdf.

The Cornell Fruit Resources website offers information on SWD monitoring and management for NYS: www.fruit.cornell.edu/spottedwing/.
Michigan State University (www.ipm.msu.edu/invasive_species/spotted_wing_drosophila) and Oregon State University (swd.hort.oregonstate.edu) are two additional sites to consult.

Ripening and ripe fruit are susceptible to SWD attack, but the adults appear to be only mildly attracted to unripe fruit. If adult SWD are present in your home garden, manage them *aggressively*.

Aggressive management entails:

1. *Excellent sanitation*: Fruit should be harvested frequently and cleanly. Remove culled fruit from the field and either freeze it, "bake it" in clear plastic bags placed in the sun, or dispose of it off-site. This will kill larvae, remove them from your garden, and prevent them from emerging as adults.

2. *Canopy and water management*: Prune plants to maintain an open canopy. This may make plantings less attractive to SWD and will improve spray coverage. Leaking trickle irrigation lines should be repaired, and overhead irrigation should be minimized. Allow the ground and mulch surface to dry before irrigating.

3. Insecticide treatments: Before applying a pesticide, always read and follow all directions on the pesticide's label. Be sure to look for and follow any restrictions on when you may harvest your fruit after applying an insecticide. Pre-emptive insecticide treatment beginning when susceptible fruit first begins to color and continuing to harvest, according to the label instructions, will help protect fruit from infestation. Treatments should be repeated in the event of rain. Choose the most effective insecticides, when known. Alternating the use of insecticides with different active ingredients will reduce the chance of insecticide resistance developing in SWD. If fruit infestations occur, practice complete sanitation, as described in 1 above, and immediately apply an insecticide spray. See table below for a list of insecticide products. For insecticides that work primarily through ingestion (e.g. spinosad, acetamiprid), adding a small amount of cane sugar (2 tsp/gallon water) to the spray tank mix can improve results. **Never apply insecticides during bloom or when bees are active**.

4. *Monitoring for SWD with baited traps*: For more information on trap construction and baiting, see www.fruit.cornell.edu/spottedwing/pdfs/SWDTraps_CornellFruit.pdf. Traps should be hung in mid-canopy or on the north side of the row. Check the traps daily or weekly. Traps using currently suggested baits are moderately effective in giving early warning of SWD presence in a planting and can indicate relative numbers of SWD in an area, such as after treatment with insecticide. Also consult your local extension office or SWD web sites for reports on SWD monitoring in your area.

5. *Fruit sampling*: Check at least 25 fruit for infestation between sprays to determine spray efficacy. Fruit can be analyzed for larvae by placing about 25 fruit randomly gathered from the garden into a Ziploc bag. Add a saltwater solution (1-2 tsp salt per cup of water) and leave for 15 minutes for the larvae to emerge from the fruit. Look for small, white larvae floating in the salt water.

6. *Cooling berries immediately*: Chilling berries immediately after harvest to 34° to 36° F will slow or stop the development of larvae and eggs in the fruit.

7. *Use of Insect Exclusion Netting*: For small plantings, use of insect exclusion netting (1 mm (1/32 inch) mesh) may protect the planting from infestation.

Homeowner Insecticides Labeled for Use against Spotted Wing Drosophila (SWD)

Product Name	EPA Reg. No.	Active Ingredient	Efficacy[1]	Fruit Crops Labeled for Use On:
BONIDE CAPTAIN JACK'S DEADBUG BREW FLOWER & VEGETABLE GARDEN DUST	4-479	Spinosad	Very good	apricots, cherries, nectarines, peaches, plums, prunes, bushberries[2] and caneberries[3]
BONIDE CAPTAIN JACK'S DEADBUG BREW CONCENTRATE	4-471	Spinosad	Very good	apricots, cherries, nectarines, peaches, plums, prunes, bushberries[2,4], and caneberries[3,4]
BONIDE CAPTAIN JACK'S DEADBUG BREW RTS	4-471	Spinosad	Very good	apricots, cherries, nectarines, peaches, plums, prunes, bushberries[2,4], and caneberries[3,4]
FERTI-LOME BORER, BAGWORM, LEAFMINER & TENT CATERPILLER SPRAY	62719-314-7401	Spinosad	Very good	apricots, cherries, nectarines, peaches, plums, prunes, and bushberries[2,4]
BULLS-EYE BIOINSECTICIDE	62719-314-56872	Spinosad	Very good	apricots, cherries, nectarines, peaches, plums, prunes, and bushberries[2,4]
MONTEREY GARDEN INSECT SPRAY	62719-314-54705	Spinosad	Very good	apricots, cherries, nectarines, peaches, plums, prunes, and bushberries[2, 4]
PROTECTOR PRO	62719-314-87130	Spinosad	Very good	apricots, cherries, nectarines, peaches, plums, prunes,bushberries[2, 4] and caneberries[3, 4]
SPINOSAD 0.5% SC	62719-314	Spinosad	Very good	apricots, cherries, nectarines, peaches, plums, prunes, and bushberries[2, 4]
ORTHO BUG B GON SYSTEMIC INSECT KILLER CONCENTRATE	8033-107-239	Acetamiprid	Good	apple, pear, apricot, cherry (sweet and tart), nectarine, peach, plum (chickasaw, damson, Japanese), plumcot, prune (fresh), grapes, strawberries and other low-growing berries, blueberries and other bush and caneberries[3].
ORTHO FLOWER FRUIT & VEGETABLE INSECT KILLER CONCENTRATE	8033-107-239	Acetamiprid	Good	apple, pear, apricot, cherry (sweet and tart), nectarine, peach, plum (chickasaw, damson, Japanese), plumcot, prune (fresh), grapes, strawberries and other low-growing berries, blueberries and other bush[2] and caneberries[3].
ORTHO FLOWER, FRUIT & VEGETABLE INSECT KILLER READY-SPRAY II	8033-107-239	Acetamiprid	Good	apple, pear, apricot, cherry (sweet and tart), nectarine, peach, plum (chickasaw, damson, Japanese), plumcot, prune (fresh), grapes, strawberries and other low-growing berries, blueberries and other bush[2] and caneberries[3].
ORTHO FLOWER FRUIT & VEGETABLE INSECT KILLER	8033-107-239	Acetamiprid	Good	apple, pear, apricot, cherry (sweet and tart), nectarine, peach, plum

Product Name	EPA Reg. No.	Active Ingredient	Efficacy[1]	Fruit Crops Labeled for Use On:
READY-SPRAY				(chickasaw, damson, Japanese), plumcot, prune (fresh), grapes, strawberries and other low-growing berries, blueberries and other bush[2] and caneberries[3].
GARDENTECH WORRY FREE BRAND READY TO USE	1021-1801-71004	Piperonyl butoxide; pyrethrins	Poor	blackberries, blueberries, currants, elderberries, grapes, raspberries (black and red), strawberries, apples, apricots, cherries (sweet and sour), nectarines, pears, peaches, plums, and prunes
GARDENTECH WORRY FREE BRAND READY TO USE DUST	1021-2564-71004	Pyrethrins	Poor	apples, pears, cherries, peaches, apricots, nectarine, plums, grapes, strawberries, and berries
BONIDE TOMATO & VEGETABLE READY TO USE	67702-15-4	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries.
ORTHO BUG-B-GON 3-IN-1 ROSE & FLOWER CARE READY-TO-USE	67702-15-239	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries
ORTHO ELEMENTALS 3-IN-1 FLOWER, FRUIT & VEGETABLE CARE	67702-15-239	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries.
READY-TO-USE WORRY FREE BRAND 3 IN 1 GARDEN SPRAY	67702-15-33116	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries
BAYER ADVANCED NATRIA FRUIT & VEGETABLE RTU	67702-15-72155	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries
BAYER ADVANCED NATRIA INSECT, DISEASE & MITE CONTROL READY-TO-USE	67702-15-72155	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries
WHITNEY FARMS 3-IN-1 ROSE & FLOWER CARE	67702-15-73327	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries
EARTH-TONE 3 N 1 DISEASE CONTROL	67702-15-83598	Sulfur; pyrethrins	Poor?	all fruits
BONIDE CITRUS, FRUIT & NUT ORCHARD SPRAY CONCENTRATE	67702-17-4	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries
BONIDE CITRUS, FRUIT & NUT ORCHARD SPRAY RTS	67702-17-4	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries
BONIDE TOMATO & VEGETABLE READY TO SPRAY	67702-17-4	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries.
BONIDE TOMATO & VEGETABLE CONCENTRATE	67702-17-4	Sulfur; pyrethrins	Poor?	apple, cherry, nectarine, peach, pear, plum, prune, blackberries, blueberries, currant, gooseberries, grapes, raspberries, strawberries
GREEN LIGHT NEEM CONCENTRATE	70051-2-869	Neem oil	Poor	all fruits

Product Name	EPA Reg. No.	Active Ingredient	Efficacy[1]	Fruit Crops Labeled for Use On:
BONIDE NEEM OIL FUNGICIDE-MITICIDE-INSECTICIDE CONCENTRATE	70051-2-4	Neem oil	Poor	all fruits
TRIPLE ACTION NEEM OIL	70051-2-829	Neem oil	Poor	all fruits
GARDEN SAFE BRAND FUNGICIDE 3 CONCENTRATE	70051-2-39609	Neem oil	Poor	all fruits
GARDEN SAFE BRAND NEEM OIL EXTRACT CONCENTRATE	70051-2-39609	Neem oil	Poor	all fruits
SAFER BRAND GARDEN DEFENSE MULTI-PURPOSE SPRAY CONCENTRATE	70051-2-42697	Neem oil	Poor	all fruits
NEEM CONCENTRATE	70051-2-85827	Neem oil	Poor	all fruits
NEEM OIL FUNGICIDE-MITICIDE-INSECTICIDE READY TO USE	70051-13-4	Neem oil	Poor	all fruits
BONIDE ROSE RX 3 IN 1	70051-13-4	Neem oil	Poor	all fruits
GARDEN SAFE BRAND FUNGICIDE 3	70051-13-39609	Neem oil	Poor	all fruits
MONTEREY NEEM OIL RTU (READY-TO-USE)	70051-13-54705	Neem oil	Poor	all fruits
BAYER ADVANCED NATRIA NEEM OIL READY-TO-USE	70051-13-72155	Neem oil	Poor	all fruits

[1]Estimate of efficacy of the active ingredient against SWD in research trials.

[2]bushberries: Aronia berry; blueberry, highbush; blueberry, lowbush; buffalo currant; Chilean guava; cranberry, highbush; currant, black; currant, red; elderberry; European barberry; gooseberry; honeysuckle, edible; huckleberry; Jostaberry; Juneberry (Saskatoon berry); lingonberry; native currant; Salal; sea buckthorn; cultivars, varieties, and/or hybrids of these.

[3]Caneberries: Blackberry; loganberry; raspberry, black and red; wild raspberry; cultivars, varieties, and/or hybrids of these

[4] Used for suppression only on these crops.