

Spotted Wing Drosophila

A new invasive pest of soft fruit



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Appearance

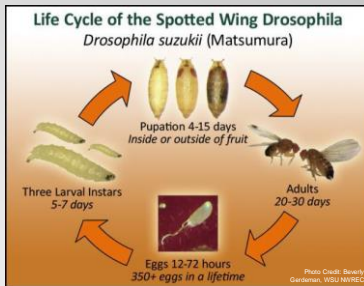
Diptera: Drosophilidae: *Drosophila suzukii*



SWD Male-Note the characteristic dark spot near the tip of each wing
SWD Female-Note the saw-like egg-laying structure (insert); Lacks wing spots

1/16 to 1/8 inch long (2-3 mm)

Life cycle



- Optimal development at 65-70°F
- ~12 day generation time
- 10-12 generations
- Adults live 3-6 weeks
- Female can lay over 300 eggs
- Females can start laying eggs (1-3 at a time) one day after adult emergence
- Limited by high heat in summer and winter cold

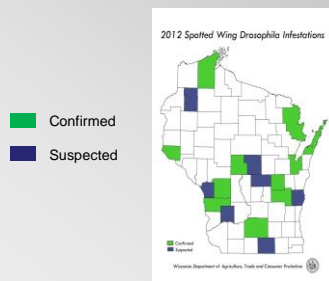
Life cycle: oviposition

Oviposit in ripening and ripe fruit (as opposed to over-ripe fruit)



Distribution

- Native to Asia
- Introduced to continental US in 2008 (California)
- Detected in 2010 in Michigan and Wisconsin (Racine Co.)



Host plants

Highest risk

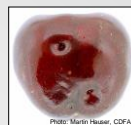
Raspberries
 Blueberries
 Cherries
 Nectarines
 Strawberries
 Blackberries

Moderate risk

Peaches
 Grapes
 Pears
 Apples
 Tomato

Alternate hosts

Snowberry
 Elderberry
 Pokeweed
 Dogwood
 Honeysuckle
 Bittersweet nightshade...



Damage

3-4 days after egg laid



Soft spots



- Skin wrinkles
- Fruit softens
- Fruit becomes juicy



- Mold may appear

After 5 days



- Scarring of tissue
- Collapse of berry
- Fruit becomes juicier

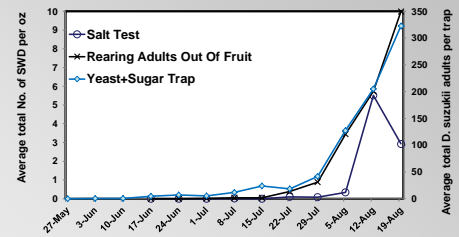


- Mold increases

Photo: Pezart, Whitney, Lic. USDA-ARS, Corvallis

Phenology

MICHIGAN STATE UNIVERSITY



- First sample 13 August from Vernon county
- Exploded in next 2 weeks - still seeing activity mid October

Detection

To see presence of eggs on berry surface:

Look for breathing tubes and pits on fruit surface



To check for larvae:

- Collect sample of coloring fruit
- Place fruits in Ziploc bag
- Crush fruit lightly to break fruit
- Add salt-water mixture (4 cups water ¼ cup salt)
- Leave fruit in mixture for 1h
- Look for larvae floating in the liquid (eggs and smaller larvae difficult to detect)



Confirmation of SWD

To confirm that larvae in fruit are SWD:

- Collect damaged fruits
- Place fruits in Ziploc bag
- When adults emerge, place bag in freezer to stun flies
- ID flies or
- Transfer adults to container with rubbing alcohol
- Ship to: Phil Pellitteri
Insect Diagnostic Lab
Madison, WI 53706

Monitoring

- Plastic 32 oz cup
- Drill or melt ~ten 3/16"-3/8" holes
- Add ~1 inch of bait:
 - apple cider vinegar or
 - 1 tbsp. active dry yeast + 4 tbsp. sugar + 12 oz. water
- Add yellow sticky card or drop of soap
- Hang in fruit canopy near fruit, in shade
- Change bait weekly and dispose off in bucket (not on ground)
- Check weekly and record catches
- Best detection expected as fruit ripen
- 1 trap / acre (vinegar) or 1 / 5-10 acre (yeast/sugar mix)



Photo: Michigan State University

SWD management

- No action threshold for SWD
- If fruit are ripening and SWD flies are trapped:
 1. Increase monitoring intensity to assess fly distribution (check traps at least twice per week)
 2. Use cultural controls where possible
 3. Use registered insecticides from detection until harvest completed

Cultural control

- Netting
 - May be useful to keep flies from attacking fruit on small fruit (e.g. strawberry)
 - Apply before fruit begins to ripen
 - Must be secured at bottom so flies cannot enter
 - Mesh size should be very small

Cultural control

- Minimize build up of SWD
 - Remove native wild hosts (plums, dogwood, honeysuckle,...)
 - Schedule timely harvests
 - Remove over-ripe fruit from fields as soon as possible to minimize SWD egg lay and larval development
 - Pickers with one container to collect good fruit and another container to collect over-ripe fruit

Cultural control

- Dispose off fruit
 - Bag fruit inside plastic bag, seal, and solarize
 - Place clear plastic sheeting over fruit in sunny location and seal around edge with soil (solarize)
 - If bury fruit, at least 2 feet deep!
 - Do NOT compost fruit!!

Chemical control

- Multiple generations, probably no distinct generations
- Continuous increase in activity once flies become active
- Spray intervals should be relatively short (4-5 days) to prevent crop infestation before and during harvest

Chemical control

Class (IRAC)	Trade name	Active ingredient
Carbamate (1A)	Lannate	Methomyl
	Sevin	Carbaryl
Organophosphate (1B)	Imidan	Phosmet
	Malathion	malathion
Pyrethroid (3A)	Mustang Max	zeta-cypermethrin
Pyrethrin	Danitol	fenpropathrin
	Asana	esfenvalerate
	Bifenture	bifenthrin
	Brigade	bifenthrin
	Pyganic OMRI	pyrethrum
Neonicotinoid (4A)	Assail	Acetamiprid
Spinosyn (5)	Delegate	spinetoram
	Entrust OMRI	spinosad

Always follow label guidelines!

Remember to rotate classes of insecticides to delay development of resistance

Organic production

- Organic insecticides less effective than conventional
- Intensive monitoring
- Cultural controls even more important to help reduce overall SWD population level
- Require more timely application
- Shorter intervals between sprays

Note: Entrust is limited to 3 applications per season in caneberries. Rotate Entrust (5 day residual) with Pyganic (2 day residual) to achieve some resistance management

2013 Monitoring for SWD in Wisconsin

- Season-long monitoring (April-October)
- Three traps per location
- Data centralized on website:
<http://labs.russell.wisc.edu/swd>
"2013 Monitoring Project"

