

Spotted Wing Drosophila

A new invasive pest of soft fruit

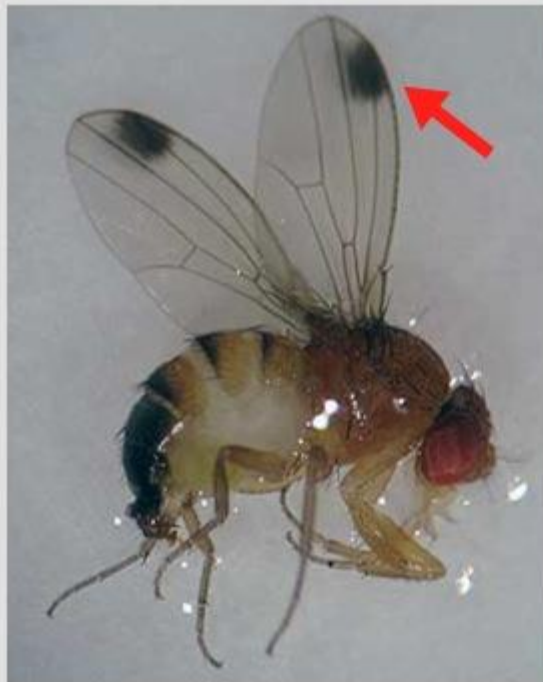


Photo Credit: Beverly Gerdeman, WSU NWREC

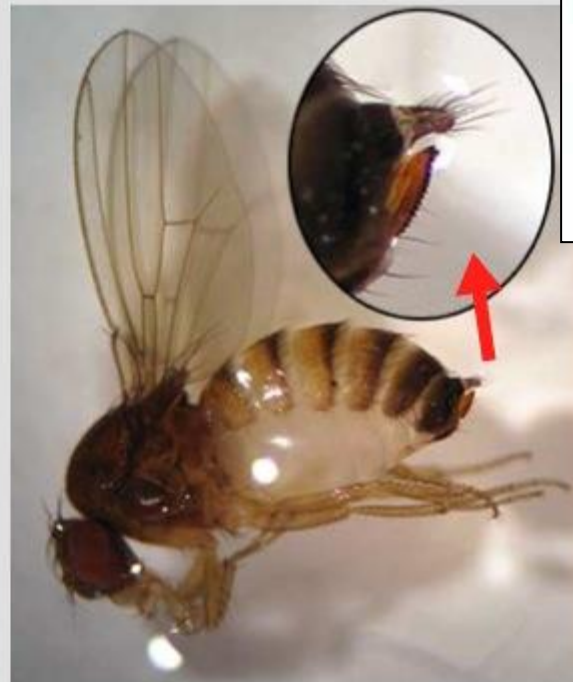
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Appearance

Diptera: Drosophilidae: *Drosophila suzukii*



SWD Male-Note the characteristic dark spot near the tip of each wing



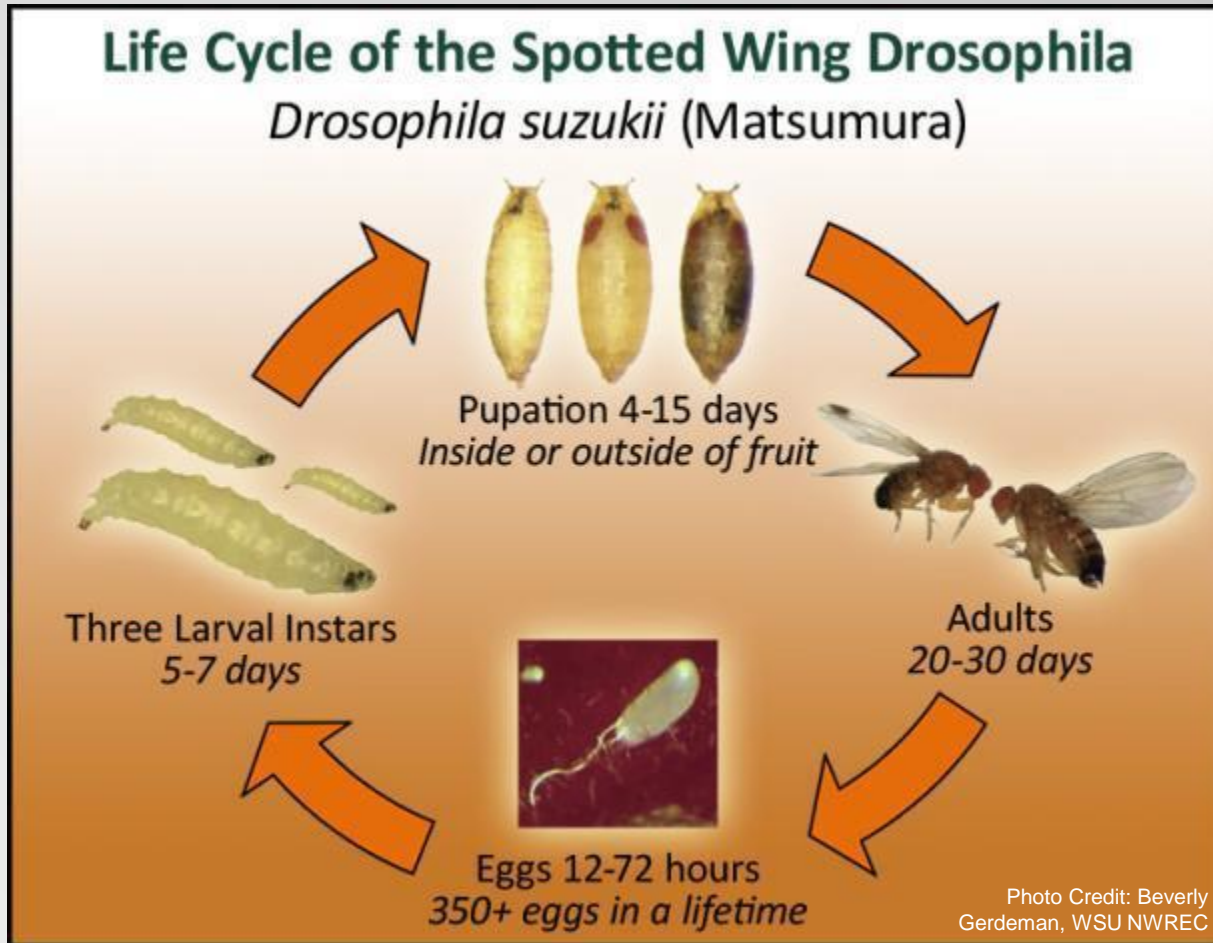
SWD Female-Note the saw-like egg-laying structure (insert); Lacks wing spots

Photo Credits: Shella Fitzpatrick, Agriculture & Agri-Food Canada, Pacific Agri-Food Research Centre, Agassiz



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)

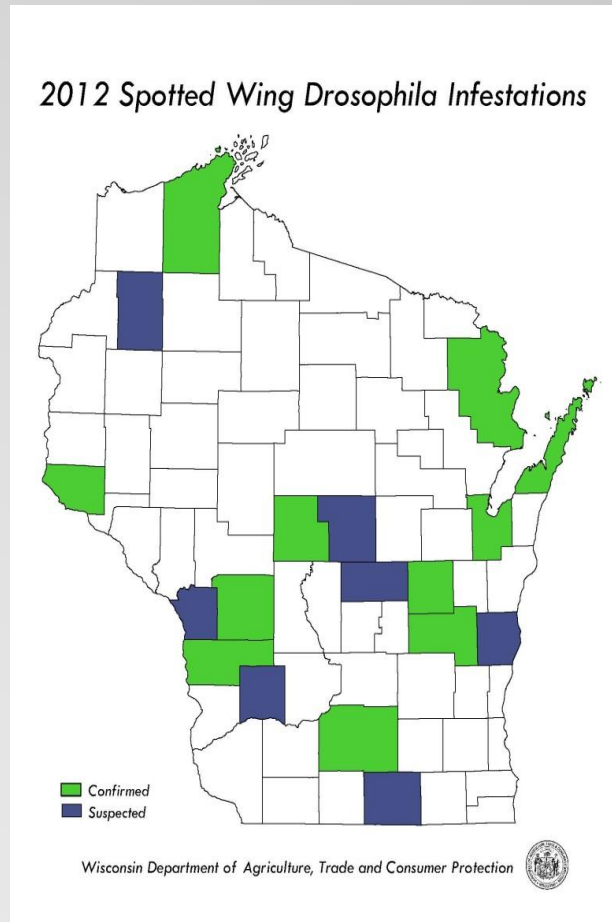


Distribution

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

 Confirmed

 Suspected



Host plants

Highest risk

Raspberries

Blueberries

Cherries

Nectarines

Strawberries

Blackberries

Moderate risk

Peaches

Grapes

Pears

Apples

Tomato

Alternate hosts

Snowberry

Elderberry

Pokeweed

Dogwood

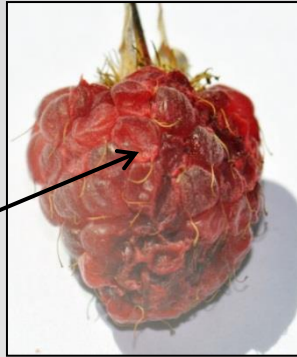
Honeysuckle

Bittersweet nightshade...

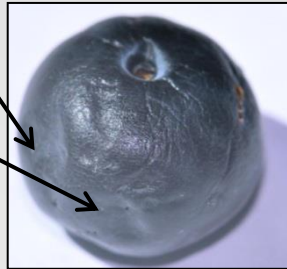


Damage

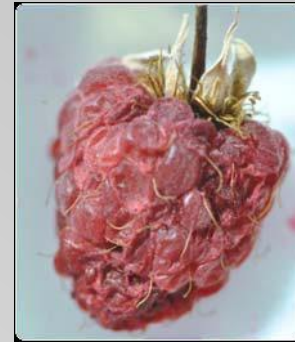
3-4 days after egg laid



Soft spots



After 5 days



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

- Skin wrinkles
- Fruit softens
- Fruit becomes juicy

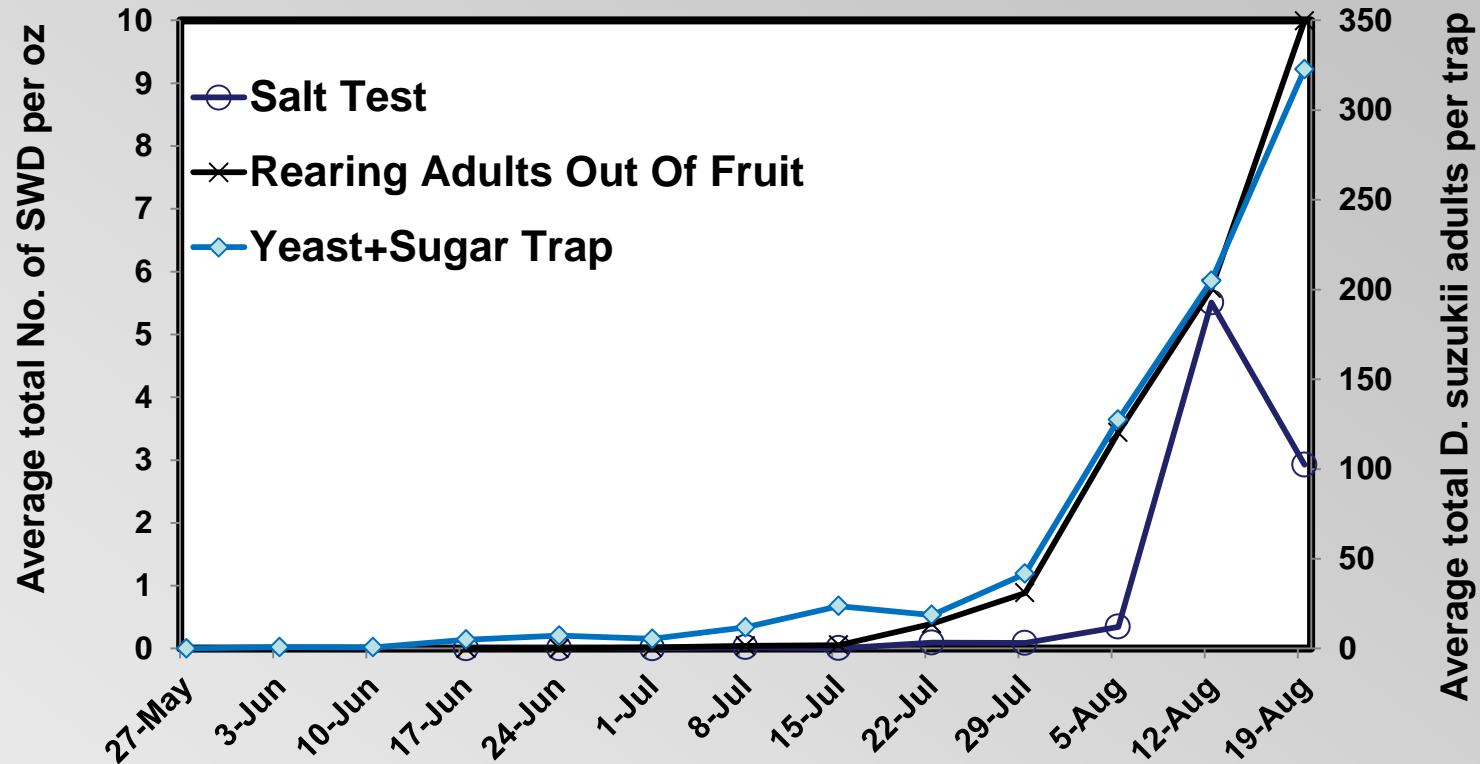


- Mold may appear



- Mold increases

Phenology



- 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 $\frac{1}{4}$ 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”

2012 Spotted Wing *Drosophila* Infestations

