Monitoring and Management of Spotted Wing *Drosophila*

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Spotted Wing Drosophila

Photo by G. Arakelian
## Reported Distribution

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Region</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Native</td>
<td>Washington</td>
<td>Summer 2009</td>
</tr>
<tr>
<td>India</td>
<td>Native</td>
<td>Florida</td>
<td>Summer 2009</td>
</tr>
<tr>
<td>Japan</td>
<td>1931</td>
<td>B. Columbia, CN</td>
<td>Summer 2009</td>
</tr>
<tr>
<td>Other Asia</td>
<td></td>
<td>France</td>
<td>2010</td>
</tr>
<tr>
<td>Hawaii</td>
<td>~1980</td>
<td>Russia</td>
<td>2010</td>
</tr>
<tr>
<td>Spain</td>
<td>2008</td>
<td>South Carolina</td>
<td>Spring 2010</td>
</tr>
<tr>
<td>California</td>
<td>fall 2008</td>
<td>North Carolina</td>
<td>Fall 2010</td>
</tr>
<tr>
<td>Italy</td>
<td>2009</td>
<td>Kentucky</td>
<td>Fall 2010</td>
</tr>
<tr>
<td>Oregon</td>
<td>Summer 2009</td>
<td>Michigan</td>
<td>Fall 2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Louisiana</td>
<td>Fall 2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Utah</td>
<td>Fall 2010</td>
</tr>
</tbody>
</table>
Spotted Wing Drosophila

• Diptera: Drosophilidae *Drosophila suzukii*
  “Fruit flies”, “Vinegar flies”, “Pomace flies”

• Our normal fruit fly *Drosophila melanogaster*

• **NOT**: Tephritidae fruit flies (bigger) Blueberry maggot

Blueberry maggot

*Drosophila melanogaster*
## Some Vulnerable Fruits

<table>
<thead>
<tr>
<th>Florida</th>
<th>California</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raspberries</td>
<td>Previous fruits plus ...</td>
</tr>
<tr>
<td>Blackberries</td>
<td>Cherries</td>
</tr>
<tr>
<td><strong>Blueberries</strong></td>
<td>Nectarines</td>
</tr>
<tr>
<td>Strawberries</td>
<td>Boysenberries</td>
</tr>
<tr>
<td>Grapes (?)</td>
<td>Plums</td>
</tr>
<tr>
<td>Tomatoes (?)</td>
<td>Asian plums</td>
</tr>
<tr>
<td>Peaches</td>
<td>Satsuma plums</td>
</tr>
<tr>
<td>Mulberries</td>
<td>Plumcots</td>
</tr>
<tr>
<td>Orange jessamine</td>
<td></td>
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</tbody>
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Management

Identification

Monitoring Ecology

Use of Natural Enemies

Prevention (exclusion)

Reduced-risk & Conventional Strategies
Correct Identification
Developing a Management Program for *D. suzukii*

Male

Black spot on wings

2 black combs on front legs

Female

Ovipositor that damage the fruit
Where eggs are laid

USDA-ARS & OSU

*D. suzukii Management*
Monitoring in IPM programs

• Monitoring involves taking regular notes on pests, natural enemies, crop growth and environment over a specified time

• Traps should be placed in the shade

Reasons for monitoring

✓ To determine if the pest is present
✓ To determine population density and distribution
✓ To apply the most appropriate management programs
Monitoring (trap)

• Monitoring should begin when fruits are ‘full green’ and begin to turn blue

Yeast-Sugar Bait Solution Recipe:

2 teaspoons of bakers yeast
4 teaspoons of sugar
2 cups of water
Mix and pour ≈1 ½ inches of yeast bait into cup

• Obtain 32 oz plastic cups
• Drill four holes (3/8 of an inch) in the lid
• Attach a wire strap for hanging the trap
• Place yellow sticky cards inside the wall of the cup

USDA-ARS & OSU
D. suzukii Management
Various types of Spotted Wing *Drosophila* traps

Courtesy MSU
Monitoring Adult Emergence

- Adults can be monitored when they emerge in the spring

USDA-ARS & OSU
D. suzukii Management
Method for checking the fruit for SWD

Flotation Method

• Randomly collect 80-100 berries
• Crush the fruit in a container
• Place in a quart size zip-lock bag
• Add a cup of sugar-water solution (1/4 cup sugar and 1 quart water)
• After a few minutes SWD larvae should float to the top and crushed pulp will fall to the bottom
• A hand lens may be necessary to see the small larvae

Dreves, Lee 2010
Selected Biological Parameters: (Japanese Literature)

• Adults most active at 68°F (20°C)
• Adult activity low at 86°F (30°C)
• About 10-16 generations per year
• 300-400 eggs / female
Average Flies per Trap

Week of Infestation
Date During Infestation

Drosophila suzukii Flies First Year Weekly Average
Fixed Traps Hillsborough County: Dover, FL Area
Dr. David Dean FDACS
Prevention

Sanitation

• Harvest ripe berries on a regular basis

• Remove or compost ripe berries that fall unto the soil

• Area-wide cooperation
Prevention

Exclusion

Preventing adults from laying eggs on the fruit

• Kaolin clay
  – coating on fruit
  – prevent adults from laying eggs on the fruit

Particle film technology
Act as a physical barrier, disrupt host finding and a repellent
Berries sprayed with Kaolin needs to be washed, which can create marketing problems.
Exclusion
Perimeter Mass Trapping
Preventing adults from entering the planting
Reduced-risk strategies

- GF120 (protein-based attractant with killing agent Spinosad)
- NuLure (a protein hydrolysate fruit fly lure) comprised of corn gluten meal mixed with a chemical

**Biologicals**

- Delegate (2nd generation spinosyn)
- Entrust (spinosyn, labeled for organic use)
Some Possibilities for Organic Blueberries

- Pyganic
- Aza-Direct
- Entrust
- GF-120
Conventional Chemical Sprays

- Depending on the state of fruit development it is important to note the PHI on the pesticide label
- OP’s
  - Malathion bait sprays (1 day PHI)
  - Imidan (Phosmet) (3 day PHI)
  - Diazinon (7 day PHI)
Conventional Chemical Sprays

• Depending on the state of fruit development it is important pesticides are safe and have short PHI

Pyrethroids

• Danitol® (Fenpropathrin) [3 day PHI]

• Mustang Max™ (1 day PHI)

• Asana (14 d PHI)
Beneficial insects regulating *D. suzukii*

Bigeyed bug (*Geocoris* spp.)

Amblyseius swirskii

Minute pirate bug (*Orius* spp.)
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