Using Monitoring Data to Make Management Decisions for SWD and BMSB

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Fruit Pest Hotline 603-862-3763
Objectives

• Brief introductory biology
  • Life cycle
  • Pest status in New England

• Identifying crop injury

• Available monitoring tools & how to use them
Spotted wing drosophila (SWD) Brown marmorated stink bug (BMSB)

- Invasive
  - Few natural enemies
  - Gaps in knowledge
- Broad host range
  - Crop and non-crop
- Re-invasion problems
  - Pesticide efficacy
Spotted wing drosophila (SWD)

*Drosophila suzukii* Matsumura

[Image of female and male spotted wing drosophila with labeled spots and ovipositor]
Best Management Practices

• Protect susceptible crops from egg-laying when fruit is ripe or ripening and when flies are present
• Susceptibility depends on crop and timing of crop maturity
New England Small Fruit Guide
ag.umass.edu/fruit/ne-small-fruit-management-guide

<table>
<thead>
<tr>
<th>Spotted Wing Drosophila (SWD)</th>
<th>IRAC</th>
<th>Product</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A</td>
<td>Assail 30SG</td>
<td>2.5 oz (7)</td>
<td></td>
</tr>
<tr>
<td>3A</td>
<td>Baythroid XL</td>
<td>2.4-3.2 oz (3)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>*Brigade 2EC</td>
<td>3.2-6.4 oz (30)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>*Danitol 2.4EC</td>
<td>10.7 oz (21)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Delegate 25WG</td>
<td>3-5 oz (7)</td>
<td></td>
</tr>
<tr>
<td>3, 4A</td>
<td>*Leverage 2.7SE</td>
<td>5-8 oz (3)</td>
<td></td>
</tr>
<tr>
<td>1B</td>
<td>Malathion 5EC</td>
<td>3 pts (3)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>*Mustang Max 5EC</td>
<td>4 oz (1)</td>
<td></td>
</tr>
<tr>
<td>1A</td>
<td>Sevin 4F, 2 qt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A, 4A</td>
<td>Triple Crown</td>
<td>5 oz (30)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Entrust 80WP, 1.25-2.5 oz (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UN</td>
<td>Grandevo, 1-3 lb (0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Evening application is best
Conventional control is challenging
Adult Trapping in New York’s Finger Lakes Region

Fermenting bait over apple cider vinegar

Mean SWD/trap/day

Weekly mean temp (°C)

30-May  30-Jun  31-Jul  31-Aug  30-Sep  31-Oct  30-Nov  31-Dec  31-Jan

Ju  Summer  Blueberry  Fall Raspberry
How do you know when SWD are present?
Larval infestation

- Wet raspberry receptacles
- Mushy berry
- Salt Flotation
Salt Flotation
Salt Flotation

- Eggs
- 1\textsuperscript{st}, 2\textsuperscript{nd}, 3\textsuperscript{rd} Instars
- Non-target larvae
Predatory fly larvae
Blueberry maggot
Cherry fruit worm
Adult monitoring
Traps capture flying adults using food odors and visual cues
Adult monitoring
Predictive Value
Trap Designs
commercial and homemade

“Trappit” Globe Yellow (McPhail-like)
Side-Mesh Trécé
Pherocon Trap® 2014
Red Stripe Deli
Side Mesh Dreeses, OR
Sombrero
Spice Jar-Knight
Droso Trap
BioBest-Spain

PBJ Trap
Beers. WA
32oz Deli with Yellow
Sticky-Isaacs, MI
18 oz Red Cups
with holes. 5/16-in
Suzukiitrap
Bio Bottle-Spain
Side-Mesh Trécé
Pherocon Trap®
Adult monitoring
Traps capture flying adults using food odors and visual cues

Gross
Adult monitoring
Traps capture flying adults using food odors and visual cues
Adult monitoring
Traps capture flying adults using food odors and visual cues

Not for the faint of heart
Presence/Absence Only
Adult monitoring
Traps capture flying adults using food odors and visual cues
Best Practices?
Action Thresholds

What triggers a spray?

• Customers start to complain
• % mushy berry
• SWD detected in the region
• Sustained capture of SWD males
• Fruit are ripe
## Action Thresholds

What triggers a spray?

Drummond et al. 2018

<table>
<thead>
<tr>
<th>CUMULATIVE MALE SWD FLIES CAPTURED (average from 3 traps / field)</th>
<th>Probability of NOT having infested fruit the following week</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>99.9%</td>
</tr>
<tr>
<td>0.5</td>
<td>99.5%</td>
</tr>
<tr>
<td>1.0</td>
<td>99%</td>
</tr>
<tr>
<td>2.0</td>
<td>95%</td>
</tr>
<tr>
<td>3.5</td>
<td>90%</td>
</tr>
<tr>
<td>7.0</td>
<td>75%</td>
</tr>
<tr>
<td>16.0</td>
<td>50%</td>
</tr>
</tbody>
</table>
What an acceptable level of infestation?

- Customers aren’t complaining
- Undetectable
- “Barely detectable”
  - < 3% larval infestation in salt flotation
Blueberry infestation 2019

- No Treatment
- Managed

Infested Fruit vs. Collection date

- Linear (No Treatment)
- Linear (Managed)
Canopy Management

For example, we found a 0.3% and 1.3% infestation in fruit from two un-sprayed, but heavily pruned, blueberry crops the same week that we found 10.6% and 15% infestations in un-sprayed and relatively wild plots elsewhere in the state.
My recommendation

Goal: Undetectable

- Monitor three traps for presence/absence on-farm
  - Trécé
- Harvest as frequently as possible
  - Cold storage
- Sustained capture or average of 1 male/trap
  - Weekly sprays for susceptible crops (see NE guide)
  - Rotate materials to avoid resistance
My recommendation

Goal: Barely Detectable

• Regional trapping information
  • Low risk (July): weekly sprays
  • High risk (August-September): weekly sprays for blueberry, cherry, at least weekly sprays for raspberry

• Harvest as frequently as possible
  • Cold storage

• Sanitation to reduce in-field populations
Questions on SWD?
Brown marmorated stinkbug (BMSB)
Halyomorpha halys Stal

stopBMSB.org
Brown, dusky, consperse, etc. (Euchistus spp.)

Rough stink bug (Bronchymena quadripustalata)

Brown Marmorated Stink Bug (Halyomorpha halys)

Native Lookalikes

Western Conifer Seed Bug (Leptoglossus occidentalis)

Boxelder Bug (Boisea trivittata)

Squash Bug (Anasa tristis)
Home Invasion!
Injury
Pest Status in New England
Adults emerge from overwintering sites

April - May

Eggs laid on wild host plants

May - July

Adults move to fruit and vegetable fields

Sept - October

Adults stop feeding and move to overwintering sites

Many adults move to soybeans or other crops
BMSB Traps

BMSB pheromone + MDT

Cumulative 10 stink bugs/trap
BMSB in Tree Fruit

May  June  July  August  September  October
<table>
<thead>
<tr>
<th>Stink bugs, incl. brown marmorated stink bug</th>
<th>none</th>
<th>Surround 95WP</th>
<th>25 to 50 lb.</th>
<th>4</th>
<th>0</th>
<th>moderate</th>
<th>OMRI listed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>*Warrior II</td>
<td>1.3 to 2.5 fl. oz.</td>
<td>24</td>
<td>21</td>
<td>moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A</td>
<td>Baythroid XL</td>
<td>1.4 to 2.8 fl oz</td>
<td>12</td>
<td>7</td>
<td>moderate</td>
<td>14 days application interval</td>
<td></td>
</tr>
<tr>
<td>3A</td>
<td>*Asana XL</td>
<td>4.8 to 14.5</td>
<td>12</td>
<td>21</td>
<td>moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4A</td>
<td>Belay</td>
<td>6 fl oz</td>
<td>12</td>
<td>7</td>
<td>good</td>
<td>max. 12 fl oz per acre per season</td>
<td></td>
</tr>
<tr>
<td>3A</td>
<td>Danitol 2,4EC</td>
<td>10.7 to 21.3 fl. oz.</td>
<td>24</td>
<td>14</td>
<td>moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4A</td>
<td>Actara 25WDG</td>
<td>4.5 to 5.5</td>
<td>12</td>
<td>varies with rate</td>
<td>moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4A + 3A</td>
<td>*Endigo ZC</td>
<td>5 to 6 fl. oz.</td>
<td>24</td>
<td>35</td>
<td>high</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A/28</td>
<td>Voliam Xpress</td>
<td>6 to 12 fl oz</td>
<td>24</td>
<td>21</td>
<td>high</td>
<td>max 31 fl oz per acre per season; 10 day application interval</td>
<td></td>
</tr>
<tr>
<td>4A + 28</td>
<td>Voliam Flexi WDG</td>
<td>6 to 7 oz.</td>
<td>12</td>
<td>35</td>
<td>moderate</td>
<td>max 16 oz per acre per season; 10 day application interval</td>
<td></td>
</tr>
</tbody>
</table>
BMSB Monitoring

Cumulative 4 stink bugs/trap

Reset after treatment
Questions on BMSB?
BMSB Traps