Late Season Spotted Wing Drosophila Management in NY.

Empire Producers Expo
January 23, 2014
Oncenter Convention Center
800 South State St. Syracuse, NY

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Invasive Species

Our work specifically addressing the impact of important invasive insect pest species across the major commodities grown in the Northeast, specifically those impacting the Hudson Valley, has been conducted since 2010. Monitoring invasive insects is our primary concern to determine early emergence, presence and development. Intensive scouting is then conducted to validate the presence in agricultural crops. From these data we hope to construct developmental models to initiate management and keep the agricultural community apprised of county distribution, management timing and economic injury levels throughout the region.

The insects of greatest concern include:
- Spotted Wing Drosophila, Drosophila suzukii in small fruit, stone fruit and grape;
- 2013 Hudson Valley Spotted Wing Drosophila Pest Alert

- Brown Marmorated Stink Bug, Halyomorpha halys, causing economic injury to Hudson Valley tree fruit and pepper;
- Brown Marmorated Stink Bug Grower Alert
- Managing BMSB Using an Integrated Approach; Pheromone based mass trapping, treated netting, high intensity lighting, and

Beauveria bassiana (Mycotrol-O GHA strain)

- African Fig Fly, Zapetionus indiana, in grape; causing injury to grape in New Jersey
Plant Protection Presentations

Brown Marmorated Stink Bug

Empire Expo, On-Center, Syracuse, NY Jan. 21, 2014:
Status of BMSB and SWD in NY

Spotted Wing Drosophila  
*Drosophila suzukii*

- An invasive insect in the vinegar fly family. (Drosophilidae)


- It was observed in 2011 in the Midwest, East Coast and northern Hudson Valley with economic losses in raspberry.

- In 2012 we observed high levels of small fruit infestation across the Hudson Valley.

- In 2013, earlier emergence and increasing range of fruit infestation.

- Raspberry & blackberry 100% loss.
Current state level spotted wing drosophila in the United States.
Known Ag hosts include: **blackberries, raspberries, blueberries, strawberries**, figs, cherries, thin skin grapes, peaches, apples, pears, nectarines, plums.

California represents the largest acreage of these fruits nationwide.

SWD was responsible for an average of 20% crop loss in CA, although near total infestations are possible.

Range of fruit injury from egg laying and larval infestation in the Hudson Valley of NY by mid-August: 17%-100% injury.
SWD – Key Characteristics

Male

- Black spot on wings
- 2 black combs on front legs

Female

- She inserts saw-like device (ovipositor) into fruits and lays eggs
Un-ripened blackberry infested with SWD eggs 2012

Key problem: SWD oviposits into pre-ripened fruit
Spotted Wing Drosophila – Overwintering

SWD trap captures in Vineland, Ontario
• Highest numbers move toward the forest in the winter
Tartarian Honeysuckle (*Lonicera tatarica*)

An invasive shrub, Tartarian honeysuckle is a native of eastern Asia and was first introduced into North America as an ornamental in 1752. SWD was found to be highly attracted to the fruit, and infestations in *L. tartarica* were noticed before infestation in cultivars.
Tartarian Honeysuckle (Lonicera tatarica)
Tartarian Honeysuckle (*Lonicera tatarica*)
Fruit Infestation levels by location. Opacity of line indicates level of infestation.

- Tartarian Honeysuckle: 93% Infested
- Blackberry: 21%
- Raspberry: 9%

July 23, 2013
As Tartarian Honeysuckle loses fruit, infestation increases in cultivars closest to forest edge.
As Tartarian Honeysuckle loses all fruit, infestation in cultivars reaches higher levels.
Tartarian Honeysuckle berries maintained high levels of infestation until August 12, when the plants bordering the orchard no longer had fruit.

Infestation in the domestic cultivars increased as wild hosts disappeared.

Fruit Infestation levels in wild hosts and small fruit: Ulster Co.
Injury in blackberry crop:
- Clean crop up to mid-July
- 20% injury on 21 July
- 90% injury on 1 August
SWD Management

**Adult Trapping**: Yeast mixture, sugar, apple cider vinegar
   Adult captures provide early warning
   Begin management at 1st adult SWD?

**Crop Monitoring**: Assessment of fruit for eggs & larva

**Cultural management of crop**: Clean pick & removal of injured fruit

**Maintain harvested fruit at 33F**: ASAP

**Insecticide frequency**: 3-4 day program using best materials
   Alternate row middle vs full row

**Insecticide class rotation**: Resistance management 10d to 2 wks
SWD Management after 0.8” of Rainfall (R. Issacs, Univ. Mich)

<table>
<thead>
<tr>
<th>Material</th>
<th>Rate</th>
<th>% Control</th>
<th>% Control 0.8” rainfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mustang Max</td>
<td>4.0 oz./A</td>
<td>100</td>
<td>70-100</td>
</tr>
<tr>
<td>Assail 30SG</td>
<td>5.3 oz./A</td>
<td>60-100</td>
<td>20-45</td>
</tr>
<tr>
<td>Delegate 25WDG</td>
<td>4.5 oz./A</td>
<td>88-100</td>
<td>20-60</td>
</tr>
<tr>
<td>Malathion 8F</td>
<td>2.0 pts./A</td>
<td>70-100</td>
<td>8-45</td>
</tr>
</tbody>
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Loss of SWD efficacy 1-3 days after rain

24 hrs post application rain event.

Stresses the need for retreatment of most insecticides.
### SWD Control in Mixed Small Fruit; Orange Co.

<table>
<thead>
<tr>
<th>Date</th>
<th>Material</th>
<th>Rate</th>
<th>Commodity</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 June</td>
<td>Malathion 57</td>
<td>2 pts./A</td>
<td>Raspberry</td>
</tr>
<tr>
<td>1 July</td>
<td>Assail 30SG</td>
<td>5 oz./A</td>
<td>Raspberry</td>
</tr>
<tr>
<td>5 July</td>
<td>Malathion 57</td>
<td>2 pts./A</td>
<td>Raspberry</td>
</tr>
<tr>
<td>12 July</td>
<td>Delegate 25WDG</td>
<td>3 oz./A</td>
<td>Raspberry</td>
</tr>
<tr>
<td>14 July</td>
<td>Brigade</td>
<td>8 oz./A</td>
<td>Raspberry</td>
</tr>
<tr>
<td>19 July</td>
<td>Assail 30SG</td>
<td>5 oz./A</td>
<td>Raspberry</td>
</tr>
<tr>
<td>22 July</td>
<td>Danitol</td>
<td>16 oz./A</td>
<td>Raspberry</td>
</tr>
<tr>
<td>27 July</td>
<td>Mustang Max</td>
<td>4 oz./A</td>
<td>Raspberry</td>
</tr>
<tr>
<td>30 July</td>
<td>Assail 30SG</td>
<td>5 oz./A</td>
<td>Raspberry</td>
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6.31” Rainfall; 6 day application interval

<table>
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<tr>
<th>Date</th>
<th>Material</th>
<th>Rate</th>
<th>Commodity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 August</td>
<td>Delegate 25WDG</td>
<td>3 oz./A</td>
<td>Raspberry</td>
</tr>
<tr>
<td>19 August</td>
<td>Brigade</td>
<td>8 oz./A</td>
<td>Raspberry</td>
</tr>
</tbody>
</table>
Orange County Fruit Infestation - 2013

Raspberry Management

Eggs/Larvae per Gram

6.31” Rainfall


Raspberry
Blackberry
House Blackberries
Blueberries
Cherry
Strawberry
Varietal Preference of SWD to Sweet Cherry & Wine Grape in the Hudson Valley of NY
SWD oviposition during pre-harvest and ripened development.

Male and Female flies were introduced to fruit, and allowed 48 hours to oviposit before they were removed and eggs were counted.

Each fruit was isolated with 2 cherry of each V. and 5 female SWD adults.
SWD ovipositional preference in pre-ripened grape varieties.

- Grape varieties placed in same container.
- 40 female SWD
- Grapes varieties placed in individual containers.
- 5 female SWD

- SWD ovipositional preference in pre-ripened grape varieties.
- Allowed 48 hours to oviposit.
Grapes collected and analyzed from an Ulster County vineyard indicated that Pinot Noir 115 is at high risk of SWD infestation.
• One UC vineyard with P115 with 100% injury levels.
Alternative Approaches to Conventional IPM

**Mycotrol-O** is a mycopesticide, employing a fungal pathogen (*Beauveria bassiana*) as a method of controlling *D. suzukii*.

- **OMRI approved**
- Strain GHA at a concentration of 10.9% or $2 \times 10^{10}$ viable spores per gram of active ingredient.

In laboratory studies, BotaniGard was applied to surface of blueberries in closed bioassay (one adult fly per berry, 10 replicates), adult fatality measured daily.
BotaniGard applied to surface of blueberries in closed bioassay (one adult fly per berry, 10 replicates). Adult mortality measured daily.

Mycotrol-O mycopesticide. (*Beauveria bassiana*) to control *D. suzukii*.
Mycotrol-O mycopesticide. (*Beauveria bassiana*) to control *D. suzukii*.

SWD adult (~5 days of exposure). Signs of fungal growth present on head and abdomen.
Mycotrol-O mycopesticide. (*Beauveria bassiana*) to control *D. suzukii*.

Advanced stage of fungal growth (~10 days of exposure).
Thanks to the staff at the HVL for all their support:

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Thank You...Questions??