Spotted Wing Drosophila and Brown Marmorated Stink Bug Updates

Bryan Butler
Extension Agent

Bay Area Fruit School
February 26, 2014
Brown Marmorated Stink Bug Life History

- One to two generations per year in this area. Developmental period lasts ~50d from egg to adult.

- Broad Host Range. 300+ host plants including tree fruit, small fruit, grapes, vegetables, legumes, and ornamentals.

- Native natural enemies unable to control populations ????
BMSB Management

• This is an “edge” pest
• Scout by walking the “hot” areas
• Alternate Row Middles keep materials “fresh”
• 100 gallons of water per acre, think coverage
• Late May flush from overwintering
• Do not allow establishment in the orchard
• Be prepared for the September adult rush
• As crop comes off be vigilant of late varieties
Materials to consider for BMSB Suppression

- Fenpropathrin (Danitol)
- Thiamethoxam (Actara)
  - Lambda-Cyhalothrin (Warrior) + Thiamethoxam
    (Actara) (Endigo)
- Malathion (Peach)
- Lambda-Cyhalothrin (Warrior II)
- Bifenthrin (Brigade) section 18
- Clothianidin (Belay)
- Dinotefuran (Scorpion) or (Venom) section 18

Borders ???
IPM?

• Many of the products that have some effect on BMSB are highly toxic to Beneficial insects
Surround is a clay product and is OMRI certified

• Based on the USDA AFRS lethality index we wanted to try a spray program with the same insecticides and intervals as 2010 but with Surround added at 12.5 pounds per 100gallons.

• $1.00/lb.
• The coating of clay may be modifying the Behavior of BMSB by providing a repellent
Insecticide applications were be made based on an IPM program using traditional monitoring tools for lepidopteron pests with visual observations for BMSB material selection being based on need for control of the pests present.
2012 Apple Timeline

- 3/12/12 – Late dormant/silver tip – **Lorsban Advanced** + Tenn Cop 5E + Dam Oil
- 3/22/12 – Tight cluster – Manzate Pro-Stick + Vintage SC
- 4/3/12 – Bloom – Manzate Pro-Stick + Rally 40WSP + Agri-Mycin 17
- 4/16/12 – Late Bloom – Syllit 65W + Captan 50W + Agri-Mycin 17
- 4/25/12 – Petal fall – Manzate Pro-Stick + Vintage SC + **Assail 30SG**
- 5/4/12 – Rally 40WSP + Syllit 65W + **Imidan 70W** + Agri-Mycin 17 + Surround WP* 
- 5/16/12 – Penncozeb 75DF + Rally 40WSP + **Assail 30SG** + Surround WP*
- 5/24/12 – Penncozeb 75DF + Flint + Actara + Surround WP*
- 6/4/12 – Rally 40WSP + Captan 50 + **Altacor** + Surround WP*
- 6/14/12 – Captan 50 + Delegate + Surround WP*
- 6/22/12 – Rally 40 WSP + Captan 50 + Delegate + Surround WP*
- 7/2/12 – Ziram 76DF + **Assail 30SG** + Surround WP*
- 7/12/12 – Rally 40WSP + Captan 50 + **Assail 30SG** + Surround WP*
- 7/24/12 – Pristine + Ziram 76DF + Actara + Surround WP*
- 8/3/12 – Captan 50 + Topsin M WSB + **Assail 30SG** + Surround WP*
- 8/13/12 – Pristine + Topsin M WSB + Captan 50W + Altacor + Surround WP*
- 9/7/12 – Pristine

*Surround WP was not applied to designated blocks of Goldrush and Enterprise

- Averaging about 11 days between sprays
- Goldrush 10/16
- Pink lady 11/6
Woods

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>GR</td>
<td>E</td>
</tr>
<tr>
<td>6</td>
<td>E</td>
<td>GR</td>
</tr>
<tr>
<td></td>
<td>GR</td>
<td>E</td>
</tr>
<tr>
<td>CORN</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>GR</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>GR</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>GR</td>
<td>E</td>
</tr>
<tr>
<td>4</td>
<td>GR</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>GR</td>
<td>E</td>
</tr>
<tr>
<td>3</td>
<td>E</td>
<td>GR</td>
</tr>
<tr>
<td>CORN</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>E</td>
<td>GR</td>
</tr>
<tr>
<td></td>
<td>GR</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>GR</td>
<td>E</td>
</tr>
<tr>
<td>1</td>
<td>GR</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>GR</td>
<td>E</td>
</tr>
</tbody>
</table>

Row 1  2  3

Orchard

Goldrush – GR
Enterprise - E
Middle Row, untreated
IPM insecticides with 12.5 lbs.
Surround
IPM insecticides w/o Surround
2012 3 minute BMSB Egg counts

- Treated
- Untreated
2012 Nymph 3 minute counts

Treated

Untreated
2012 Adult BMSB 3 minute counts

Date


Treated

Untreated

Date
2013 3minute BMSB Nymph Counts

Nymphs

- Treated
- Untreated

Graph showing the number of nymphs counted over a period from 7/1/2013 to 9/30/2013, with peaks on 8/19/2013 and 8/26/2013 for Treated and Untreated samples respectively.
Average Fruit Damage of all Replicates Combined 2012

Severity: 3.96

Severity: 4.60

Surround

Control

50%

78%
### Pairing 1 bordering corn 12
- Severity: 3.7
- Row 1 Rep 1: 16%
- Row 3 Rep 1: 68%

### Pairing 1 bordering corn 13
- Severity: 4.6
- Row 1 Rep 1: 8%
- Row 3 Rep 1: 52%

### Pairing 2 bordering corn 12
- Severity: 3.5
- Row 1 Rep 3: 68%
- Row 1 Rep 2: 82%

### Pairing 2 bordering corn 13
- Severity: 4.9
- Row 1 Rep 3: 30%
- Row 1 Rep 2: 10%
2013 APPLE TIMELINE Cripps Pink <2% damage

4/8/13 – Tight cluster – Lorsban Advanced + Damoil + Copper
4/17/13 – Open cluster – Manzate Pro-Stick + Rally 40WSP
4/24/13 – Bloom – Manzate Pro-Stick + Procure 480SC + Agri-Mycin 17
5/1/13 – Late bloom – Manzate Pro-Stick + Rally 40WSP + Agri-Mycin 17
5/8/13 – Petal fall – Manzate Pro-Stick + Flint + Agri-Mycin 17 + Imidan 70W
5/15/13 – Thinning spray – Sevin XLR Plus @1 pt/acre
5/17/13 – 1st cover – Manzate Pro-Stick + Rally 40WSP + Imidan 70W
5/27/13 – 2nd cover – Inspire Super + Manzate Pro-Stick + Assail 30SG + Surround WP
6/8/13 – 3rd cover – Captan 50W + Topsin M + Delegate + Surround WP
6/17/13 – 4th cover – Captan 50W + Rally 40WSP + Altacor + Surround WP
7/2/13 – 5th cover – Captan 50W + Topsin M + Assail 30SG + Surround WP
7/18/13 – 6th cover – Captan 50W + Rally 40WSP + Assail 30SG + Surround WP
7/29/13 – 7th cover – Captan 50W + Topsin M + Delegate + Actara + Surround WP
8/9/13 – 8th cover – Pristine + Actara + Surround WP
8/16/13 – 9th cover – Captan 50W + Pristine + Venom + Surround WP
8/29/13 – 10th cover – Pristine + Assail 30SG + Surround WP
9/10/13 – 11th cover – Captan 50W + Topsin M WSB + Brigade WSB + Surround WP

Hail storm on 6/13/13

Sprayer calibrated for 100 gpa
Acknowledgements;
Greg Krawczyk, Ph.D.
Extension Tree Fruit Entomologist
Research Associate Professor
Penn State University
Spotted Wing Drosophila

INVASIVE VINEGAR FLY FROM ASIA

LARGE SERRATED OVIPOSITER ALLOWS SWD TO LAY EGGS IN IMMATURE FRUIT

FRUIT MAY COLLAPSE

WORSE, IT MAY GO HOME WITH THE CUSTOMER

SWD IS HERE TO STAY AND INSECTICIDES WILL CONTINUE TO PLAY A MAJOR ROLE IN MANAGING THEM FOR NOW
Traps are a tool not the tool for Monitoring

Based on 3 years of monitoring

- Strawberries, Black raspberries; Safe
- Early Blueberries, Sweet & Tart Cherries; Questionable
- Late Blueberries, Blackberries and Fall Raspberries; Big trouble
SWD Captures by Crop

- Apricot
- Black Raspberry
- Blackberry
- Bluberry
- Fall Red Raspberry
- Fall Yellow Raspberry
- Late Season Plum
- Nectarine
- Strawberry
- Summer Plum
- Summer Red Raspberry
- Sweet Cherry
- Tart Cherry
- Tomato
- Wine/Table Grape

SWD Adults

The bar chart shows the number of SWD captures by crop. Bluberry has the highest number of captures, followed by Summer Red Raspberry and Sweet Cherry.
Initial traps were placed on 5/20/2013 in MD and on 5/24/2013 in PA.
Up to 13 generations/year in Japan. Prefer cooler wetter weather. 68 F optimal, inactive above 86 F

Michigan State University http://www.ipm.msu.edu/SWD.htm
SWD Identification – key characters

Male

Black spot on wings

2 black combs on front legs

Female

She inserts saw-like device (ovipositor) into fruits and lays eggs
Drosophila suzukii

Scaptomyza

Leucophenga sp.

Chymomyza amoena

Pictures from bugguide.net

D Biddinger 2011
**Highest risk**
- Fall Raspberries
- Blackberries
- Blueberries

**Moderate risk**
- Peaches
- Grapes
- Pears
- Tomato
- Strawberries
- Sweet Cherries
- Black Raspberries
- Tart Cherries

**Alternate hosts**
- Wild plants with berries, such as...
  - Snowberry
  - Elderberry
  - Pokeweed
  - Dogwood
DEVELOP A SOUND INSECTICIDE PROGRAM

• Try to stay ahead of SWD
• Make sure you are getting excellent coverage
• Rotate among modes of action for resistance management
• Be aware of days to harvest and use products strategically
• Don’t exceed allowable seasonal total ai
• Be aware of possible impact on beneficials
• Reapply after rain
New DuPont product
EXIREL
anthranilic diamide

• Comparable to Delegate but different chemical family
• May have extended residual control works through ingestion, some contact activity
• Different MOA as part of rotation
• EPA label in 2014 for blueberries recently approved
CLASSES OF SWD INSECTICIDES

<table>
<thead>
<tr>
<th>Class</th>
<th>IRAC Code</th>
<th>Examples</th>
<th>SWD Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organophosphates</td>
<td>1B</td>
<td>Malathion, Imidan</td>
<td>Excellent to good</td>
</tr>
<tr>
<td>Pyrethroids</td>
<td>3A</td>
<td>Brigade, Danitol,</td>
<td>Excellent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mustang Max</td>
<td></td>
</tr>
<tr>
<td>Spinosyns</td>
<td>5</td>
<td>Delegate, Entrust</td>
<td>Excellent to good</td>
</tr>
<tr>
<td>Neonicotinoids</td>
<td>4A</td>
<td>Assail</td>
<td>Good to poor</td>
</tr>
<tr>
<td>Carbamates</td>
<td>1A</td>
<td>Sevin</td>
<td>Good to poor</td>
</tr>
<tr>
<td>Diamide</td>
<td>28</td>
<td>Exirel*</td>
<td>Excellent to good</td>
</tr>
</tbody>
</table>

*Just received EPA label for blueberries, not raspberries

Greg Loeb, Department of Entomology, NYSAES, Geneva, NY
**Good, shorter residual** about 3 days
*Delegate 25WG* (4.5 oz), Caneberries (1) blueberries (3)
*Malathion 8F* (2 pt), Caneberries (1) Strawberries (3), Cherries(3)
*Pyganic EC* (64 oz), All (0)

**Good, use for rotations** 3 – 7 days
*Entrust SC* (6 oz), Blueberries (3) others (1) cherries(7)
*Sevin* 2pts., cherries (3),all (7)
*Assail* 5.3 oz. blueberries (1) strawberries (1) cherries (7) caneberries (1) Do not make more than 5 applications per season.
  - Do not apply more than once every 7 days.
  - Do not apply less than 1 day before harvest (PHI = 1 day).
  - Do not exceed a total of 0.5 lb. active ingredient (11.4 ozs product) per acre per growing

**Good, Longer residuals** 7-14 days depending on conditions
*Danitol* 10.3 oz., blueberries, cherries and caneberries (3), strawberries (2)
*Mustang Max* (4 oz), caneberries (1) cherries (14)
*Bifenture* 8 and 16 oz. same, caneberries (3),strawberries(0),
*Imidan 70WP* (1.33 lb), blueberries (3), tart cherries (7)
*Lannate 90SP* (1 lb), blueberries
*Exirel* New blueberry product for 2014

Bioassays were conducted at 1, 3, 5, 7, and 10 DAT. 50 psi in a volume of water equivalent to 120 gallons per acre
Spray program to consider

• Delegate
• Delegate
• Assail
• Assail
• Mustang Max
• Mustang Max
• Delegate
• Delegate
• Assail
• Assail
• Assail
• Research indicates possible increased mortality to adult SWD for some insecticides when mixed with 2 pounds of Sugar in 100 gallons
  -spinosyns (Entrust, Delegate)
  -some pyrethroids (Bifenthrin)
  -some neonicotinoids (Assail)
African Fig Fly
Good News

Since it does not have a large, sharp ovipositor like SWD females, AFF appears to only attack damaged and over-ripe fruit and the harsher winters of Pennsylvania may prevent it from establishing as aggressively here as it did in Florida.

Grapes

A. Spotted Wing Drosophila (SWD) male in comparison with the African Fig Fly (AFF). B. African Fig Fly (AFF) and its black-bordered, white “racing stripes”.

Drs. David Biddinger and Neelendra Joshi, Penn State Department of Entomology; Kathy Demchak, Penn State Department of Plant Science
Special Thanks To:
Dr. Dave Biddinger, Biocontrol Specialist,
Penn State University, Biglerville, PA
Greg Loeb, Department of Entomology,
NYSAES, Geneva, NY