Update on BMSB in the Southern Region

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MHCREC, Mills River, NC
Information Provided by

Ric Bessin – Kentucky
Jeff Davis – Louisiana
Amanda Hodges – Florida
John Hopkins – Arkansas
Dan Horton – Georgia
Blake Layton – Mississippi
Ayanava Majumdar – Alabama
Russ Mizell – Florida
Alan Morgan - Louisiana
Mary Rodgers – Tennessee
Andy Rollins – South Carolina
Powell Smith – South Carolina
Raul Villanueva - Texas
Occurrence and Distribution of BMSB in the Southern Region
BMSB detected in soybeans in 44 of the 56 major soybean Cos., northernmost to the NC border
- In soybean in 3 coastal plain Cos.
- In one cotton field (nymph)

BMSB found in crops other than soybean

Updated on Oct. 1, 2012

Courtesy of Ames Herbert and Tom Kuhar, Virginia Tech
Brown Marmorated Stink Bug Timeline

Knoxville, TN

Cincinnati, OH

Jeffersonville, IN

Courtesy of Ric Bessin, Univ. Kentucky
Brown Marmorated Stink Bug


Courtesy of Mary Rogers, Univ. Tennessee
Brown Marmorated Stink Bug in North Carolina
ABSOLUTELY
NO HORSES, MULES, DONKEYS, ETC.
ALLOWED ON THE BOARDWALK.

NOTICE
TOWN OF LOVE VALLEY
ORDINANCE NO. 23
DRINKING IN PUBLIC PLACES
IT SHALL BE UNLAWFUL TO DRINK OR CONSUME ALCOHOLIC BEVERAGES (BEER, WINE, LIQUOR) OR HAVE AN OPEN CONTAINER WITHIN THE TOWN STREETS. PARKING LOTS OR BUSINESS NOT LICENSED FOR SUCH.
(ORD. NO. 17-62. 4-4-42)
Research & Extension Personnel Working on BMSB in the Southern Region

• Virginia
  – Chris Bergh (tree fruits)  – Tom Kuhar (vegetables)
  – Eric Day (pest ID)  – Doug Pfeiffer (small fruits)
  – Ames Herbert (field crops)

• North Carolina
  – Jim Walgenbach (fruit & vegetables)
  – Mark Abney (vegetables)

• Kentucky
  – Ric Bessin (field and specialty crops)

• Tennessee
  – Mary Rogers (organic, specialty crops)
Southern Region Sponsored
BMSB Projects

- **Southern Region IPM Program**: Brown Marmorated Stink Bug: Impact of an Invasive Pest on Orchard and Vegetable IPM. 2011-2014

- NC State and Virginia Tech: J. Walgenbach, M. Abney, T. Kuhar.

- **Objectives**:
  1. Quantify stink bug species diversity, abundance, phenology, and natural enemy complex in different habitats.
  2. Evaluate damage caused by different life stages of BMSB to tomato and pepper.
  3. Determine effects of different insecticides on BMSB, and develop use guidelines for tree fruits and vegetable crops.
Species composition

Western VA
- BMSB 99.6%
- E. servus 88%
- BMSB 32%
- E. tristigmus 26%
- A. hilare 22%
- E. servus 73%
- A. hilare 26%
- E. tristigmus 43%
- A. hilare 43%
- E. servus 56%
- BMSB >1%

Virginia
- BMSB 84%
- E. servus 56%
- A. hilare 43%
- E. tristigmus 43%

Northern VA
- M. histrionica 88%
- BMSB 32%

Eastern Shore
- E. servus 99.6%
- A. hilare 43%
- E. tristigmus 43%
- BMSB >1%

North Carolina
- BMSB 84%
- E. servus 67%
- A. hilare 43%
- E. tristigmus 26%

Western NC
- BMSB 88%
- A. hilare 43%
- E. tristigmus 26%
- E. servus 73%
- A. hilare 26%
- E. tristigmus 22%

Central NC
- E. servus 84%
- A. hilare 26%
- E. tristigmus 22%
- E. servus 73%
- A. hilare 22%
- E. tristigmus 43%

Eastern Coastal Plain
- E. servus 73%
- A. hilare 22%
- E. tristigmus 22%
- Thyanta, sp 22%
## Percentage of BMSB on Wild Hosts - VA

<table>
<thead>
<tr>
<th>Plant</th>
<th>2011 (n=4854)</th>
<th>2012 (n=2433)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree of Heaven</td>
<td>31.2</td>
<td>Paulownia</td>
</tr>
<tr>
<td>Paulownia</td>
<td>19.3</td>
<td>Magnolia</td>
</tr>
<tr>
<td>Mimosa</td>
<td>13.9</td>
<td>Jimson weed</td>
</tr>
<tr>
<td>Catalpa</td>
<td>5.1</td>
<td>Fig tree</td>
</tr>
<tr>
<td>Cherry</td>
<td>4.5</td>
<td>Lilac</td>
</tr>
<tr>
<td>Magnolia</td>
<td>4.0</td>
<td>Catalpa</td>
</tr>
<tr>
<td>Crape Myrtle</td>
<td>3.4</td>
<td>Mulberry</td>
</tr>
<tr>
<td>Mulberry</td>
<td>3.1</td>
<td>Redbud</td>
</tr>
<tr>
<td>Pokeweed</td>
<td>2.4</td>
<td>Bradford pear</td>
</tr>
<tr>
<td>Black Walnut</td>
<td>2.1</td>
<td>Tree of Heaven</td>
</tr>
<tr>
<td>Other (15)</td>
<td>11.1</td>
<td>Other (19)</td>
</tr>
<tr>
<td>Plant</td>
<td>% of total</td>
<td>Plant</td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Tree of Heaven</td>
<td>33.8</td>
<td>Tree of Heaven</td>
</tr>
<tr>
<td><em>Paulownia</em></td>
<td>26.5</td>
<td>Yellowwood</td>
</tr>
<tr>
<td><em>Catalpa</em></td>
<td>25.2</td>
<td>Catalpa</td>
</tr>
<tr>
<td>Locust</td>
<td>3.4</td>
<td>Paulownia</td>
</tr>
<tr>
<td>Dogwood</td>
<td>3.0</td>
<td>Cherry</td>
</tr>
<tr>
<td>Wild grape</td>
<td>2.6</td>
<td>Locust</td>
</tr>
<tr>
<td>Cherry</td>
<td>2.1</td>
<td>Black walnut</td>
</tr>
<tr>
<td>Black Walnut</td>
<td>1.3</td>
<td>Wild Grape</td>
</tr>
<tr>
<td>Red Maple</td>
<td>0.9</td>
<td>Sycamore</td>
</tr>
<tr>
<td>Other (3)</td>
<td>1.2</td>
<td>Buckeye</td>
</tr>
<tr>
<td>Other (20)</td>
<td>5.8</td>
<td></td>
</tr>
</tbody>
</table>
## Common Host Plants – NC 2012

<table>
<thead>
<tr>
<th>Plant</th>
<th>BMSB (93%)</th>
<th>BSB (50%)</th>
<th>GSB (72%)</th>
<th>RSB (93%)</th>
<th>Other (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree of Heaven</td>
<td>209</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Yellowwood</td>
<td>203</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Catalpa</td>
<td>182</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cherry</td>
<td>155</td>
<td>0</td>
<td>3</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Paulownia</td>
<td>97</td>
<td>0</td>
<td>12</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Locust</td>
<td>69</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Black walnut</td>
<td>48</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Wild Grape</td>
<td>46</td>
<td>0</td>
<td>12</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Sycamore</td>
<td>15</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Buckeye</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All other (21)</td>
<td>80</td>
<td>4</td>
<td>20</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
Voltinism Study

- Objective: To determine the maximum number of generations that occur at different latitudes.
- Ovarian development can occur at 13-15 h day length; 14 h reported most often.
- In 2012, colonies initiated with laboratory reared eggs placed in cages on date of 14-hr day length. In 2013, additional cage with overwintered adults.

Paulownia, Tree of Heaven
Green Beans, Pepper,
Sweet corn, Sunflower
## Effect of Latitude on Day Length

<table>
<thead>
<tr>
<th>Location</th>
<th>13-h light</th>
<th>14-h light</th>
<th>Difference (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hood River, OR</td>
<td>3 April</td>
<td>23 April</td>
<td>20</td>
</tr>
<tr>
<td>Geneva, NY</td>
<td>7 April</td>
<td>29 April</td>
<td>22</td>
</tr>
<tr>
<td>Biglerville, PA</td>
<td>9 April</td>
<td>4 May</td>
<td>25</td>
</tr>
<tr>
<td>Kearneysville, WV</td>
<td>10 April</td>
<td>6 May</td>
<td>26</td>
</tr>
<tr>
<td>Mills River, NC</td>
<td>13 April</td>
<td>13 May</td>
<td>30</td>
</tr>
<tr>
<td>Difference (d)</td>
<td>10</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>
### Mills River, NC Voltinism 2012

<table>
<thead>
<tr>
<th>Biological Period</th>
<th>Calendar Date</th>
<th>Mean Degree Days ± SE (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Generation Dev.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs placed in field cages</td>
<td>May 13</td>
<td>542.2 ± 0.49 (541.7-542.7)</td>
</tr>
<tr>
<td>Egg hatch</td>
<td>May 24-25</td>
<td></td>
</tr>
<tr>
<td>First generation adults</td>
<td>July 17</td>
<td></td>
</tr>
<tr>
<td><strong>Second Generation Dev.</strong></td>
<td></td>
<td>448.9</td>
</tr>
<tr>
<td>Eggs placed in field cages</td>
<td>July 26</td>
<td></td>
</tr>
<tr>
<td>Second generation adults</td>
<td>August 29</td>
<td></td>
</tr>
</tbody>
</table>

DD calculations based on Neilsen et al. (2008):
- **Lower threshold temp**: 59°F, 15 °C
- **Upper threshold temp**: 92°F, 33.3 °C
- Total development from egg to adult = 537.6
Phenology of BMSB in Woodland Samples

Stink bugs per sample

- May: Egg Hatch
- Jun: First Adults
- Jul: Egg Hatch
- Aug: First Adults
- Sep: Egg Hatch
- Oct: Egg Hatch

Adults
Nymphs
Biological Control of BMSB and Native Stink Bugs on Southern Region Organic Farms

• KY, NC, TN and VA participating in USDA-OREI project.

• Sentinel egg masses deployed to assess parasitism and predation of BMSB eggs.
  – Two crops and two farms per state

• NC has expanded survey to include conventional farms, other crops, and non-managed habitats.
Fate of BMSB Eggs in Apple Orchard - 2012

- Hatched: 70%
- Parasitized: 0%
- Predation: 0%
- Unknown: 30%

n = 1,976