Project Updates

- BMSB Working Group
- USDA Regional IPM Project
- USDA NIFA SCRI Project
- USDA NIFA OREI Project
- NE SARE Project
- BMSB Multistate Project
BMSB Working Group

- First funded in 2010

- Intended to bring together university and industry personnel, and stakeholders to discuss BMSB

- Minutes of all meetings posted at the NE IPM Center website

- http://www.northeastipm.org/working-groups/bmsb-working-group/

- Funding continued in 2014
USDA Regional IPM Project

- Funded in 2011

- Two year project to examine the impact of BMSB in peppers

- Participants – DE, MD, NJ

- Objectives
  - Examine phenology and damage in bell peppers
  - Examine varietal differences in susceptibility
  - Look at the impact of natural enemies
  - Insecticide efficacy
Biology, Ecology, and Management of Brown Marmorated Stink Bug in Orchard Crops, Small Fruit, Grapes, Vegetables, and Ornamentals
Particulars of Funded Project

• Funded for 3 years with opportunity for renewal.

• September 2011 – September 2014

• Total Federal Award $5,739,966.

• Matching Funds $ 7,325,637.
Cooperating Institutions

1. USDA-ARS
   - Appalachian Fruit Research Station, Kearneysville, WV
   - Beneficial Insects Introduction Research Unit, Newark, DE
   - Invasive Insect Biocontrol and Behavior Laboratory, Beltsville, MD
   - Horticultural Crops Research Unit, Corvallis, OR
2. The Pennsylvania State University
3. Washington State University
4. North Carolina State University
5. Virginia Polytechnic Institute and State University
6. Rutgers University
7. Northeastern IPM Center
8. Oregon State University
9. University of Maryland
10. University of Delaware
11. Cornell University
At-Risk Specialty Crops

- Orchard Crops
- Small Fruit
- Vegetables
- Grape
- Ornamentals
Landscape Level Threat to Specialty Crops

Invasive Tree-of-Heaven

Native Woody Hosts

Corn

Apple
Overall Objectives

• Objective 1. Establish biology and phenology of BMSB

• Objective 2. Develop monitoring and management tools

• Objective 3. Establish effective management programs

• Objective 4. Integrate stakeholder input and research findings to form and deliver practical outcomes.

• Each has several sub objectives
Progress Through November 2012
Objective 1: Establish Biology and Phenology of BMSB in Specialty Crops

1.1.1 Determining voltinism characteristics of BMSB

1.1.2 Movement to and from overwintering sites and overwintering survivorship

1.2.1 Establish the impact of BMSB presence and feeding on orchard crops, small fruit, vegetables,...

1.2.2 Plant pathogenic microorganisms associated with BMSB feeding damage

1.2.3.1 Post-harvest impacts of BMSB feeding (tree fruit)

1.2.3.2 Post-harvest impacts of BMSB feeding (wine grapes)

1.3.1 Determine BMSB phenology and impact on specific specialty crops

1.3.2 Determine the time lag and impact of BMSB as it colonizes new habitats

1.4 Identify landscape and temporal risk factors associated with BMSB on crops and adjacent...

1.5 Genetic studies of BMSB
Objective 2: **Develop Monitoring and Management Tools for BMSB**

- **2.1.1.1** Identification of pheromone and other...
- **2.1.1.2** Optimization of pheromone and kairomone...
- **2.1.1.3** Identification of attractive visual stimuli...
- **2.1.1.4** Define behavioral characteristics of BMSB...
- **2.1.2** Assess other types of monitoring tools
- **2.2.1** Evaluate efficacy of registered and...
- **2.2.2** Identification of a single, well-characterized...
- **2.2.3** Develop attract-and-kill and mass trapping...
- **2.2.4** Examine potential repellents and tactile...
- **2.2.5** Screen Asian natural enemies of BMSB for...
- **2.2.6** Screen potential and quantify impact of...
- **2.2.7** Develop cultural techniques that contribute...
- **2.2.8** Entomopathogens
- **2.2.9** Host plant resistance

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**Objective Completion**

- Year 1 (Projected)
- Year 1 (Actual)
Objective 3: Establish Effective Management Programs for BMSB in Specialty Crops

Objective 4: Integrate Stakeholder Input and Research Findings to Form and Deliver Practical Outcomes

3.1 Short-term mitigation of BMSB risk within specific specialty crops

3.2 Establish crop-specific IPM programs for BMSB

4.1 Measuring biological, economic, and sociological impact on the specialty crop community.

4.2.1 Develop complementary state- and crop-specific Extension programs

4.2.2 Establish a continuity plan with the Northeastern IPM Center for sustained delivery of...

4.2.2.1 Develop an interactive online insect identification system for stink bugs

4.2.2.2 Create crop-specific curricula for IPM coordinators and educators

4.2.2.3 Integrate state-and crop-specific research findings into existing region-wide education and...

4.2.2.4 Provide internet-based decision support tools, including updated research reports, biological...

4.2.2.5 Coordinate with other regional IPM Centers to ensure continuity and relevance and avoid...

4.3 Hold Stakeholder Advisory Panel meetings to review accomplishments, direct research plans and...
# Key Personnel Trained To Date

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<th>M.S.</th>
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Next Steps

• Assessment of progress and objectives in Fall 2013.

• Development of a renewal application to be submitted in January 2014.
Whole-farm Organic Management of BMSB and Endemic Pentatomids Through Behavior-based Habitat Manipulation

USDA NIFA OREI

PD: Nielsen
OREI PI’s

1. Rutgers University – Nielsen and Hamilton
2. West Virginia University – Park and Kotcon
3. Redbud Farm- Mathews
4. University of Tennessee - Rogers
5. University of Kentucky - Bessin
6. University of Maryland – Hooks and Dively
7. USDA – AFRS and BIIR – Leskey and Hoelmer
8. Rodale Institute – Zinati
9. Michigan State University - Grieshop
10. University of Florida - Mizell
11. North Carolina State University – Walgenbach
12. Ohio State University – Welty
13. Virginia Tech – Pfieffer
14. eOrganic – Stone

$ 2.67 million
3 years
OREI Goals

- Investigate dispersal behavior within the farmscape
- Integrate behavior with core organic pest management strategies:
  - Trap Crops (*selection, management and implementation*)
  - Conservation biological control
  - Natural enemy surveys
  - Physical barriers
OREI Goals

• Identify integrated management tactics that could be employed by organic farmers for BMSB and endemic species
• Investigate management of BMSB at different “invasion” levels
• Incorporate field crops
• Compliment and build off of SCRI, not duplicate!!
Progress – Year 1

• Beginning first field season
• Ric Bessin has identified barrier fabrics for field testing
• Currently conducting on-farm movement studies in WV and NJ to identify sequence of host plants and hot spot
• Dispersal behavior studies in laboratory on going
• Trap crop comparison trial is planted at 4 geographic sites
• Sentinel egg mass surveys started in all locations
• Video is being used to investigate natural enemy complex and behaviors
• Website hosted through eOrganic (linked to STOPBMSB.org)
Brown marmorated stink bug (BMSB) poses a significant threat to organic production, and farmers have expressed an urgent need for effective organic pest management strategies. We have assembled a transdisciplinary team of organic researchers, farmers and extension educators that will coordinate the development and delivery of whole-farm organic management practices for BMSB and endemic stink bugs. This website will continue to evolve with the addition of social media to help organic farmers.

BMSB has proven to be one of the most devastating pests of Mid-Atlantic agriculture in the past 30 years. It was introduced into eastern PA in the late 1990’s and is now present in 35 states. Conventional farmers, who have access to powerful synthetic insecticides, have struggled to manage BMSB. The pest has a wide host range and has damaged a diversity of crops, including: tree fruits (apple, peach), small fruits (caneberries, grapes), vegetables (pepper, tomato, eggplant, sweet corn) and row crops (soybean and corn). With high populations in soybean, sweet and field corn, fruit and vegetables, BMSB has fully exploited the niche of diverse plantings common on organic farms near urban areas in the Mid-Atlantic and Southern regions.

BMSB has rapidly become a devastating pest of conventional and organic agriculture in Southern and Mid-Atlantic regions and is expanding to surrounding states. Management of this pest with conventional synthetic insecticides has proven extremely challenging and there are currently no viable organic management tactics. The programs developed in our project will be based on BMSB dispersal and whole-farm movement integrated with core organic pest management strategies — i.e. conservation biological control, habitat manipulation and the use of trap crops and crop barriers.

Our specific objectives are:

1. Develop habitat manipulation tactics based upon how host plant phenology impacts BMSB preference and dispersal.
2. Determine biotic and abiotic factors affecting adult and juvenile BMSB whole-farm movement.
3. Determine the identity and importance of extant natural enemies of stink bugs and their impact on BMSB populations.
4. Evaluate integrated management plans for BMSB and endemic stink bugs specific to organic production systems.
5. Develop and deliver extension materials for organic growers.
• Investigating border spray applications (targeting BMSB) combined with OFM mating disruption and ground cover management

• Peach

• Year 1 results showed significant reduction in cost, amount of a.i. applied and injury
BMSB Multistate Project

- USDA/AES support for projects that foster cooperation between states on a regional or national basis

- Rapid response project (NE508) in 2011 – 2 years

- Ten states participating

- Objectives similar to SCRI objectives

- Annual meeting

- Being converted to five year standard project