

# Whole-farm Organic Management of BMSB and Endemic Pentatomids Through Behavior-based Habitat Manipulation

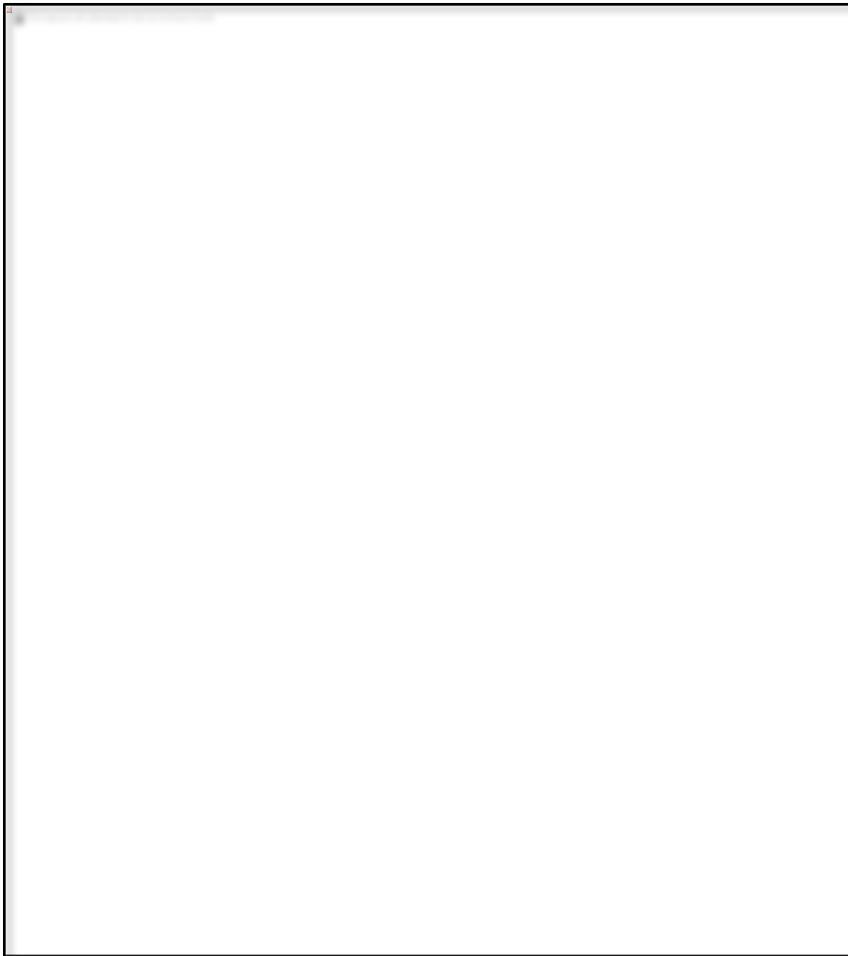
*USDA NIFA OREI*

*PD: Nielsen*



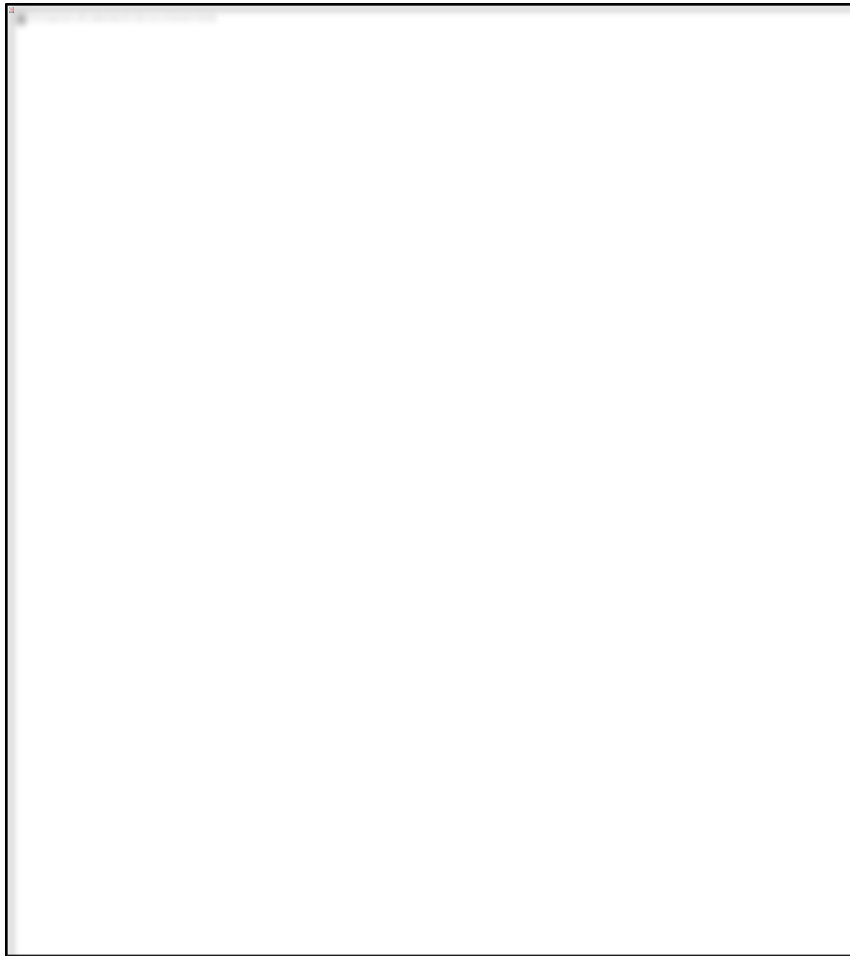
**RUTGERS**  
UNIVERSITY

# *Organic Production in Mid-Atlantic*



- Organic farms in mid-Atlantic and Southern regions tend to be small, diversified farms
- 151,000+ acres
- 1200+ farms

# *The Threat of BMSB to Organic*



- Relies on systems-level solutions
- Integration of tactics
- Biological control
- Synthetic chemicals are not available

# *Working Group and Planning Grant*

- Ted Rogers (USDA OPMP) organized organic researchers, commodity groups, farmers
- Identified problem, granting agency, and interested collaborators
- OREI requires all research to be conducted on certified or “in transition” land
- M. Grieshop and A. Nielsen – Planning grant in 2011
  - Bring a farmer!
  - Oct. 2011 Planning Meeting in Beltsville, MD

# Stakeholder Involvement



[Home](#) [BMSB Contacts](#) [BMSB Damage Pictures](#) [BMSB Identification](#) [BMSB Locator Map](#) [On-Farm Research for Growers](#)

## Welcome to the Organic Management of BMSB Website/Wiki

Posted on [February 8, 2011](#) by [admin](#)

This website is maintained by [Dr. Matt Grieshop](#)—the organic pest management specialist at Michigan State University— and [Dr. Anne Nielsen](#), fruit entomology specialist at Rutgers University. The purpose of this website is to provide organic farmers and researchers with up to date information on the ongoing efforts to develop organic management plans for the brown marmorated stink bug. The website is currently under construction and many new features will be added.

Posted in [Uncategorized](#) | Tagged [Welcome](#) | [13 Comments](#)

### Recent Posts

- [BMSB Activity in 2012](#)
- [Native Parasitoids Hold Promise in Stink Bug Defense](#)
- [Wall Street Journal article on BMSB](#)
- [Organic Grower Survey](#)
- [Planning Meeting to be held Oct 18-20, 2011 in Beltsville, MD.](#)

### Recent Comments

- [Seeds Organic](#) on [New pages!](#)
- [E | james](#) on [Welcome to the](#)

# ***OREI PI's***

1. Rutgers University – Nielsen and Hamilton\*
2. West Virginia University – Park and Kotcon
3. Shepherd University - 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 – Ziegler
9. Michigan State University - Grieshop
10. University of Florida - Mizell
11. North Carolina State University – Walgenbach\*
12. Virginia Tech – Pfeiffer\* ***\$ 2.67 million***
13. eOrganic – Stone ***3 years***

# *Farmer Collaborators*

1. Redbud Farm – Haroun Hallack, WV
2. Rodale Institute – Jeff Moyer, PA
3. JEM Farm - Elizabeth Maylater , TN
4. Strawberry Creek Farm - Warren Landis, VA
5. Abington Organics - Anthony Flaccovento, VA

# *OREI Objectives*

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. Extension and Outreach



# Goals

- Investigate dispersal behavior within the farmscape and integrate with core organic pest management strategies
  - Conservation biological control
  - Habitat manipulation
  - Trap Crops
  - Barriers

# *Goals*

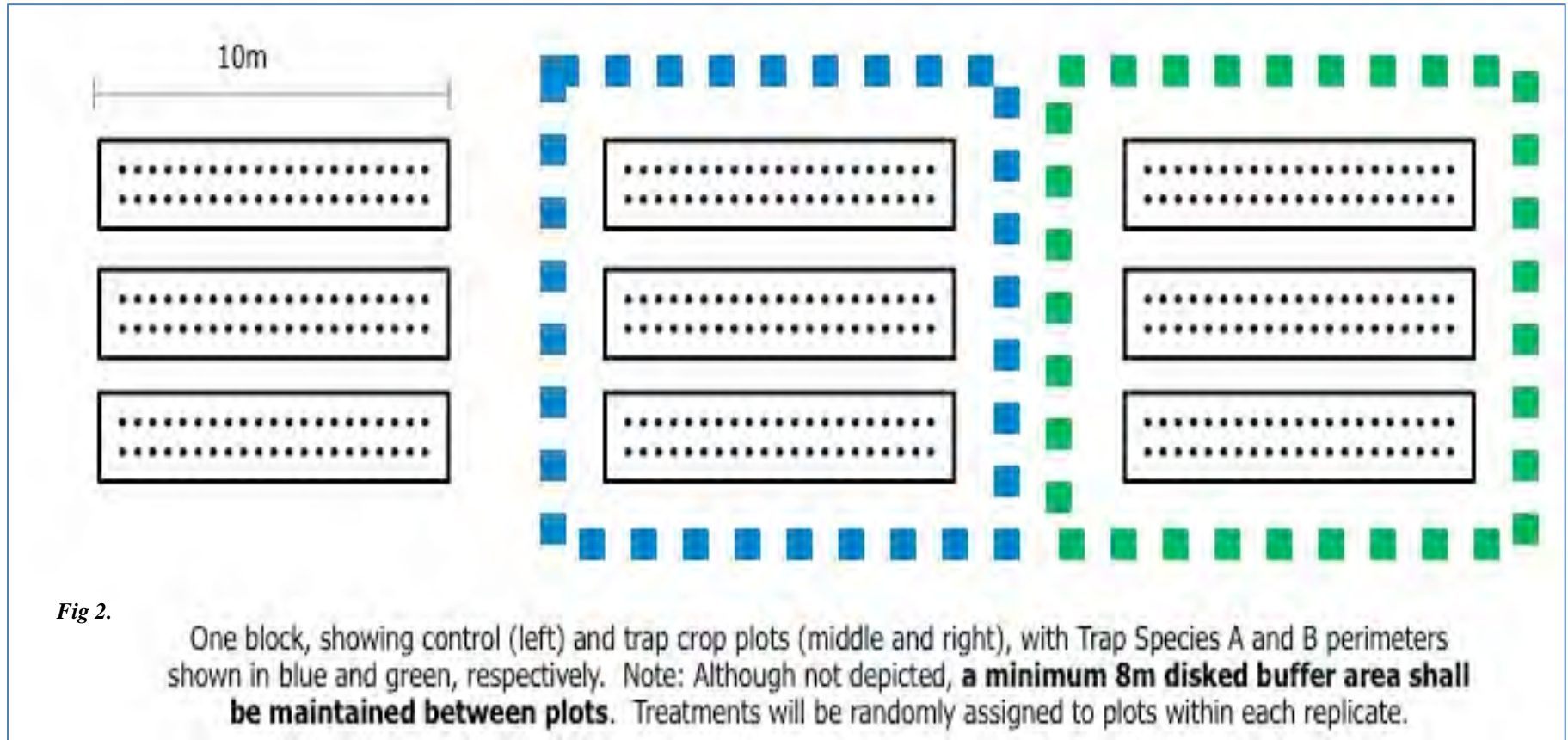
- Identify integrated management tactics that could be employed by organic farmers for BMSB and endemic species
- Investigate management of BMSB at different “invasion” levels
- Incorporate field crops
- Compliment and build off of SCRI, not duplicate!!

# *Obj. 1 - Develop habitat manipulation tactics based upon how host plant phenology impacts BMSB preference and dispersal*

- Identify top two candidate trap crops
  - Green amaranth
  - Sunflower
  - Buckwheat
  - Okra
  - Summer Squash



- Spatial and temporal utilization of trap crops (selected vegetables and field crops)

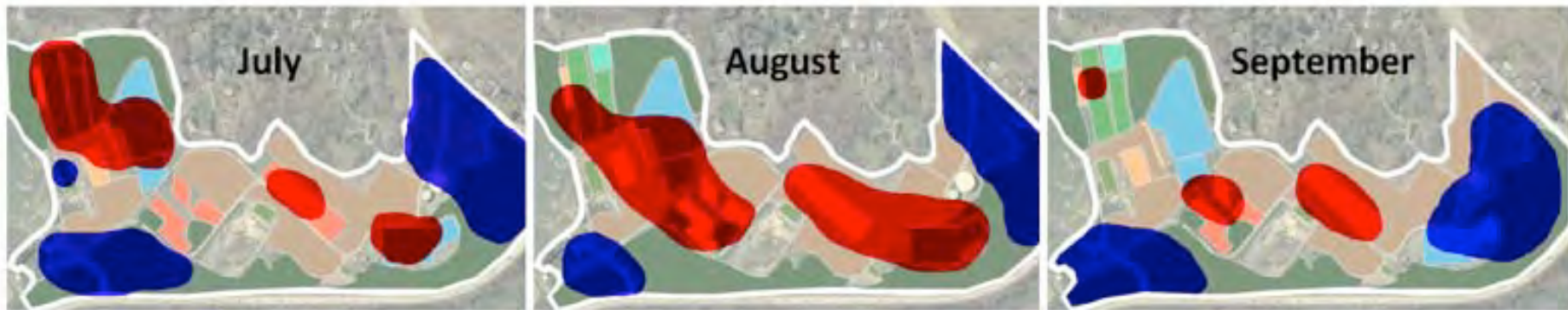


- Management within trap crop
- Source – sink dynamics with protein markers

## *Obj 2. Determine biotic and abiotic factors affecting adult and juvenile BMSB whole-farm movement*

- Patterns of within-farm movement
  - Whole-farm sampling to establish spatiotemporal distribution patterns and relationship to crops, wild hosts, and structures

**Fig 3.** An example time-series patch/gap maps. Red areas (patches) indicate areas with significantly higher BMSB density and blue areas (gaps) show areas with significantly lower BMSB density.



## *Obj 2. - Determine biotic and abiotic factors affecting adult and juvenile BMSB whole-farm movement*

- Abiotic and biotic factors affecting adult flight behavior
  - Temperature
  - Reproductive status
  - Response to cues
- Factors affecting nymphal dispersal behavior
  - Mark release recapture at known distances with baited pyramid traps
  - Mark release recapture to examine movement among host plants at progressive phenological stages
- Characteristics of human-made structures as overwintering habitats
- Develop and evaluate an overwintering trap

## *Obj. 3 - Determine the identity and importance of extant natural enemies of stink bugs and their impact on BMSB populations*

- Impact of natural enemies
  - Species composition of parasitoids and predators using sentinel egg masses
  - Rates of egg predation and parasitism
  - Identify taxa responsible in soybean and fruit using video camera
- Impact of trap crops on natural enemies
- Potential of insectary plants to enhance mortality
- Impact of organic insecticides on natural enemies

# *Obj. 4 - Evaluate integrated management plans for BMSB and endemic stink bugs specific to organic production systems*



- ~~Field evaluation of NOP compounds~~
- Barrier fabrics for cultural control
- Integrated organic management in final year



## *Obj. 5 Extension and Outreach*

- Web-based materials
- On-farm demonstrations
- Field day at each cooperating farmer site
  - Grower surveys
- Traditional extension materials
- Rodale Institute
- eOrganic partnership
- Project evaluation at 'integrated' farms

# *Outcomes*

- Identify management tactics for organic growers
- Advance knowledge of BMSB behavior and movement
- Disseminate information on the best whole-farm practices for BMSB and endemic stink bugs
- Network of future organic research collaborations