Specialty Crop Research Initiative
Annual Report

Project Year	Reporting Period
Year 4 (Ends 08/31/2015	September 1-August 31

Reporting Institution	Co-PD/Institutional PI
Cornell University	Arthur Agnello

Institutional Co-PIs

Name	Title	Location
Peter Jentsch	Senior Extension Associate	Highland, NY
Charles Bornt	CCE ENYCHP Specialist	Troy, NY
Laura McDermott	CCE ENYCHP Specialist	Hudson Falls, NY
Crystal Stewart	CCE ENYCHP Specialist	Johnstown, NY
Dan Donahue	CCE ENYCHP Specialist	Highland, NY
Teresa Rusinek	CCE ENYCHP Specialist	Kingston, NY
Maire Ullrich	CCE ENYCHP Specialist	Middletown, NY
Amy Ivy	CCE ENYCHP Specialist	Plattsburgh, NY
Anna Wallis	CCE ENYCHP Specialist	Plattsburgh, NY
Daniel Gilrein	CCE ENYCHP Specialist	Riverhead, NY
Faruque Zaman	Association Senior Educator	Riverhead, NY
Jim O'Connell	Assc Extnsn Entomologist	Highland, NY
Deborah Breth	CCE ENYCHP Specialist	Albion, NY
	CCE Fruit Specialist	

Technical Summary of Progre

Objective 1. We collaborated with USDA-ARS, North Carolina State Univ, and Oregon State Univ, in continuing to assess voltinism using a semi-field cage system into which overwintered adults and lab-reared egg masses were introduced and developmental progress monitored, to better define voltinism and phenology of BMSB in the Hudson Valley. Additionally, we monitored agronomic settings and border areas of tree fruit and vegetable plantings to determine the distribution and rate of colonization by BMSB during the growing season.

Objective 2. We evaluated different methods of monitoring BMSB occurrence and activity, including an improved aggregation pheromone formulation, different pheromone lure formulations and synergist combinations, and a pheromone-based attract and kill trapping approach.

Objective 3. Utilizing perimeter pheromone trap data, we provided growers with a 'Provisional Trap Threshold' for management of BMSB this season and will assess the effectiveness of the threshold in pest management decision making this fall.

Objective 4. We continued to test Trap and Kill netting for efficacy against BMSB along the wooded edge of commercial orchards

General Project Forecast

Outlined Experimentation for Upcoming Period

Outlined Experimentation for Upcoming Period
Objective 1. We will continue to monitor BMSB and native stink bugs in tree fruit and vegetable crops and bordering natural habitats using visual inspections throughout the season, to assess the establishment of BMSB in our area.

Objective 2. We will continue to monitor for BMSB populations in orchard and other agronomic ecosystems throughout the state using newly developed traps and lures to enhance trap sensitivity and accuracy.

Objective 3. We will continue to study the use of stand alone and integrated approaches for BMSB management employing pheromone trap-and-kill strategies and levels of topical and residual efficacy while evaluating feeding site deterrence.

Identification of Barriers to Project Success

Key Personnel Trained/Advised (Post-Docs, Graduate Students, Undergraduate Studen

Tim Lampasona, Field Technician, HVRL, Highland, NY
Sara Rower, CCE ENYCHP Technician, Highland, NY
Mike Fraatz, Field Technician, HVRL, Highland, NY
Jonathon Binder, Field Technician, HVRL, Highland, NY
Kathrine Apointe, Field Technician, HVRL, Highland, NY
Forrest English-Loeb, SUNY Fredonia, NY
Abagail Davis, Roanoke College, Roanoke, VA
Elizabeth Tee, CCE Specialist, Albion, NY
Kevin Besler, CCE ENYCHP Technician, Middletown, NY

Research Products

Research Talks, Posters, Meetings/Symposia, and Workshops

" Overview of Three Years of ARDP Funded Research in Brown Marmorated Stink Bug, in NY Annual Reporting Session to the Advisory Board of the New York State Apple Research and Development Program (ARDP) NYSAES, November 26, 2015

" Review of the 2014 Pest Management Season in ENY; 2015 Hudson Valley Commercial Fruit Growers' School, Garden Plaza Hotel, Kingston, NY February 11-13, 2015

" Strategies for Late Season Invasives Management in Berries and Grapes, 2015 Hudson Valley Commercial Fruit Growers' School, Garden Plaza Hotel, Kingston, NY February 11-13, 2015

" Emerging Insect Problems of Tree Fruit in Eastern NY, Long Island Agricultural Forum, Suffolk County Community College; Eastern Campus Riverhead, New York. January 8, 2015

" Emerging Invasive Insects in Eastern NY, ICS Full Scale Exercise, Fire Training Center New Hampton, NY July 21st , 2015

Research-Oriented Websites and Digital Products

Use of Citizen Science-based data to track BMSB throughout NYS.
http://imapinvasives.org/nyimi/map/

Use of pheromone trapping data to determine the presence of BMSB in NYS agricultural production systems. Provide historical urban tracking of BMSB throughout NYS.
http://www.eddmaps.org/bmsbny/

Research Publications (Accepted, Submitted, In Preparation)

" Jentsch, P.J. A New Threshold-Based Management Tool for the Brown Marmorated Stink Bug, NY Fruit Quarterly, Vol. 23, No.3 Fall 2015

" Leskey TC, Agnello A, Bergh JC, Dively GP, Hamilton GC, Jentsch P, Khrimian A, Krawczyk G, Kuhar TP, Lee D-H, Morrison III WR, Polk DF, Rodriguez-Saona C, Shearer PW, Short BD, Shrewsbury PM, Walgenbach JF, Weber DC, Welty C, Whalen J, Wiman N, Zaman F (2015) Attraction of the invasive Halyomorpha halys (Hemiptera: Pentatomidae) to traps baited with semiochemical stimuli across the United States. Environ Entomology 25 April 2015

Extension and Outreach Products

Extension Talks, Meetings, and Workshops

" Brown Marmorated Stink Bug: Field Confusion. Scaffolds No.19, August 3, 2015

" Organic Pesticide Applicator Training for Fruit and Vegetable Growers; ‘ IPM in Organic Pest Management Programs ’ Cornell Cooperative Extension; Hudson Valley Research Laboratory, September 10th , 2015

" Onion Bulb Mite & Brown Marmorated Stink Bug in Hudson Valley Vegetable Crops. CCE Orange County, Middletown, February 2015

" Migration and Population Increase of the BMSB in NYS. Peter Jentsch; Agrassistance Mtg; Studebakers Restaurant, Lyons, NY

" Management of the Stink Bug Complex in Commercial Vegetable Production. Peter Jentsch; Hudson Valley Commercial Vegetable School, The Falcon, Marlboro, NY

" Management of the Stink Bug Complex in Commercial Tree Fruit. Peter Jentsch; Hudson Valley Commercial Fruit Growers School, Garden Plaza Hotel, Kingston, NY
Presentation in meetings and conferences where BMSB was discussed (presented by Dan Gilrein, Extension Entomologist and Faruque Zaman, Associate Entomologist, CCE-Suffolk, NY):
(1) 2014 conference: Long Island Arboricultural Association: Cornell Entomology Update: Notes and Noteworthy Landscape Pests; 11 November 2014; Farmingdale,

Extension-Oriented Websites and Digital Products

The ‘ Jentsch Lab ’ web site (http://blogs.cornell.edu/jentsch/) produced 21 Extension and Outreach Publications included topics:

" Stink Bug Management in Red Delicious: September 22, 2015

" BMSB Update: Nymphs Increasing in Traps & Found on Peach on 08/17/2015

" BMSB Update: Bifenthrin Use recommendations, Section 18 Labels Available on 08/06/2015

" BMSB: Bifenthrin Section 18 Renewal Includes Columbia County on 08/06/2015

Extension and Outreach Publications (Published and In Preparation)

" The Brown Marmorated Stink Bug Update: Eastern NY Commercial Horticulture Program,
Teresa Rusinek; Weekly Vegetable Update. Vol. 2, Issue 23, September 18, 2014

During the 2015 growing season BMSB information was published in the weekly “ Fruit and Vegetable Newsletter ” published by Cornell Cooperative Extension of Suffolk County distributed to 230 growers and trade representatives.

F. Zaman: Fruit and Vegetable Newsletter article, “ Brown Marmorated Stink Bug (BMSB) Update ” , 9 April 2015

F. Zaman: Fruit and Vegetable Newsletter article, “ Brown Marmorated Stink Bug (BMSB) Update ” , 8 June 2015

F. Zaman: Fruit and Vegetable Newsletter article, “ Brown Marmorated Stink Bug

Impact of Research and Extension Activities During Reporting Period

New Leveraged/Complementary Resources

(Jentsch , P.) 04/15/15 to 03/31/17. New York Farm Viability Institute for $99,614. Increasing the Efficacy and Economic Viability of Trap and Kill Systems for Spotted Wing Drosophila Management and Brown Marmorated Stink Bug in NY Vegetable and Fruit Production

(Jentsch , P.) 09/15/13 to 10/31/14. Confidential Consulting to Private Firm ($7,400) Studies Determining Risk Factors Associated With BMSB in Food Product Contamination.

(Jentsch , P., Lampasona, T.) 04/01/14 to 3/31/15 NYS Ag & Mkts CCE Columbia County for $64,740. ‘ Monitoring and Management Strategies for the Invasive Spotted Wing Drosophila and Brown Marmorated Stink Bug in the Hudson Valley of NY. ’

(Jentsch , Peter;) 03/01/14 to 11/30/15 Agricultural Company Gifts/Grants, $35,000. Field Insecticide Trials with Apple, Pear, Small Fruit

(Jentsch , P., Lampasona, T.) 04/01/13 to 3/31/14 NYS Ag & Mkts ARDP, $14,900 Tree Host Survey, Monitoring and Management Strategies for the Invasive Brown

Media Contacts and Press Coverage

" How To Get Rid Of Stink Bugs. April 6th, 2015 from Poughkeepsie Journal by Bill Cary
http://www.poughkeepsiejournal.com/story/news/local/2015/04/06/get-rid-stink-bugs/25385369/

" Invasive Insects Taking A Bite From N.Y. Farms, Gardens. September 10th, 2015 from Poughkeepsie Journal by Mary Perham
http://www.poughkeepsiejournal.com/story/news/local/2015/09/10/invasive-species-hitc

Grower/Stakeholder Cooperators

- Allen Ochs Orchard, 4 Ochs Lane, Warwick NY, 10990
- Jack Pennings Orchard, 161 State Route 94 S., Warwick NY, 10990
- Amy Hepworth; Hepworth Farms, Marlboro NY.
- Leonard, Steve and Brad, Clarke; Clarke & ProspectFarms, Milton NY.
- Jeff, Jenny and Joel Crist; Crist Brothers Farms, Monroe NY.
- Vito, Joel and Bill Truncali; Truncali Farm, Marlboro, NY.
- Doug Glorie; Glorie Farm & Winery, Marlboro, NY.
- Fabio Chizzola; Westwind Orchard, Accord, NY
- Chuck Mead, Mead Orchards, Tivoli, NY
- Josh Moranthau, Fishkill Farm, Fishkill, NY
- Briermere Fruit Farm, Clark McCombe, Northville, NY
- Davis Fruit Farm, Dave Davis, Wading River, NY
- Halsey Fruit Farm, Tom Wickham, Milk Pail, NY

Additional Project Information, Details, and General Comments

Additional Project Information from A. Agnello, NYSAES, Geneva
Regional Trapping Study: Worked with NYS tree fruit growers to collect trap data from 8 sites in WNY (Wayne, Orleans, Ontario and Niagara Counties) and provided results on a weekly basis to a network of extension agents and private consultants on the capture numbers.

Voltinism Study: A single generation was observed in 2015 with 1st generation adults not seen to lay eggs
7 June 1st egg clusters observed on from overwintering adults obtained from Lab Services in Hamburg, Pennsylvania, kept in a field cage under a standard size apple tree on the NYSAES grounds. Clusters were sleeve-caged on foliage of potted peach trees inside field cage.
10 June 1st instar nymphs were first observed hatching from the clusters
23 June 2nd instar nymphs observed in sleeve cages
3 July 3rd instar nymphs observed in sleeve cages

Institutional Progress Toward Accomplishment of Objectives During Reporting Period

General Institutional Progress

- ○ 0% (Project Under Development)
- ○ 20% (Year 1 Objectives Completed)
- ○ 40% (Year 2 Objectives Completed)
- ○ 60% (Year 3 Objectives Completed)
- ● 80% (Year 4 Objectives Completed)
- ○ 100% (Project Close-Out Initiated)

Subaward Budget Outlays

- ○ <20% of Project Total
- ○ 20%-40% of Project Total
- ○ 40%-60% of Project Total
- ○ 60%-80% of Project Total
- ● 80%-100% of Project Total
- ○ Over Subaward Budget

Key Institutional/Co-PI Accomplishments

Progress Toward Accomplishment of Individual Objectives

1.1.1 Determine phenology and voltinsim characteristics of BMSB

Categorical Progress

- ○ 0% (Under Development)
- ○ 25% (Project Initiated)
- ● 50% (Results Collected)
- ○ 75% (Data Analysis Completed)
- ○ 100% (Manuscript Completed)

1.3.2 Determine BMSB invasion patterns into new habitats.

Categorical Progress

- ○ 0% (Under Development)
- ○ 25% (Project Initiated)
- ● 50% (Results Collected)
- ○ 75% (Data Analysis Completed)
- ○ 100% (Manuscript Completed)

2.1.1.2 Optimization of pheromone and kairomone dispensers for monitoring BMSB

Categorical Progress

- ○ 0% (Under Development)
- ○ 25% (Project Initiated)
- ● 50% (Results Collected)
- ○ 75% (Data Analysis Completed)
- ○ 100% (Manuscript Completed)

2.1.2 Assess other types of monitoring tools

Categorical Progress

- ○ 0% (Under Development)
- ○ 25% (Project Initiated)
- ● 50% (Results Collected)
- ○ 75% (Data Analysis Completed)
- ○ 100% (Manuscript Completed)

2.2.1 Evaluate efficacy of registered and developmental insecticides against BMSB

Categorical Progress

- ○ 0% (Under Development)
- ○ 25% (Project Initiated)
- ● 50% (Results Collected)
- ○ 75% (Data Analysis Completed)
- ○ 100% (Manuscript Completed)

2.2.3 Develop attract-and-kill and mass traping strategies for management of BMSB in commercial crops

Categorical Progress

- ○ 0% (Under Development)
- ○ 25% (Project Initiated)
- ● 50% (Results Collected)
- ○ 75% (Data Analysis Completed)
- ○ 100% (Manuscript Completed)

Categorical Progress

- ○ 0% (Under Development)
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Matching Costs and In-Kind Contributions: Receipt and Verification

Source of Matching Funds	$ Budgeted	$ Contributed	Verified
Matching Source 1			☐
Matching Source 2			☐
Matching Source 3			☐
Matching Source 4			☐
Matching Source 5			☐
Matching Source 6			☐
Matching Source 7			☐
Matching Source 8			☐
Matching Source 9			☐
Matching Source 10			☐
Matching Source 11			☐
Matching Source 12			☐

Additional Information on Matching Costs and Verifications