Entomology Program
2011 and 2012

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Studies on Brown Marmorated Stink Bug

Project: Monitoring, Damage Assessment and Program Evaluation for Management of Brown Marmorated Stink Bug *Halyomorphia* halys (BMSB) in the Hudson Valley of New York.

Funding: Hatch; NYS Ag & Mkts; USDA SCRI; ARDP

In the fall of 2010 brown marmorated stink bug caused extensive damage to many crops, including fruit crops, in the mid-Atlantic region. Traditional IPM-based insect pest management programs were ineffective for managing this pest on tree fruit. By summer of 2011, the entomology group at the Hudson Valley Lab had initiated a Citizen Science Project to map the presence of BMSB throughout New York State. Early results showed increased spread of the insect throughout much of the Hudson Valley.

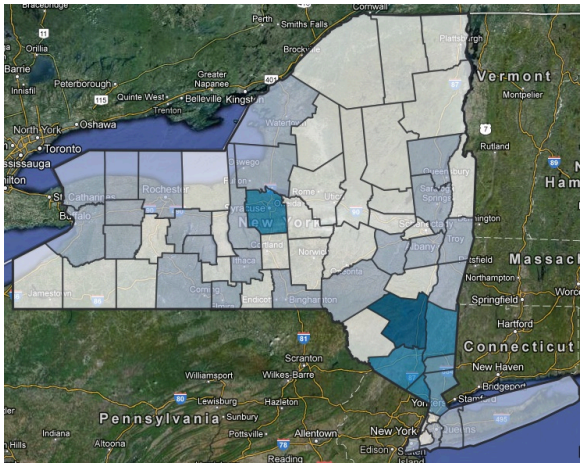


Figure 1. Urban spread of BMSB in NYS; Darker counties indicate higher Citizen Science Project submissions of BMSB specimens.

Beginning in early May of 2011, state-wide trapping for the BMSB was initiated at 72 sites in the major growing regions using methyl (E,E,Z)-2,4,6-decatrienoate (MDT), the male-produced pheromone of another pentatomid common in eastern Asia, *Plautia stali* Scott. During the season we were unsuccessful in capturing the BMSB using this lure with only a single site in Marlboro capturing them in September. However, in 2012 a newly developed lure distributed by USDA proved more effective, capturing the adults as they emerged from overwintering sites. BMSB were captured in traps using the USDA #10 lures well before they were otherwise noted in survey observations.

Field observations included crop monitoring both for live insects and for BMSB damage as well as surveys for the insect in bordering deciduous host plants and other agricultural commodities such as vegetables (tomato and pepper), sweet corn, pome and stone fruit. In orchards where economic feeding injury was observed on tree fruit, high intensity light and insecticide treated netting were employed to survey the stink bug complex to determine the proportion of BMSB to the native insect complex.

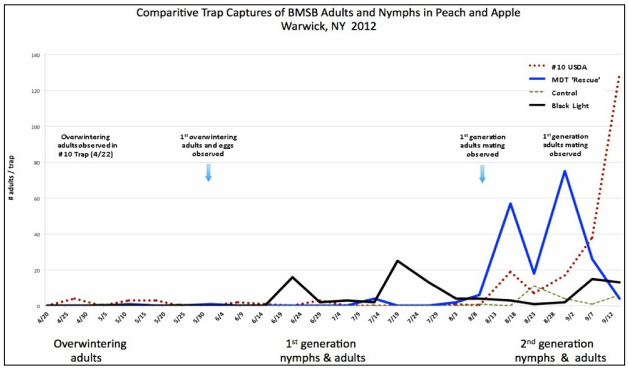


Figure 2. Results from weekly trapping with black light, USDA#10 lure, MDT and untreated controls in Tedders traps, Warwick, NY. 2012.

We employed a 24-hour night surveys for rapid population assessment, using sticky Tack Trap applied to high-density polyethylene sheeting and 4-fixture 4000kW halogen lighting to attract and monitor BMSB in organic vegetable systems. During this evaluation, we captured 338 adults over a 48-hour period. This method may allow for trap-out of BMSB damaging populations when a non-insecticide management program is required, especially during preharvest intervals when BMSB is most damaging and insecticides cannot be applied due to label restrictions.

Figure 3. Tower halogen lights and poly sheeting used to trap BMSB in organic tomatoes.

Project: Assessment of Late Season Damage to Tree Fruit Caused by Brown Marmorated Stink Bug.

Funding: SCRI USDA/ARS

Cooperators: Multi-state project with 54 cooperators.

In 2012 we observed late-season stink bug feeding injury in Hudson Valley orchards. Light traps employed on the 8th of September captured the native green stink bug and the invasive BMSB both inside and along the perimeter of affected orchards. This provided the first record of a stink bug complex involving both native and invasive stink bugs causing economic damage in NY.

Figure 4. Trapping stink bugs in orchards.

A tower light and insecticide-treated netting were employed both along the edge and in the interior of a Red Delicious block and were used to trap BMSB on the night of 8 September. The perimeter placement along the wooded edge produced 30 BMSB and 37 GSB whereas only 3 BMSB and 10 GSB were trapped in the orchard interior. Captures of nymphs and adults from 22 September to late October in Tedders traps using a combination of MDT and the new USDA #10 pheromone lure showed continuing BMSB presence in the interior of the orchard well after Red Delicious harvest.

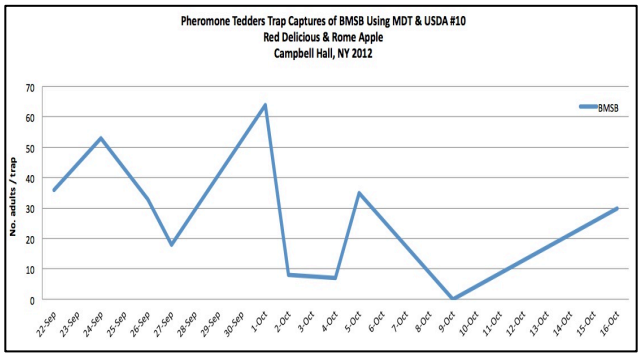


Figure 5. Late-season BMSB captures. Campbell Hall, NY. 2012.

Three late season varieties, Golden Delicious, Red Delicious and Pink Lady, sustained the greatest damage from stink bug feeding. In our first evaluation of BMSB injury, Golden Delicious harvested on 5 October in Milton, NY, were examined to determine the extent of BMSB injury. One thousand fruit were randomly selected from each of three representative field bins, and the selected fruit were rated for BMSB damage. The samples had 24%, 54% and 68% of fruit with feeding injury for an average of 48.7% fruit loss.

Figure 6. BMSB feeding damage evaluations of field-run Golden Delicious, 5 October, Milton, NY 2012.

In our second evaluation of BMSB fruit injury, field evaluations of 'Pink Lady' from trees flanking BMSB pheromone traps were made on the 16 October. The orchard consisted of 5th leaf trees on M.9 rootstocks spaced 3 ft. by 11 ft. and averaging 9.5 ft. in height. Fruit were assessed in 2 center rows and 2 border rows. Beginning along the wooded edge of the block and rating fruit toward the center of the block, 100 fruit from 10 trees were evaluated, thereby providing a total sample of 3600 fruit.

Fruit was considered injured by stink bug if darkened depressions contained one or more feeding sites or 'holes' from the insertion of the insect rostrum or evidence of a 'feeding tube' in conjunction with internal corking which is symptomatic of pentatomid feeding. Fruit loss to stink bug in this block averaged 21.4%.

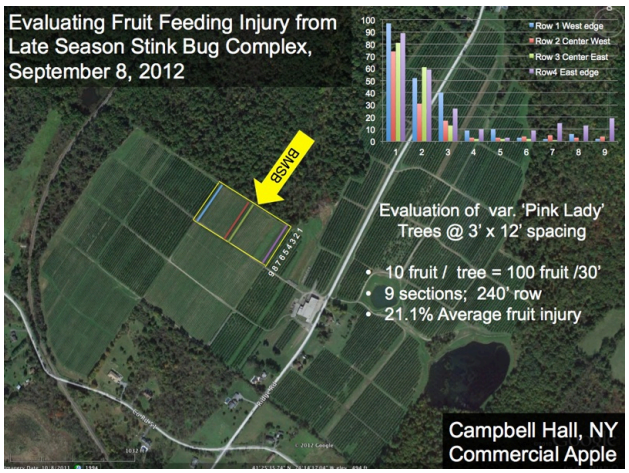


Figure 7. Aerial photo of the farm with the Pink Lady orchard where on-the-tree BMSB damage assessments were conducted in 2012.

In our third evaluation of BMSB fruit injury, pack-out data for Red Delicious fruit was collected at a packing-house in Walden, NY for fruit packed on 30 October. A total of 100,556 fruit were graded using GeoSort software in a Greefa packing line using iQS (intelligent quality sorter) for external imaging that allowed detection of defects as small as one square mm. From this lot, a total of 31,300 fruit or 31.1% were sorted as damaged by the grader software.

One hundred fruit from each of three representative bins of cull fruit from the grader were further evaluated to determine the extent of BMSB feeding. From these samples we determined that 97%, 90% and 93% of the fruit had stink bug injury, indicating that 29.1% of the harvested fruit were lost specifically because of stink bug feeding.

Figure 8. Late season feeding damage to apple (top) and BMSB-damaged fruit in cull bins (below).

<u>Project</u>: Tree Host Survey, Monitoring And Trap Tree Management Strategies For The Invasive Brown Marmorated Stink Bug, Halyomorpha Halys (Stål): (Pentatomidae), Along Borders Of NY Tree Fruit.

Funding: ARDP

The invasive deciduous tree species, *Ailanthus altissima,* is present throughout the state, existing as both male and female trees, and capable of harboring very high populations of BMSB throughout the growing season.

In 2012, we noted that BMSB completed two generations in the mid-Hudson Valley. The highest numbers of BMSB were found in orchard perimeter surveys where they were frequently observed feeding and developing on the fruiting clusters of female *A. altissima*. In monitored orchards where the BMSB was found to exist on *A. altissima*, it did not migrate into orchards to feed on tree fruit even though it was observed in pheromone and light traps along the orchard perimeter throughout the season. Conversely, on farms where *A. altissima* was not found in deciduous woodlands or in hedgerows bordering tree fruit, BMSB emerged from the arboreal habitat late in the growing season to move into and feed intensively on tree fruit.

Figure 9. A 50-ft lift is used to collect samples from 'Tree of Heaven along orchard borders.

The insecticide Acephate was introduced into *A. altissima* trap trees via either injections or implants shortly after fruit set or at the onset of 2nd generation BMSB. Significant mortality of BMSB adults was observed in laboratory bioassays with BMSB placed on seed and foliage of treated trees. This preliminary study provides evidence to support the concept that *A. altissima* might be used as a trap tree to reduce BMSB damage to agricultural commodities if populations in *A. altissima* can be managed using insecticide injections or implants.

Figure 10. Vacuuming canopy cone traps for removal of insect detritus were used to survey BMSB.

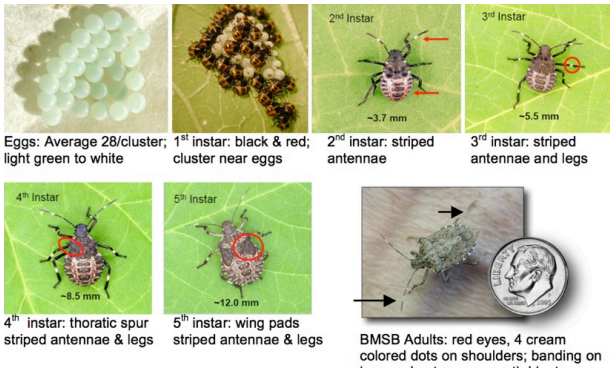
Figure 11. Injection of Ailanthus altissima and subsequent use of treated foliage and seed for adult BMSB bioassay.

Project: Determining the Capacity for Brown Marmorated Stink Bug Voltinism Development in New York State.

Grant: SCRI USDA/ARS

Cooperator: Art Agnello

Insect pests of tree fruit that have multiple generations each season often showed increased population densities and caused increasing amounts of injury to crops with each successive generation. It was initially believed that BMSB had only one generation in NY, PA, NJ, MD and Delaware. This project was conducted to determine the number of generations the insect has in NY.



Eggs: Average 28/cluster; light green to white

1st instar: black & red; cluster near eggs

2nd instar: striped antennae

3rd instar: striped antennae and legs

4th instar: thoratic spur striped antennae & legs

5th instar: wing pads striped antennae & legs

BMSB Adults: red eyes, 4 cream colored dots on shoulders; banding on legs and antenna, smooth blunt shoulders. Banded abdomen; 14 -17 mm in length.

Figure 12. Life stages of BMSB.

Three sets of BMSB eggs were placed into an outdoor screened cage on 4 May based on the reported insect response to a 14 hour light / 10 hours dark day-length. The caged samples were monitored to determine dates for egg hatch (10-15th May), larval development sequences (10 May-16 July), first generation adult emergence (23 July), adult egg-laying (13 August) and subsequent nymph to adult development throughout the remainder of the season.

This project confirmed the presence of two generations of BMSB in NYS.

Studies on Pear Psylla and Fabraea Leaf Spot

Project: Use Of Surround WP ® and Horticultural Oil To Manage Pear Psylla & Fabraea Leaf Spot.

Funding: Partnership Grant NOFA NY, 2010-11.

This two-year project incorporated the use of two OMRI certified insecticide tools to manage pear psylla and *Fabraea maculata* in a comparison study with conventional management programs. Research plots at the HVL and a 5-acre commercial orchard were employed to evaluate the kaolin clay barrier film insecticide Surround WP, used in a single application during the onset of pear psylla egg laying during the pre-bloom period and a single petal fall application, followed with bi-weekly 1% horticultural oil applications from first cover to the end of the season to manage 2nd and 3rd generations of pear psylla and *Fabraea* leaf spot. Drift reduction and deposition from applications with an airblast sprayer fitted with standard hollow cone nozzles applications were compared to applications made with air-induction nozzles. Application speeds and dilution rates were evaluated to determine how they affected insecticide efficacy and application efficiency. The OMRI program required 5 applications while the conventional program used only 3 applications.

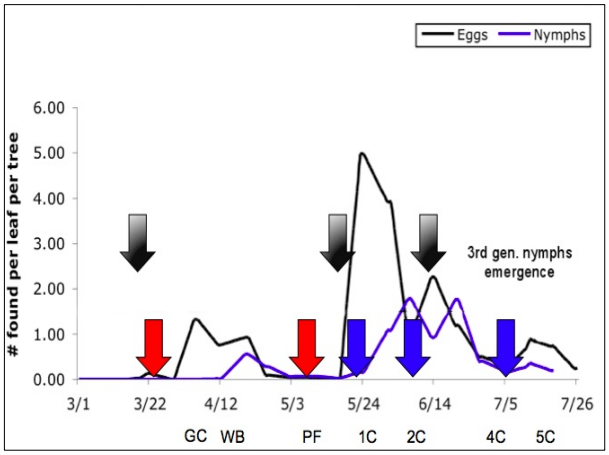


Figure 13. Application schedule for conventional and organic insect pest management: standard conventional applications (black) were compared with applications of OMRI-approved Surround WP (Red) and 1% oil (blue).

Bi-weekly foliar assessments and fruit harvest evaluations were made to assess damage from psylla, *Fabraea,* and rust mite in 2011. When compared to the conventional program, The Surround / horticultural oil program was comparable or superior to the conventional program for control of pear psylla and rust mite.

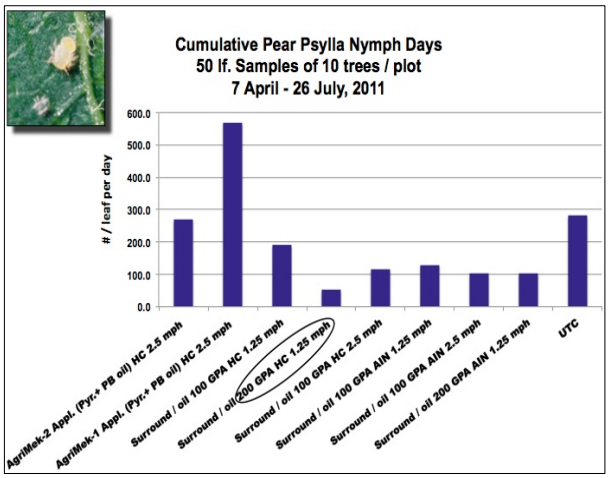


Figure 14. Impact of treatments on pear psylla.

Apple and Pear Efficacy Trials (2011-2012)

Funding: Industry Support from Bayer Crop Science, Dow AgroSciences, E.I. DuPont De Nemours & Co., Nichino America Inc. Syngenta Crop Protection, United Phosphorus Inc., New York State Apple Research and Development Program (ARDP).

Forty treatments involving season-long applications of experimental and newly registered insecticides were evaluated in replicated plots of apple, pear and small fruit varieties in 2012. Applications were made either with airblast sprayers or via handguns. Foliar and fruit feeding insect presence and injury were assessed throughout the season with 1600 fruit assayed at harvest. Yearly reports were submitted to industry representatives. Those reports include statistically analyzed field data demonstrating degrees of efficacy relative to commercial standards and untreated control plots.

Figure 12. Handgun application of test products to apples.

Contributions to Scaffolds Fruit Journal

Cooperators: Art Agnello, Mike Fargione

Beginning in March, insect pest monitoring data from the Hudson Valley Laboratory research orchard is submitted weekly for publication *Scaffolds Fruit Journal*. Based on visual observations of foliage and fruit plus pheromone trapping in combination with degree-day predictive modeling, we submit timely articles on insect occurrence and anticipated pest events, including pest management recommendations based on labeled insecticide use.

Sweet Corn Insect Pest Monitoring, Reporting And Recommendations.

Cooperators: Teressa Rusnick, Maire Urlich, Abby Seaman

Weekly results from pheromone-baited traps and from scouting for sweet corn pests are collected and posted to a web based regional trapping database. Weekly 'Pest Alerts' that include insect pest presence, PESTWATCH update link, and action recommendations are delivered to regional sweet corn producers via email list serve.

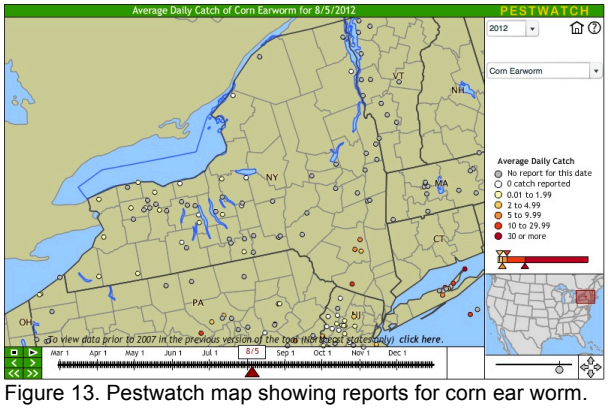


Figure 13. Pestwatch map showing reports for corn ear worm.

Integrated Management Of Spotted Wing Drosophila On Small Fruit And Grapes

Cooperators: Greg Loeb, Laura McDermott, Mike Fargione

Spotted wing drosophila (SWD), *Drosophila suzukii*, was first observed in NY in late August of 2011. We monitored SWD in 10 locations throughout the lower to mid-Hudson Valley in 2012 using traps baited with apple cider vinegar. The first SWD trap captures were found in Warwick, NY on 3 August followed by Tivoli on 6 August and Highland on 23 August. Blackberries harvested on a commercial farm in Marlboro on 31 July showed 100% ovipositional injury and we confirmed SWD adult emergence the following week. By late August, many blackberry and raspberry growers had abandoned their berry patches because attempts to control the SWD were ineffective using commercial insecticide materials, rates and timings.

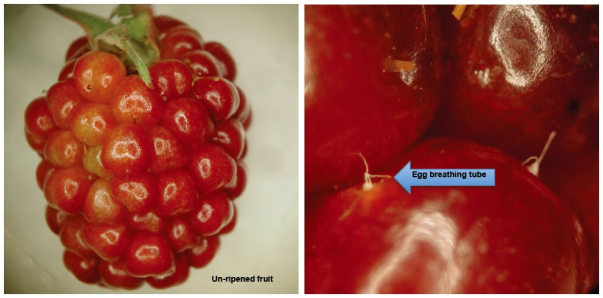


Figure 14. Immature blackberry infested with SWD eggs. 2012

Growers who harvested berries daily and applied insecticides at 5-7 day intervals were able to keep infestations levels down to 18-20%. During weeks in which applications could not be made, levels of injury increased to over 50%.

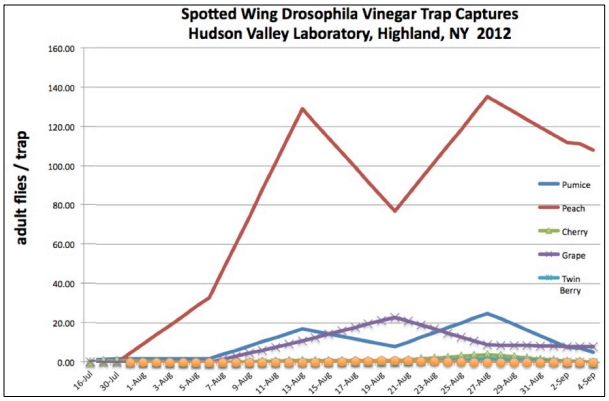


Figure 15. Highest SWD trap captures were observed in peach, but larva of SWD were not found infesting sound peach in 2012.

On-farm raspberry insecticide efficacy trials for SWD management showed replicated field trials of cyazypyr, spinetoram and bifenthrin at a 7-day schedule were ineffective at reducing damage below 30%.

Table Evaluations of Insecticide Schedules for Controlling Spotted Wing Drosophila on Raspberry [a]. Milton, N.Y. - 2012.

Treatment	oz./A	% of raspberries with drosophila breathing tube observed			
		30 Aug.	5 Sept.	20 Sept.	24 Sept.
1. Exirel + LI700	20.5 32.0	58.3 ab	96.7 c	56.7 a	30.0 a
2. Bifenture + LI700 + LI700	16.0 32.0	81.7 b	86.7 bc	60.0 a	31.7 a
3. Delegate + LI700 + LI700	6.0 32.0	48.3 a	66.7 a	73.3 b	30.0 a
4. Untreated	-	70.0 ab	100c	86.7 b	58.3 b
P value for transformed data		0.083	0.003	0.001	0.006

[a] Evaluation made on 30 August, 5, 20, 24 September on Caroline cultivar. Percent data were transformed using $\log_{10}(x+1)$ conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. All treatments received Elevate 50WDG to control botrytis fruit rot.

Figure 16. Control of SWD achieved with several different insecticides.

Berry treatments were made to determine the effects temperature and oil have on egg hatch and larval survival. Two submersion treatments were applied to berries of Caroline, a red fall-bearing raspberry, on 24 September using a split plot design with four treatments replicated five times. Treatments were made by immersing berries in 1% vegetable oil (MSO) for 1, 5 or 10 minutes. Berries were then dried and exposed to 1.1 ^{o}C or 2.2 ^{o}C for 48 or 72 hours and were compared to berries held at 22.2^{o}C, (room temperature) for 72 hours. The berries given 48-hour exposures were then held at room temperature for the remaining 72 hour period. Treatments were compared to untreated controls (UTC) held at room temperature with and without oil treatments. After 72 hours berries were teased apart to tally larval presence.

Reduced larval numbers were observed in both 48 and 72-hour cold temperature treatments. High levels of live larva were found in all control samples. The lowest levels of egg hatch were observed in berries held at room temperature, treated with 1% oil for 5 or 10 minutes. The data suggests 1% oil applications alone may reduce egg viability if used in field applications prior to harvest.

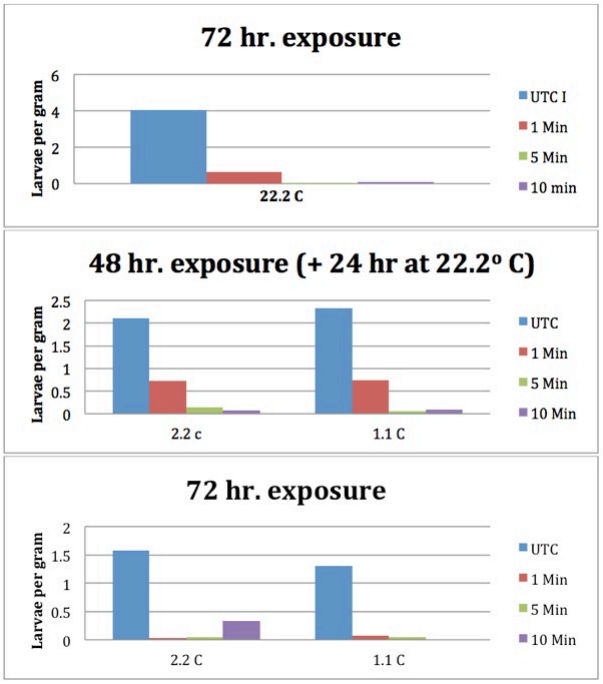


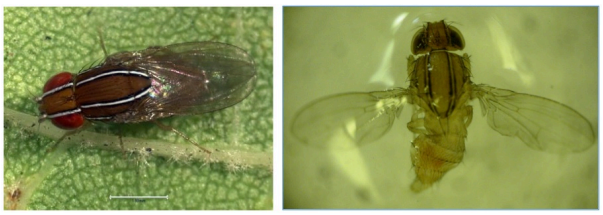
Figure 17. All berries treated with 1% oil (red, green & purple bars) showed significant reduction in larval mortality while low temperatures alone reduced larval survival by 50%.

Invasive Insect Trapping 2011-2012

Funding: NYS Ag. & Markets (CAPS)
Cooperators: Julliet Carroll, NYS IPM

Weekly trapping for invasive pome fruit insects was conducted in Hudson Valley Orchards including Warwick and Tivoli, NY. Insects of interest included spotted wing drosophila (SWD), brown marmorated stink bug (BMSB), summer fruit tortrix (SFT), false codling moth, light brown apple moth (LBAM), Asian gypsy moth (AGM). Only SWD and BMSB were captured in 2012.

However, traps baited with apple cider that were used to capture SWD, *Drosophila suzukii* (Matsumura), also captured 10 flies of the species *Zaprionus indianus* Gupta, the fig fruit fly, in Milton, NY on 4 September, 2012. The fig fruit fly is native to tropical Africa, but it has been found in South America where it was recorded for the first time in the Western Hemisphere in 1999. The first U.S. detection occurred in a survey of fruit fly hosts in Central Florida on 26 July, 2005. Detections of the fig fly were recorded in Virginia, Mississippi and CT in 2012.



Zaprionus indianus Gupta found in Milton, NY on 4 September, 2012.

Presentations at professional meetings (2011-2012)

Monitoring the BMSB in Urban and Agricultural Environments in New York State.

November 29, 2012, 88th Annual Cumberland-Shenandoah Fruit Workers Conference, Winchester, VA.

Tree Host Survey, Monitoring and Management Strategies for the Invasive Brown Marmorated Stink Bug, Halyomorpha halys (Stal): (Pentatomidae), Along Borders of NY Tree Fruit. . Northeast IPM Brown Marmorated Stink Bug Working Group meeting.

November 27, 2012, Alson H. Smith Research and Extension Center, Virginia Agriculture Experiment Station, Winchester, VA

Development of a Citizen Science Project to Monitor the Spread of the Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål), in NYS.

October 23-24, 2012 New England, New York, Canadian Fruit Pest Management Workshop. Burlington Vt.

The Leafroller and Internal Lepidopteran Complex: How Complex is it?

August 16th, 2012; NE Fruit Consultants Summer Tour and Meeting, Shelbourne, MA,

Threat of the Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål) to New England on Tree Fruit, Small Fruit, Vegetable and Sweet Corn.

March 21, 2012, New England Annual Grower and Advisory Meeting, South Deerfield, MA.

Monitoring the Spread of Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål) in NY. Measuring the Value of Urban Citizen Science. Northeast IPM Brown Marmorated Stink Bug Working Group meeting.

June 12-13, 2012. Fruit Research & Extension Center , Penn State University , Biglerville, PA

Surveying the BMSB in New York State. Northeast IPM Brown Marmorated Stink Bug Working Group meeting.

November 29, 2011, Alson H. Smith Research and Extension Center, Virginia Agriculture Experiment Station, Winchester, VA

Threat of the Brown Marmorated Stink Bug, *Halyomorpha halys* (Stål) to NY on Tree Fruit, Small Fruit, Vegetable and Sweet Corn. Northeast IPM Brown Marmorated Stink Bug Working Group meeting.

June 20-21, 2011. Fruit Research & Extension Center , Penn State University , Biglerville, PA

Strategies For Using Cyazypyr On Pear Psylla In NY Pear Orchards.

Oct. 24 – 25, 2011. Northeast Tree Fruit Insect Control Experts Meeting, DuPont Stine-Haskell Research Facility, Newark, Del.

Commercial Orchard Study Comparing Reduced Risk Insecticides to Conventional Tools for Management of Pear Psylla.

March 19, 2011. Eastern Branch Entomological Society of America, Hilton Hotel, Harrisburg, PA.

Presentations at extension meetings 2000-2013

Updates on the Brown Marmorated Stink Bug, Halyomorpha halys (Stål) and Spotted Wing Drosophila, Drosophila suzukii in NY State

January 22, 2013. Fruit & Vegetable Expo, Oncenter, Syracuse NY

Managing Insecticide Use

January 10, 2013; Aroma Thyme, Ellenville, NY

2012 Insect Pest Management of Tree Fruit Updates

January 10, 2013. Long Island Agricultural Forum, Riverhead, NY

Use of Trap Trees to Manage Brown Marmorated Stink Bug, Halyomorpha halys (Stål) in NY.

November 26, 2012. Apple Research and Development Board Annual Report, Geneva, NY.

Monitoring the BMSB in Urban and Agricultural Environments in New York State. Agricultural Invasive Species session.

November 13, 2012. Annual CCE Agriculture and Food System In-service, Ithaca, NY.

Sweet Corn Insect Pest Management. Updates from the Hudson Valley.

November 13, 2012. Annual CCE Agriculture and Food System In-service, Ithaca, NY.

Invasive Pest Update –Spotted Winged Drosophila

August 21, 2012 Cornell Cooperative Education Center, Troy, NY.

Invasive Pest Update – Spotted Winged Drosophila

August 15, 2012 Hudson Valley Laboratory, Highland, NY.

Insect Pests of Ornamental and Landscape Plants: Biology and Management. Cornell Cooperative Ext.,

March 6, 2012; Webinar: Westchester CCE, Valhalla, NY.

The Brown Marmorated Stink Bug, Halyomorpha halys (Stål) in NY Ornamental and Landscape Environments: Biology and Management. Cornell Cooperative Ext.

February 27, 2012, Webinar: Hudson Valley Laboratory, Highland, NY.

Invasive Pest Update – Biology and Management of Brown Marmorated Stink Bug and Spotted Winged Drosophila on Grape.

March 8th , 2012. WNY Grape School, CLEREL Laboratory, Portland, NY

Invasive Pest Update: Biology and Management of Brown Marmorated Stink Bug and Spotted Winged Drosophila on Grape.

February 17, 2012. Hudson Valley Grape School Kingston, NY

Invasive Pest Updates – Biology and Management of Brown Marmorated Stink Bug on Tree Fruit.

February 13, 2012 Upper Hudson & Lake Champlain School, Lake George, NY

Tree Fruit Insect Round-Up. Managing the Hudson Valley Pome Fruit Insect Complex.

February 14, 2012. Hudson Valley Fruit School, Kingston, NY

Invasive Pest Update: Management of BMSB and SWD on Tree Fruit in NY State.

February 15, 2012. Hudson Valley Fruit School, Kingston, NY

Tree Fruit Insect Pest Management. Novel Insecticides & Newly Invasive Pests.

February 6-7, 2012. Western NY Fruit Schools, Niagara County CCE Training Center, Lockport, NY

Tree Fruit Insect Pest Management. Novel Insecticides & Newly Invasive Pests.

February 6-7, 2012. Lake Ontario Fruit Schools, Wallington Fire Hall, Sodus, NY

Vegetable Insect Control: Resource, Identification, Scouting and Management For Key Insect Pests in New York Vegetable Production. Cornell Beginner Farmer Program, BF 121- Week 3

February 2, 2012, Webinar: Hudson Valley Laboratory, Highland, NY

Surveying the Brown Marmorated Stink Bug, Halyomorpha halys (Stål) in NY State

January 25, 2012, 2012 Fruit & Vegetable Expo, Oncenter, Syracuse NY

Insect Pest Management 101: Future Fruit Growers of NY; Cornell University.

February 3, 2012, Hudson Valley Laboratory, Highland, NY

2011 Insect Pest Management of Tree Fruit & Web Based Pest Management Resources.

January 13, 2012. Long Island Agricultural Forum, Riverhead, NY.

Threat of the Brown Marmorated Stink Bug, Halyomorpha halys (Stål) to NY and New England on Tree Fruit, Small Fruit, Vegetable and Sweet Corn. November 30, 2011, Apple Research & Development Program NYSAES, Jordan Hall, Geneva, NY.

The Brown Marmorated Stink Bug, Halyomorpha halys (Stål). New England, New York & Canadian Fruit Pest Management Workshop.

October 18-19, 2011. Bishop Booth Conference Center Burlington, VT.

Tree Fruit Efficacy Trial / Field Tour.

June 7, 2011. Hudson Valley Laboratory, Highland, NY

The Brown Marmorated Stink Bug, Halyomorpha halys (Stål) in NY. Workshop to NY Agricultural Stakeholders.

June 9, 2011. Hudson Valley Laboratory, Highland, NY

The Brown Marmorated Stink Bug, Halyomorpha halys (Stål) in NY. April 29, 2011. Webinar to NY Agricultural Stakeholders. Hudson Valley Laboratory, Highland, NY

Efficacy of Voliam Flexi and Voliam Express on Tree Fruit Arthropd Complex. Syngenta Agrichemical Fruit and Vegetable Technical Information Exchange.

March 23-24, 2011. The Inn at Glenora Wine Cellars, Dundee, New York,

Shifting Management Strategies: The Challenge of Filling the Insecticide Void.

January 27, 2011 Empire State Fruit and Vegetable Expo, Oncenter, Syracuse, NY.

Invasive Pest Update – Brown Marmorated Stink Bug and Spotted Winged Drosophila

February 18, 2011 Hudson Valley Fruit School, Kingston, NY

Annual Insect Update: Spotted Wing Drosophila, Stink Bugs, Grape Berry Moth

February 15, 2011. Hudson Valley Fruit School, Kingston, NY

Invasive Pest Update – Brown Marmorated Stink Bug and Spotted Winged

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Relevant Extension/Outreach Publications

Brown marmorated stink bug in the Hudson Valley: Appellation Cornell Newsletter Issue 12 November 2012

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Detection and Management of Brown Marmorated Stink Bug (1 credit) PMEP Distance Learning Center: On-Line DEC Pesticide Recertification Module for categories 2, 3a, 9, 10, 7a, 1a, 21, 22, 23, 24, and 25. http://coursem.cce.cornell.edu/catalog.php?item=10

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