Updates on Brown Marmorated Stink Bug and Spotted Wing Drosophila in New York

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The impact of invasive insect species on NY tree fruit production dates back to the colonial propagation of fruit trees in Long Island and early fruit plantings along the Hudson Valley during the 17th century. Newly emerging insect pests continue to 'appear', often causing significant economic loss in commercial fruit production during the early years of establishment. Included in the historical lineup are such global notorieties as oriental fruit moth, European red mite, European apple sawfly, San Jose scale, codling moth and rosy apple aphid along with a host of other, lesser known but sporadically damaging pests. With increasing global trade have come new immigrants such as the **brown marmorated stink bug (BMSB)**, ***Halyomorpha halys,*** a newly invasive Asian insect pest to the United States. This insect has been observed in the urban, home garden and agricultural environs of New York State since 2007. As an urban pest it moves to homes for overwintering shelter during the early Fall, retreating back to a natural environment in mid-spring. It is an arboreal or forest insect, with very diverse feeding habits, found on over 300 plant species from US surveys conducted over the past 15 years. In the mid-Atlantic it has been observed feeding on vegetable (tomato, pepper), tree fruit (apple, pear and peach), sweet corn, grain crops, small fruit, grape, annual and ornamental plantings of sunflower and deciduous trees (Catalpa, Tree of Heaven, Maple and Ash) to name but a few (Image 1).

A continuing Citizen Science project established in 2010 to study the presence and spread of BMSB in the NY urban environment, has shown increasing presence of this invasive insect in man made structures throughout the state. Confirmed BMSB specimens have now been reported in 33 counties in NY. Urban specimens submitted by 'Citizen Scientists' as live insects or representative images, were identified by the Cornell University's Hudson Valley Lab entomologist and posted on an a internet accessible map (http://hudsonvf.cce.cornell.edu/bmsb1.html). Considerable confusion by homeowners in keying out the pest is evident and arises from the numerous 'Look-a-Like' insects that enter homes in the Fall (Image 2). When statewide Citizen Scientists submitting a verified BMSB were queried through email surveys in the fall of 2012, 57% of respondents perceived increases in the adult BMSB overwintering populations moving into their home compared to the 2011 fall migration. Hudson Valley participants perceived a 71% increase over the previous year (N=62). A growing problem associated with the urban presence of BMSB is homeowner use of noxious and unapproved treatments to rid their homes of this pest. This activity could lead to ineffective and potentially detrimental exposure to toxins in the home. Physical exclusion and removal using a designated vacuumed containment of the insects appears to be the least toxic and very effective method of reducing BMSB populations in the home.

Field observations conducted in 2012 were made to determine how best to monitor this pest in and around agricultural commodities. We surveyed the agricultural edge bordering woodlands of vegetable and tree fruit, while employing a variety of trapping methods placed along the wooded edge of tree fruit. Surveys revealed the presence of BMSB populations on plants along the borders of agricultural commodities. We also captured BMSB adults and nymphs in pheromone and light traps throughout the season, capturing the first BMSB adult in late April, a month earlier then those observed on plants (Graph 1). Unfortunately, BMSB biology and behavior is not yet fully understood, and as such, no specific thresholds are available that would correlate the number of observed BMSB on the tree or in traps and predicable economic levels of fruit injury. In other words, we can capture and observe the insect along agricultural borders but we can not predict if the insect will move to and feed on the agricultural commodity to cause economic injury.

In 2012 the BMSB was capable of completing two distinct generations in the Hudson Valley. The

development of a second generation in August dramatically increases the BMSB populations late in the growing season. In two locations in Orange and Ulster Counties we did see a late season emergence of BMSB onto commercially produced apple and were able to quantify significant feeding injury to fruit by September. These evaluations were made in three ways; in the field through 'on the tree' fruit surveys; directly from field run bins; and in pack-out evaluation using a Greffa sorting line on Red Delicious, Pink Lady and Golden Delicious varieties. Fruit feeding damage losses from BMSB exceeded 21% in 2 orchards located in Campbell Hall and Milton, NY.

The shift in BMSB status from urban nuisance to agricultural pest, along with the lack of susceptibility of the insect to commercially available and effective insecticides, requires additional highly effective insecticides to reduce the damage caused by this pest through the growing season. Cornell entomologists and PMEP, in cooperation with EPA and Mid-Atlantic State University researchers are in the process of submitting a Section 18 request for the neonicotinoid *dinotefuran* (Scorpion 35SL and Venom 70SG), and the pyrethroid *bifenthrin* (Brigade 2EC and Bifenture EC and 10DF) on apples, peaches and nectarines for control of brown marmorated stink bug for NY in 2013.

Laboratory and field efficacy studies to evaluate insecticides labeled on tree fruit have demonstrated the percent mortality (#) of the current insecticides available to fruit producers in NY, which provide good control of this insect (Penn State FREC 2012). However, it's very important to understand that the studies were made using directed insecticide droplets to the insect. Field results in Pennsylvania shown dramatically lower efficacy of adult populations on apple.

Insecticide Group	Product	Active Ingredient	% Adult BMSB Mortality[1]
Pyrethroid	**Bifenture**	bifenthrin	100
	Danitol	fenpropathrin	95
	Warrior II	lambda-cyhalothrin	73
Carbmate	**Lannate**	methomyl	92
	Vydate	oxymyl	68
Neonicotinoid	**Actara**	thiamethoxam	92
	Assail	acetamiprid	87
	Calypso	thiacloprid	58
Pre-mix	**Leverage 360**	imidacloprid and bifenthrin	95
	Endigo	lambda-cyhalothrin and thiamethoxam	98
	Voliam Flexi	chlorantraniliprole and thiamethoxam	98

1. Direct contact activity of insecticides against BMSB adults in a lab setting may be very high, yet the activity of field-aged residue may, over time, quickly becomes ineffective at preventing feeding injury.

Monitoring, research and extension efforts were conducted during the 2012 growing season, to determine the presence and impact of the **Spotted wing Drosophila (SWD)** ***Drosophila suzukii*** on agricultural commodities. No infestations of SWD were found on sound apple, pear, plum or peach in the Hudson Valley. However, Raspberry and blackberry infestations began in early August with many berry patches experiencing 100% fruit injury. Only a single blueberry sample had confirmed SWD.

We monitored for the adult fly on 6 commercial berry farms in Ulster County by Cornell Cooperative Extension (CCE staff) and research staff. SWD adults were captured at all sites using apple cider vinegar traps with confirmed SWD infested fruit found at all sites by rearing larvae to adult fly. SWD

trap capture numbers were low compared with the proportion of infested fruit. Fruit infestation of 17-67% were seen during weekly checks before the first trap capture occurred.

Image 1. Brown marmorated stink bug (BMSB), *Halyomorpha halys,* feeding on tomato, feeding injury to Cortland apple in NY State, use of native deciduous Sugar Maple (egg cluster & nymphs).

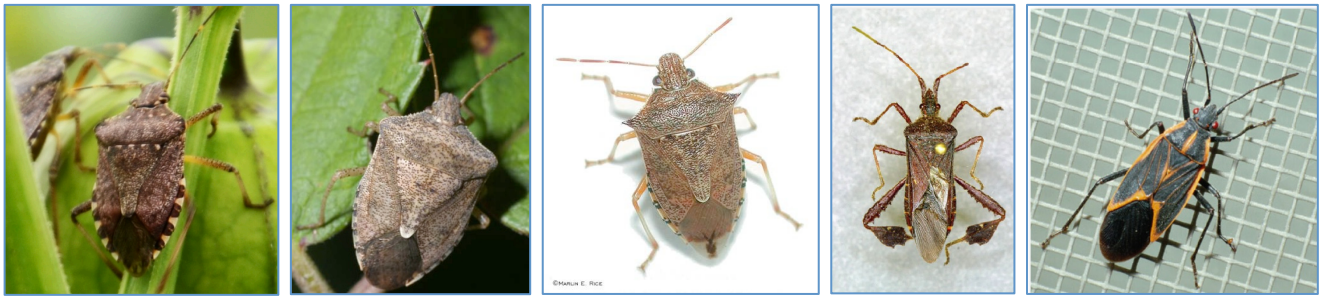
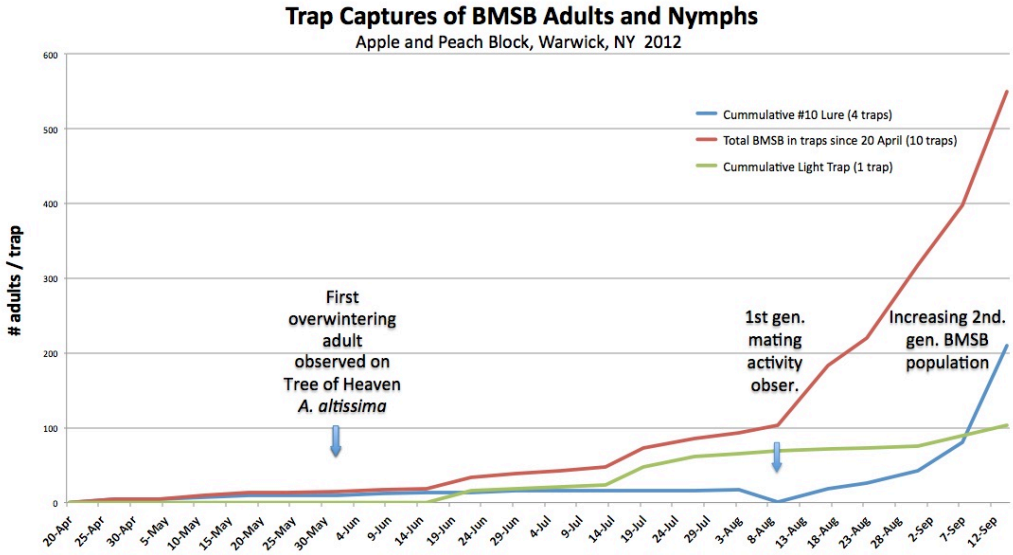


Image 2. The BMSB and confusing look-a-likes (Left to right); brown marmorated stink bug, brown stink bug, sharp shoulder stink bug, western conifer seed bug and boxelder bug.



Graph 1. Seasonal BMSB black light and Tedders trap captures of nymphs and adults in pheromone baited lures *methyl* (E,E,Z)-2,4,6-*decatrienoate* and USDA #10, and 'Control' traps.