Project: Brown Marmorated Stink Bug: Damage Survey and Monitoring Efforts
Institution: Appalachian Fruit Research Station, USDA-ARS, Kearneysville, WV 25430
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Background

The brown marmorated stink bug (BMSB), *Halyomorpha halys* (Stål) was introduced from Asia into the mid-Atlantic region. The epicenter of this infestation is believed to have originated in Allentown, PA in the mid 1990s. Since then, BMSB has spread to New Jersey, Maryland, Delaware, West Virginia, and Virginia. Limited populations also have been detected in Mississippi, Ohio, Oregon, and California. BMSB is polyphagous pest whose host range includes tree fruit, ornamentals, hardwood trees and cultivated crops such as soybean. Among host plants surveyed in the mid-Atlantic, several hosts emerged as supporting populations of BMSBs at different periods throughout the season. Nymphal abundance appeared to be associated with maturing fruit and pods.

BMSB is known to attack high value crops, such as tree fruit, in Asia. In the mid-Atlantic, BMSB populations were detected on apple and pear, particularly later in the season in Pennsylvania and cage studies revealed the potential for BMSB damage on both stone and pome fruits. In the region encompassing western Maryland, the eastern panhandle of West Virginia and southeastern Pennsylvania, populations have steadily increased annually since first detection in 2003. During the 2009 growing season, serious economic injury to peach, apple, and Asian pear due to large BMSB populations was commonly detected in commercial late in the season. Some commercial growers used late-season pyrethroid applications in an attempt to control BMSB and mitigate economic injury, while other growers were unaware of the extent of BMSB injury until harvest. These late-season applications severely disrupt beneficials within the orchard agroecosystem and result in limitations to fundamental IPM practices put in place over the past several decades. Thus, as the threat posed by BMSB to U.S. agriculture continues to increase, there is no established detection method, treatment threshold or control strategy for BMSB in any cropping system including tree fruit. In order to effectively monitor and manage BMSB in the narrow-spectrum, reduced-spray environment of tree fruit, it is imperative that insecticide treatments be triggered by tools designed to detect increases in BMSB abundance or activity.

Current Study

In 2010, the USDA-ARS Appalachian Fruit Research Station initiated a study with commercial growers in Maryland and West Virginia aimed at defining the threat posed by BMSB in commercial

orchards, as severe injury was detected early in the growing season for the first time. This study includes weekly sampling of fruit to identify abundance and severity of injury in peach and apple. One hundred fruit are picked from both perimeter and interior trees in ~3-4 acre blocks. Each fruit is visually examined for the presence of external injury. The side of the fruit bearing the most severe injury is subsequently sectioned multiple times. The total number of injured fruit and the number of distinct BMSB feeding sites per fruit are recorded. If a fruit has greater than 10 injury sites, it is rated a 10+. In addition, three black pyramid traps baited with a known attractant for BMSB have been deployed in the perimeter row of the sampled apple block in each grower orchard. Total numbers of adults and nymphs per trap are removed and counted weekly. Collaborators in PA, NJ, and VA also have agreed to conduct similar studies in commercial orchards in their respective states.

Peach Injury Caused by BMSB

Apple Injury Caused by BMSB

Current Results and Observations

Damage in commercial orchards affected by BMSB has reached critical levels with some growers losing entire blocks of stone fruit, and with severe injury also being detected in apples and Asian pears.

The threat from BMSB in tree fruit begins in early May as overwintered adults enter orchards to feed on developing fruit. Fruit injury from nymphal and adult feeding can continue until harvest. This is different from native stink bugs in that injury is only inflicted by adults and generally only very early in the season on stone fruit and later in the season in apple.

Early season feeding on stone fruit may not only result in dimpling and cat-facing, but also in internal injury, with areas of corky or gummy tissue found below the skin and extending deep into the flesh almost to the pit. Injury in apple and Asian pear results in severe corky areas beneath the skin

Aggressive management against BMSB appears to reduce economic injury. However, concerns regarding IPM programs and resistance management must be carefully considered.

Even small populations of BMSB can cause serious economic injury if left unchecked.

The current monitoring system is inadequate and requires improvement to allow for reliable season-long captures of adults.

Questions? Please contact Dr. Tracy Leskey, (304)-725-3451x329, tracy.leskey@ars.usda.gov;

Current Commercial Orchard Results (September 2010)

Fruit	Orchard	Overwintering BMSB Population Size	Management Level Targeting BMSB	Mean Captures Per Trap / Week		Perimeter Orchard Sample		Interior Orchard Sample	
				Nymph	Adult	% Fruit Injury	# Feeding Sites (Severity)	% Fruit Injury	# Feeding Sites (Severity)
Apple	WV 1	Large	Moderate	1093.3	5.7	81.0	3.2	61.0	3.2
	WV 2	Large	Aggressive	1.0	6.0	29.0	1.6	6.0	1.5
	WV 3	Large	Light	1007.7	27.0	99.0	6.9	88.0	3.9
	MD 1	Moderate	Moderate	129.3	3.0	70.0	3.4	29.0	2.6
	MD 2	Small-Moderate	Moderate	7.3	0.0	70.0	3.5	46.0	3.3
	MD 3	Small	Light	5.3	0.3	24.0	1.8	20.0	2.0
			Regional Average	*374.0*	*7.0*	*62.1*	*3.4*	*41.7*	*2.8*
Peach	WV 1	Large	Moderate	---		16.0	1.6	13.0	1.5
	WV 2	Large	Aggressive	---		58.0	2.5	18.0	1.7
	WV 3	Large	Light	---		47.0	2.3	10.0	2.0
	MD 1	Moderate	Moderate	---		74.0	3.6	---	---
	MD 2	Small-Moderate	Moderate	---		92.0	5.1	85.0	4.7
	MD 3	Small	Light	---		24.0	2.1	15.0	1.4
			Regional Average	---		*51.8*	*2.9*	*28.2*	*1.9*