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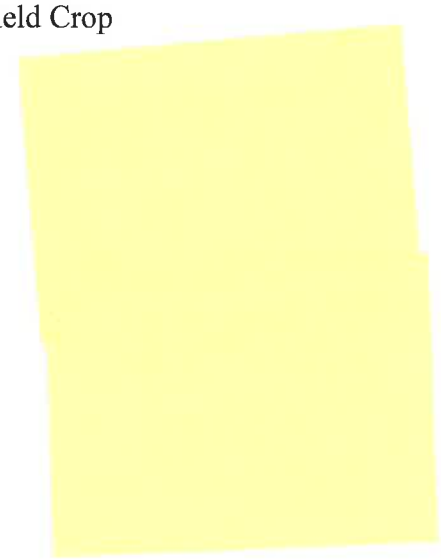
Stink Bug in Your Soybeans? — Jeff Graybill, Agronomy, Lancaster County

Many Soybean growers were caught unaware of the growing presence of the Brown Marmorated Sting Bug in their soybean fields last August. Today, this new pest is probably more widespread in the media than in some fields; however, it is a very real threat to many if not most of our crops here in Pennsylvania.

Soy growers have a legitimate concern for both yield and quality loses stemming from this pest. To meet this challenge, the PA Soybean Board recently funded a Penn State effort to intensively scout soybeans within South-central and Southeast PA. These funds have hired a summer intern to work with soybean growers, extension educators and local crop scouts to monitor stink bug populations. We hope to not only monitor this pest but develop thresholds for recommending control action as well.

Dr. John Tooker, Penn State Extension Entomologist is developing a scouting protocol which will be used for this project. The summer intern is Kurt Martin, who graduated from the college of Agricultural Sciences at Penn State University this spring. Kurt will be working out of the Lancaster office and will be scouting specific fields in the region. He would also like to receive reports from others as the season progresses. I will disseminate the protocol in the near future which can be used by others to help us monitor the development of this pest. As information is collected and analyzed we will issue any alerts via the Field Crop



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Final Report to the PA Soybean Board

Brown Marmorated Stink Bug Monitoring Project

2011 Summary and Accomplishments

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To: PA Soybean Board and PA Soybean Growers *Oct 1st, 2011*

It is with pleasure and thanks that I submit this summary to the board of the activities of this board funded project. I trust that you will find it a true and useful accounting of how the board's funds were used to increase farmer's awareness of the Brown Marmorated Stink Bug (BMSB) and to take proactive steps in its control.

Respectfully submitted,

Jeffrey S. Graybill

Jeffrey Graybill

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Project Inception:

The growing season of 2010 was noteworthy to farmers for several reasons. We had a very wet spring, hot fairly dry summer, then followed by a very warm dry fall. It was also the first year that very high numbers of BMSB were found throughout the environments of much of Eastern and Central PA. Fruits, vegetables, ornamentals and row crops such as corn and soybean were invaded by high if not uniform infestations. Many crop professionals were caught unawares as this pest seemingly came out of nowhere in the months of August and September. Populations in the millions were observed with one farmer in Berks County literally filling five gallon bucks from BMSB on his combine's screens and filters. Another farmer reports of cows refusing silage due to the acrid smell and taste of BMSB in corn silage. Specifically, soybeans with shrunken and aborted beans on the top 4-5 nodes were widely reported.

During the winter meeting season questions abounded about this new invasive pest and what the prevalence would be in 2011. With this in mind, and upon consultations with local farmers and Dr. John Tooker, PSU Extension Entomologist, this proposal was quickly put together to monitor this pest and attempt to collect information to assist farmers in its management and control.

Proposal Summary:

1. Hiring a summer intern and working with other crop professionals to monitor a large geographic area of South Central PA for BMSB.
2. Educate the agricultural community about this pest, how to scout and determine if pest thresholds indicate the need to spray.
3. Working with farmers to treat affected fields with appropriate insecticides.
4. Increase general knowledge of this new pest and its activity in soybean and corn fields.

Total requested and approved funds: $9,757.50 (See attached budget proposal). Expended funds very nearly mirrored the proposal.

Timeline of activities:

- May, 2011: Kurt Martin, 2011 graduate of Penn State College of Ag., was hired and began employment on May 23rd, 2011. Kurt worked roughly 20 hours a week thru Sept 9th, 2011. Initially he learned about extension, accompanying the educator on farm visits and field research projects. Kurt performed a literature search on the BMSB and worked with Dr. John Tooker to put together a scouting protocol.
- June, 2011: An article is run in the PSU Field Crop News (FCN) making growers aware of this project and asking them to contact one of the three folks scouting fields, should they want to have a soybean field included.
- June 21st: Meet at the Landisville Research farm with Dr. Tooker as a team for training on sweeping fields, and determining pest counts. The protocol calls for scouting fields on an approximately 10 day schedule.
- July, 2011: Finalize list of fields and visit growers interested in participating. Some fields were scouted in late June for the first time while others were started in mid-July. **38 fields in 9 counties** are on the official list to scout at regular intervals.
- July 26th: Counts have been very low to zero for virtually all of July. Reports of BMSB activity in DE and MD are being reported, however this is mostly in corn. On this date our first field in PA reaches threshold levels on the perimeter. Field is located in southern Lancaster Co. and cooperator sprays two fields' perimeters with the recommended product: Bifenthrin.

- August 2nd: Jeff Graybill and Kurt Martin make presentations on project and BMSB control at Hubner Seed company official kickoff meeting. (Approximately 65 attending)
- August 25th: PA Soybean Board/PSU Soybean workshop, Southeast Agriculture Research and Extension Center, (SEAREC) Landisville, PA. 4 presentations given to approximately 50 each time by Jeff and Kurt.
- August 2011: Reports of increasing populations in corn and soybean abound but most of the projects fields remain well below threshold levels.
- Late August 2011: 2 fields in northern Lancaster / southern Lebanon Co reach high numbers and are sprayed. Several fields in central and northern York Co. have moderate pressure in perimeters, one grower decides to spray two project fields. The field previously sprayed in southern Lancaster county again crosses threshold and is sprayed for a second time.
- Early September 2011: Reports of BMSB are still sporadic. Many of the project fields – especially perimeters are showing low to moderate levels of BMSB, however most fields are at or near R5 and will not benefit from a spray at this time. Most of these fields are full season or barley beans. Wheat bean fields will still be susceptible for a few more weeks.

Summary:

Of the 38 fields officially scouted only 6 (2 southern Lancaster, 2 southern Lebanon/Lancaster line, & 2 York Co.) were sprayed.

One local scout not involved with the project reported recommending a perimeter spray on about 1/3 of his soybean scouting (mainly in Lancaster, Dauphin, and York Co.), while another field scout with a local agricultural application company reports virtually no soybean fields at threshold and had sprayed none as of September 1st.

This insect seems to be somewhat of an enigma. Field perimeters were often high but only 20-30 feet in from the field boundary very few BMSB were observed. Insects also seemed to vary from one end and one side of a field to another making control recommendations difficult. Most fields did not seem to show significant populations over a broad area, thus we question the economic impact of this insect.

Included in the report you will find photos of stink bug damage to both corn and soybean. Last year Green Bean Syndrome (GBS) was widely reported and observed in this region. This condition is not well understood but is closely associated with the BMSB. It appears that significant feeding by the pest somehow stimulates the plant to remain in a green growing vegetative state. If this condition occurs over a wide area, it can delay and complicate harvest. This year we have not been observing nor hearing of many fields with this condition, a further indication that populations were sporadic and not very uniform. I have attached photos from one field in central Lancaster co. which illustrates this condition. You can clearly see an increase in aborted and shrunken beans and empty pods in areas of the field boundary where high populations of BMSB were identified. In fact a local scout called my attention to this field as one he had recommended spraying but the weather prevented it from occurring.

More detailed information on control products, MBSB life cycle and additional information is contained in the articles and handouts which were presented throughout the summer and are in the appendix of this report.

Appendix: A. Excel spreadsheet of BMSB counts,
B. PSU Field Crop News Articles & Handouts for field days
C. Protocol for Scouting BMSB

Soybeans damaged by BMSB feeding in Lancaster Co.

Green Bean Syndrome (GBS) on field perimeters not sprayed but above threshold.

Corn ear on outside rows of field with High BMSB

Corn ear on inside rows of High BMSB field

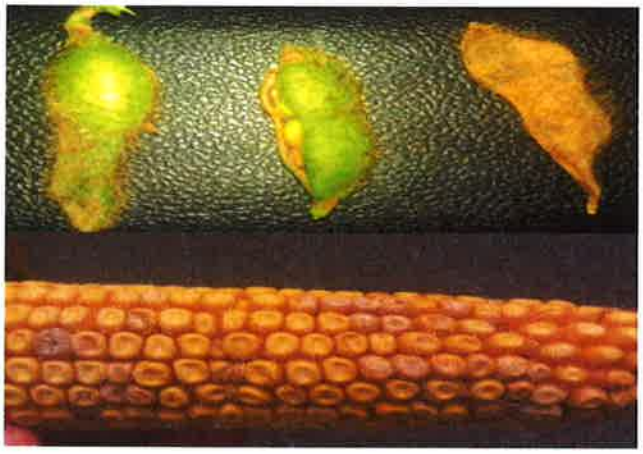
Mid-Atlantic Brown Marmorated Stink Bug Scouting Protocol in Soybeans (and field crops in general) – 2011

- Developed by Joanne Whalen (Univ. of Delaware), Ames Herbert (Virginia Tech), **John Tooker (Penn State)**

a) Begin Scouting Fields by mid-July – to catch first occurrence (although last year moved into soybeans in early to mid August)
b) Use a 15 inch sweep net
c) 180 degree sweeps – dipping in the canopy
d) Be sure to begin sampling on field edges, esp near woodlots and overwintering areas
e) Take 15 sweeps in 10 locations, concentrate on the field edge first and then move toward inner portions of the field. Keep good records to track population changes over time; record numbers of bugs and life state (adults or nymphs) captured for each bout of 15 sweeps. (Adults have fully formed wings, nymphs do not.)
f) Be sure to count all species - green, brown and BMSB - adults and nymphs
    a. Familiarize yourself with the spined shoulder bug. Do an Google image search on this species or see this website and compare different brown stink bugs (note the "spined shoulders" to discriminate between species): http://www.uky.edu/Ag/CritterFiles/casefile/insects/bugs/stinkbugs/stinkbugs.htm#spined
g) Threshold – tentatively the same as for native species: 1 large nymph/adult per row foot if using a beat sheet, or 2.5 per 15 sweeps in narrow-row beans, or 3.5 per 15 sweeps in wide-row beans.
h) NOTE: We currently do not have a threshold for BMSB in soybeans. These thresholds were developed for green and brown stink bugs and so are just informal guidelines until more research is done.

Update on PA Soybean Board Brown Marmorated Stink Bug Monitoring Project — Kurt Martin, Penn State Field Scout

After scouting soybean fields across southeastern counties for the past several weeks, the brown marmorated stink bug has arrived in several southeastern counties. Brown marmorated stinkbug levels were discovered to be above threshold levels in both corn and soybean fields. Within the past week, BMSB nymph populations have increased dramatically, which indicates that the eggs laid earlier in the season by adult BMSB are hatching and beginning to invade fields. The majority of BMSB populations have been discovered in full-season soybeans. The full-season beans are more mature then beans after barley or wheat, and stinkbugs are attracted to the highly developed bean inside the pod. The stinkbugs will use their piercing/sucking mouthpart to penetrate the bean and suck the nutrients from the developing bean inside the pod. Below are several pictures of common BMSB damage to soybeans, as well as damage to corn.



BMSB damage to soybean pods and corn

As we continue into late August and early September, we are expecting that BMSB populations will continue to increase in soybeans. If nymph populations are being found, follow the same threshold developed for adult BMSB. Use an economic threshold of 2.5 adult stink bugs/large nymphs per 15 sweeps in narrow row beans or 3.5 stink bugs per 15 sweeps in wide row beans. For management options in soybeans, see the Penn State Agronomy Guide's pest management section (http://extension.psu.edu/agronomy-guide/pm/sec4). If spider-mites are still a problem in your field along with BMSB, Brigade is the most effective product to control both species. The Agronomy Guide provides several other products for stinkbug control as well. If you choose to use Brigade, which contains the active ingredient bifenthrin, the maximum application rate is 6.4 ounces per acre. Additionally, when using Brigade it is important not to apply the insecticide within 18 days of harvest. It is important to consistently scout your fields to prevent populations from reaching damaging numbers. Continuous monitoring will enable you to take action when population numbers reach threshold levels.

Handout for: July 26th Field Crop News &

August 25th Penn State/ PA Soybean Board Workshop

Update on PA Soybean Board Brown Marmorated Stink Bug Monitoring — Kurt Martin, PSU Field Scout, Dr. John Tooker, PSU Entomology Specialist

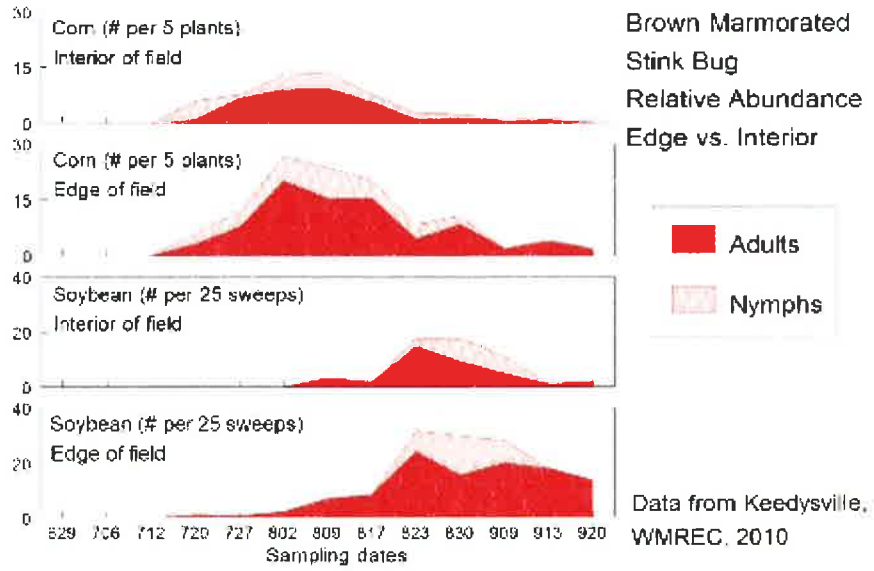
After scouting soybean fields across southeastern counties for the past several weeks, the brown marmorated stink bug has arrived in southern Lancaster County. Brown marmorated stinkbug levels were discovered to be above threshold levels in both corn and soybean fields. Field margins (20–40') had significant levels of pests while field interiors remained below economic levels. As we continue into August, we are expecting that BMSB populations will continue to increase in soybeans. In fact, entomologists in Maryland are reporting that stink bug populations have jumped five to ten fold in the past week at their monitoring stations, indicating that the summer adults have arrived. Adult bugs have wings, which allow them to move around and invade fields and be detected at monitoring stations.

In Pennsylvania, we expect to start seeing large populations developing on the edges of soybean fields. Considering that BMSB move into bean fields from the edges, this would be the best location to determine if your field is infested with the pest. Start scouting field edges that border woodlots and corn fields. We recommend scouting 10 different locations, sweeping 15 times in each location. Again, start on the edge and move toward the middle of the field as you progress. Use an economic threshold of 2.5 stink bugs per 15 sweeps in narrow row beans or 3.5 stink bugs in 15 sweeps in wide row beans. For management options in soybeans, see the Penn State Agronomy Guide's pest management section http://extension.psu.edu/agronomy-guide/pm/sec4. From laboratory tests and some field work, it seems that products that contain the active ingredient bifenthrin (Brand name Brigade) are a good option for stink bug control. This active ingredient is only one of many with a label for BMSB; however, it also does a good job on ***Two Spotted Spider Mites*** which are also beginning to invade soybean fields here in the state. The maximum application rate for Brigade in soybeans is 6.4 ounces per acre. When using Brigade, it is important not to apply the insecticide within 18 days of harvest. In many cases where BMSB populations are above the threshold level, a perimeter spray should be sufficient, however it may need to be repeated as stinkbugs continue to enter soybean fields throughout the summer months.

To illustrate that BMSB enters fields from the edge, we have provided a figure of brown marmorated stink bug relative abundance in field edges versus the field interior. The graph was constructed by Galen Dively of the University of Maryland, using data collected from research in Keedysville, Maryland in 2010. The horizontal axis of the graph depicts the date, while the vertical axis depicts brown marmorated stink bug populations. The top two panels of the figure depict populations in corn and the bottom two show populations in beans. Notice in both crops the progression of bugs into the field.

Lastly, we provided a link to a very informative BMSB webinar narrated by Dr. Ames Herbert Jr., who is the professor of entomology at Virginia Tech. This is an excellent summary of BMSB biology, damage, and management. Most folks that will be encountering BMSB will likely learn

a lot from this presentation —
http://www.plantmanagementnetwork.org/edcenter/seminars/BMSB/player.html



In addition to causing damage to soybeans, brown marmorated stinkbugs can also cause damage to corn. According to Dr. David Buntin of the University of Georgia, "Corn is most susceptible to stink bug injury during ear formation before tasseling stage. Bugs will feed through the sheath, causing a dead spot on the ear (VT)." While scouting bean fields in the area several days ago, we noticed BMSB populations in corn fields adjacent to the bean field where we previously discovered BMSB populations. Brown marmorated stinkbug populations in corn have already been discovered; therefore it would be wise to keep an eye on your corn fields as well to catch the pest before too much damage is done.

Along with the BMSB, we have been noticing spider mite populations, Japanese beetle populations and Mexican bean beetle populations as well as grasshopper populations in soybean fields across the southeastern counties. Populations of these pests have been variable across the counties, which is why it is important not to rely on pest reports from your neighbor. Try to scout your fields as much as you can to catch pest populations before they reach the economic threshold.