Insect Management Reports

2012 Season

University of Delaware
Cooperative Extension -- IPM Program

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Management of Corn Earworm in Early Season Snap Beans with Foliar Insecticides, 2012- 'Slenderette' snap beans were planted on June 20 at the University of Delaware's Research and Education Center located near Georgetown, DE. Plots consisted of four 25 ft long plots planted on 30-inch centers replicated four times in a RCB design. Foliar treatments were applied on July 26 (late bud stage), August 2 (pin stage) and Aug 10 (3 days from harvest) with a CO^2 pressurized backpack boom sprayer delivering 18 gpa @ 30 psi. Snap beans were harvested on Aug 13 from a 6 ft row section and all the beans were evaluated for corn borer and corn earworm injury. Data were analyzed using Proc GLM and means were separated by Tukey's means separation test (P=0.05).

No corn borer damage was detected in the plots and corn earworm pressure was light. No phytotoxicity was observed.

Treatment	Rate/Acre	Treatment Timing	Percent CEW Damaged Beans Aug 13[1]
Belt SC	3 oz	Bud, Pin and 3 days from harvest	0.69a
Besiege Warrior II	9.0 oz 1.92 oz	Bud and Pin 3 days from harvest	0.62a
Acephate 97 Warrior II	1 lb 1.92 oz	Bud and Pin 3 days from harvest	0.61a
Warrior II	1.92 oz	Bud, Pin and 3 days from harvest	0.24a
Untreated	---	---	1.06a

[1]Means in the same columns followed by the same letter are not significantly different (Tukey's; P=0.05).

Early Season Evaluation of Foliar Insecticides for Control of Lepidopterans on Sweet Corn, 2012**:** 'Xtra Tender 372A' sweet corn was planted on May 24 at the University of Delaware Research and Education Center located near Georgetown, Delaware. Plots were 25 ft long and two rows wide, planted on 30 inch centers. Each treatment was replicated 4 times and arranged in a RCB design. Silk sprays began at ear shank emergence. All applications were made using a CO^2 pressurized back pack sprayer and a two nozzle boom equipped with D2 hollow cone nozzles delivering 33 gpa at 40 psi. At harvest (July 25), all the ears from each plot were husked and evaluated for damage as percent clean ears (fresh market) and percent clean plus tip damaged ears (less than 1.0 inches from the tip- processing ears). The total number of live larvae of each species were identified and counted. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Corn earworm and sap beetle pressure was high.

Treatment	Application Date	Rate/A
A,C,E - Besiege B,D – Warrior II	A - 7/5, C– 7/13, E—7/22 B – 7/10, D – 7/17	Besiege- 9 oz Warrior II - 1.92 oz
A,B,C - Besiege D,E – Warrior II	A - 7/5, B – 7/10, C– 7/13 D – 7/17, E– 7/22	Besiege - 9 oz Warrior II - 1.92 oz
A,C,E – Coragen 1.67 SC B,D – Lannate LV + Asana XL	A - 7/5, C– 7/13, E—7/22 B – 7/10, D – 7/17	Coragen - 5 oz Lannate LV – 24 oz + Asana XL – 9.6 oz
A,B,C - Coragen 1.67 SC D,E - Lannate LV + Asana XL	A - 7/5, B – 7/10, C– 7/13 D – 7/17, E– 7/22	Coragen 1.67 SC - 3.5 oz Lannate LV - 24 oz + Asana XL - 9.6 oz
A,C,E-Belt 480 SC + NIS B,D- Baythroid XL	A - 7/5, C– 7/13, E—7/22 B – 7/10, D – 7/17	Belt - 3 oz + Li-700 0.25% Baythroid XL - 2.8 oz
A,B,D,E -Belt 480 SC + NIS + Baythroid XL C-Lannate LV + Baythroid XL	A - 7/5, B – 7/10, D – 7/17, E– 7/22 C– 7/13	Belt -3 oz + Li-700 0.25% v/v + Baythroid XL 2.8 oz/A Lannate -24 oz/A + Baythroid XL -2.8 oz
Blackhawk 36WG	A - 7/5, B – 7/10, C– 7/13 D – 7/17, E– 7/22	3.3 oz
Radiant SC	A - 7/5, B – 7/10, C– 7/13 D – 7/17, E– 7/22	6 oz
Warrior II	A - 7/5, B – 7/10, C– 7/13 D – 7/17, E– 7/22	1.92 oz/A
Untreated	-------	-------

Treatment	% Clean Ears (Fresh Market)[1]	% Clean + Tip Damaged Ears (Processing)[1]	Percent Damaged Ears[1]	
			CEW	Sap Beetles
A,C,E - Besiege B,D – Warrior II	84.88a	96.60a	0.00b	14.71a
A,B,C - Besiege D,E – Warrior II	85.23a	97.94a	0.00b	14.78a
A,C,E – Coragen 1.67 SC B,D – Lannate LV + Asana XL	59.18abc	88.39ab	1.19a	40.82a
A,B,C - Coragen 1.67 SC D,E - Lannate LV + Asana XL	53.53abc	88.13ab	1.49b	44.98a
A,C,E-Belt 480 SC + NIS B,D- Baythroid XL	55.00abc	88.89ab	1.56b	44.28a
A,B,D,E -Belt 480 SC + NIS + Baythroid XL C-Lannate LV + Baythroid XL	62.83abc	92.23ab	0.00b	37.63a
Blackhawk 36WG	49.99bc	79.43b	4.55b	45.07a
Radiant SC	55.90abc	85.09ab	1.59b	42.10a
Warrior II	82.34ab	93.94a	1.10b	16.57a
Untreated	38.20c	57.12c	23.51a	35.65a

[1]Means in the same columns followed by the same letter are not significantly different (Tukey's; P=0.05).

Evaluation of Lannate LV to Control Slugs in No-till Corn

In 2010, interest was expressed in evaluating the efficacy of Lannate (methomyl) LV for slug management in no-till corn systems. Although data from Europe indicated that Lannate may provide some level of slug control, no information was currently available in the United States regarding efficacy, length of control and the best timing for an application.

2010 Season-- *Don Ganske, DuPont, Joanne Whalen and Bill Cissel, University of Delaware*
The objective of this trial was to evaluate the efficacy of Lannate LV (methomyl) to control slugs at three different application timings: 1) late evening, 2) after dark and 3) early morning. Plots 20 ft long by 9 ft wide were replicated four times and arranged in a randomized complete block design. The trial was conducted in a commercial no-till corn field located near Middletown, DE. Corn was planted into heavy wheat-soybean stubble and slug pressure was rated as moderate to severe. Treatments were applied on 3-leaf stage corn using a CO_2 pressurized backpack sprayer equipped with a 6 nozzle boom on 18 inch spacing delivering 20 gpa at 35 psi. A one ft. x one ft. shingle trap was placed in the center of each of the plots in an attempt to estimate the slug population for each plot following the application of treatments. Visual slug counts were taken at night, 2 days after application by recording the total number of slugs found on 10 consecutive plants from each plot. Five days after treatment, 10 plants from each plot were examined for slug feeding injury on the newest emerged whorl leaves and the total numbers of slugs found under the shingle traps were recorded. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05)

			Number Slugs per 10 Plants May 21 (2 DAT)		May 25 (5 DAT)		
						Number Slugs per Shingle Trap	
Treatment Timing	Treatment	Rate/ Acre	Grey Garden	Marsh	% Damaged Plant	Grey Garden	Marsh
Early Evening (6:55 PM)	Lannate LV (2.4 SL)	1.5 pt	2.25b	0.00a	87.5a	1.25a	1.00a
Late Evening – (9:40 PM)	Lannate LV (2.4 SL)	1.5 pt	3.75b	0.25a	80.0a	0.25a	0.25a
Early Morning (5:15 AM)	Lannate LV (2.4 SL)	1.5 pt	2.75b	0.25a	100.0a	0.25a	1.25a
Untreated Check	--	--	24.5a	0.75a	92.5a	0.25a	0.75a

Means in the same columns followed by the same letter are not significantly different (Tukey's; P=0.05)

Conclusions: At two days after treatment, there were significantly fewer grey garden slugs in each of the treatments compared to the untreated check. At five days after treatment, there were no significant differences between the treatments and untreated check for the percentage of plants with slug feeding injury and slug counts under the shingle traps. Overall, grey garden slugs were the prominent species causing damage to the corn plants. Although some level of control was observed, this study indicated that additional information is still needed to determine timing and length of control. At all three application timings, weather conditions were favorable for slug activity on the plants. For the evening applications, slugs were present at both application timings because it was extremely still and there was free moisture on the leaves. We have observed that slugs are not out on plants at night even under slightly breezy conditions. For the morning application, weather conditions were foggy /dewy resulting in early morning slug presence on plants. This year's results lend support to the conclusion that Lannate acts as a contact material only and residual control is limited. It appears that slugs need to be present on the plants at the time of application to provide any level of suppression. However, more data is still needed.

<u>2012 Season – Joanne Whalen and Bill Cissel University of Delaware</u>

Replicated Study

Due to drier spring weather, conditions favoring slug damage were lower in 2011. However, the unusually warm winter and spring conditions in 2012 were extremely conducive to slug problems. Since limited information was available on the proper application timing of Lannate as well as length of control for slug management in no-till corn systems, a second study was conducted in 2012. Plots were established in a field located near Wyoming, DE with heavy wheat-soybean stubble and history of severe slug problems. The field was treated with Deadline MP-s on April 28. An untreated strip was left in the most severely damaged section of the field and plots were placed in this strip. Plots 10ft wide (4 rows) by 17.5ft long were arranged in a randomized complete block design with four replications. Treatments were applied on 2-3 leaf stage corn with a CO_2 pressurized backpack sprayer equipped with a 6 nozzle boom delivering 16.9 gpa at 40 psi. Treatments consisted of (1) Lannate LV at 1.5 pt/acre applied at dusk (7:40 PM) on May 3, (2) Lannate LV at 1.5pt/acre applied at dawn (5:40 AM) on May 4 and (3) an untreated check.. Slug populations were monitored at night by visually inspecting all the plants in the center two rows of each plot and recording the number of slugs. The predominant species was the grey garden slug. Pre-treatment damage assessments were done on the entire plant. Post treatment damage assessments were performed by counting the number of plants with newly damaged whorl leaves in the center two rows. A plant was rated as damaged only if the newest emerged leaves had active feeding signs. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

			Percent Damaged Plants			Mean Number Slugs/35 ft. of row	
Treatment	Rate/A	Application Timing	May 2 Pre-trt	May 7 4 DAT	May 10 7 DAT	May 2 Pre-trt	May 6 3 DAT
Lannate LV (2.4SL)	1.5 pt	Dusk (7:40 PM)	79.33a	49.27ab	40.19a	5.25a	11.5a
Lannate LV (2.4SL)	1.5 pt	Dawn (5:40 AM)	87.82a	42.8b	45.94a	4.0a	9.75a
Untreated Check	---	---	87.77a	65.8a	53.92a	7.5a	15.0a
Deadline MP-s	10 lbs (Apr.28)	Main Field by Grower	50.0 (April 27)	9.2 (May 3)	9.0 (May 17)	---	1/ 50 pl (May 6)

Means in the same columns followed by the same letter are not significantly different (Tukey's; P=0.05).

Conclusions: At four days after treatment, the percent damaged plants were significantly greater in the untreated check compared to the Lannate LV application applied at dawn. Weather conditions were extremely foggy and dewy when the application was made at dawn and slugs were active on the plants. It was slightly breezy at the time of the early evening treatment and slugs were not active on the plants. The Lannate LV treatment applied at dusk was not significantly different from the untreated check for percent damaged plants. There were no significant differences between either treatment timing at seven days after treatment for the percent damaged plants and at three days after treatment for the number of slugs per 35ft row. Lannate LV appears to have provided some level of control when applied at dawn but not at dusk. This is due to the fact that slugs were active on the plants at dawn but not at dusk lending support to the fact that Lannate is providing contact control. It did not provide extended control as evidenced by the lack of difference in plant damage at seven days after treatment. Overall, slug pressure remained moderate to high regardless of the treatment timing and the percent damaged plants and severity of damage remained at levels that were capable of causing economic losses. Although not part of the replicated study, the Deadline MP-s applied by the producer to the main part of the field provided very good control as evidenced by the reduction in the number of plants damaged at 19 days after treatment and the low number of slugs present on 50 plants at 8 DAT.

2012 Lannate Grower Demonstration – Commercial Field

We also evaluated the effectiveness of a Lannate LV application in a second commercial field with heavy wheat-soybean stubble and history of severe slug problems near Dover, DE. In this field Lannate LV and Deadline were compared. Pre-treatment damage assessments were done on the entire plant. Post treatment damage assessments were performed by counting the number of plants with newly damaged leaves. Two hundred plants were sampled for plant damage in each treatment area (10 consecutive plants in 20 locations). Treatments were applied on May 5 with the Lannate treatment being applied at 5 AM when slugs were active and the Deadline MP-s in the middle of the day. Corn was in the one-leaf stage. The grower did not feel that the Lannate was providing control so decided to treat the Lannate demonstration area with Deadline MP-s as well.

Treatment	Rate/A	Timing	Percent Damaged Plants	
			Pretreatment – May 4	Post Treatment – May 7
Lannate LV	1.5 pt	5 AM – May 5	71.3	82.0
Deadline MP-s	10 lbs	Middle of the Day - May 5	67.0	20.0

Comments*:* Although replicated plots indicate that Lannate provides some level of control, Lannate applications in this commercial field in Delaware as well as commercial fields in Maryland and Virginia in 2012 resulted in poor control. In many cases, fields were re-treated with Deadline MP-s with good results.

Overall Summary : As a general summary, information from replicated trials and grower experiences indicate that:

(a) Lannate may provide 2-4 days control maximum which can vary with weather conditions at application time
(b) At 5-7 days after treatment in our two research trials, the percent damaged plants in the Lannate treated plots was not significantly different from the untreated plots. This would indicate that Lannate provides short residual control.
(c) Although we now have some information, more information is needed on proper timing of Lannate applications related to weather conditions. Slugs must be out on plants at the time of application. This would indicate that it is providing contact control only.
(d) Based on observations in commercial situations, the Deadline MPs are still providing the most consistent control and providing longer residual control. Lannate LV is providing some level of control, better than liquid nitrogen applied at night; however, more research is needed.

Final 2012 Delaware Soybean Board Report

Title: Survey for a Potential New Invasive Species, the Kudzu Bug (Megacopta cribraria), in Delaware Soybean Fields

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The kudzu bug (Megacopta cribraria) is an invasive species that was first detected in the Southeastern United States in 2009. It is native to Asia and commonly referred to as the globular stinkbug, bean plataspid, lablab bug, and kudzu bug. Since its initial detection in northern Georgia in 2009, it has rapidly spread across eight southeastern states (Figure 1). Unlike stink bugs that feed on pods, the kudzu bug adults and nymphs feed on soybean stems and leaf veins resulting in a reduction in pod set, beans per pod and a reduction in seed size. Previous research in Georgia has documented yield losses as high as a 47%.

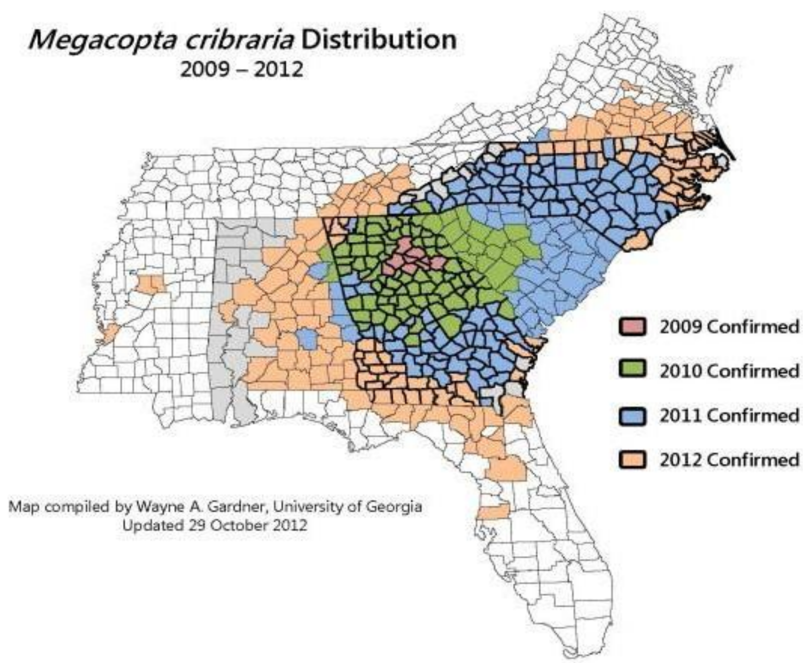

Figure 1. Kudzu Bug Distribution Map

A statewide survey was conducted on 72 soybean fields throughout the state to determine if kudzu bugs were present. Full season and double crop soybean fields were included in the survey and have been sampled on a weekly basis starting in mid-June and continued through mid-September. Fields were sampled by conducting one hundred sweep net counts and visually inspecting plants in ten locations for kudzu bug adults, nymphs, and egg masses. Five kudzu "patches" in close proximity to soybeans were surveyed season long using sweep net counts and direct visual observations. All known kudzu patches throughout the state were also surveyed once at the beginning and end of September (Figure 2). It was thought that the kudzu bug would initially be detected on kudzu. New information from South Carolina indicates that this may not be the case. To date, the kudzu bug has not been detected in Delaware. However, it continues to slowly move north. In 2011, it was first identified along the southern border of Virginia in Patrick County, Virginia. To date, it has now been identified in a total of 19 counties in Virginia reaching as far north as Goochland County which is located approximately in the middle of the state.

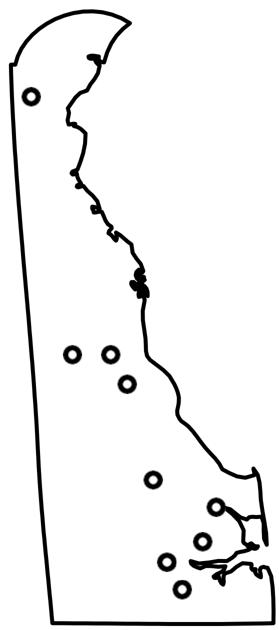

Figure 2. Kudzu Sampling Locations

A significant amount of research addressing the management of kudzu bug has been conducted in South Carolina and Georgia. The following information will need to be validated under Delaware conditions when/if this insect makes it to our state:

- Yield losses range from 0-47% with an average yield loss of 18%.
- The immature stage of the kudzu bug appears to cause significant loss so it is important to control them before they complete a generation.
- The R-3 and R-4 soybean growth stages appear to be the stages when kudzu bug causes the most damage to soybeans.
- Tentative thresholds: 1 nymph per sweep at R-3 to R-4 growth stage; for later growth stages the threshold may be 2 nymphs per sweep but more research is needed.

Insect Management in Late Planted Snap Beans with Foliar Insecticides, 2012- 'Slenderette' snap beans were planted on July 2 at the University of Delaware's Research and Education Center located near Georgetown, DE. Plots consisted of four 25 ft long plots planted on 30-inch centers replicated four times in a RCB design. Foliar treatments were applied on August 9 (bud stage), August 15 (pin stage) and Aug 22 (6 days from harvest) with a CO^2 pressurized backpack boom sprayer delivering 18 gpa @ 30 psi. Snap beans were harvested on Aug 28 from a 6 ft row section and all the beans were evaluated for corn borer and corn earworm injury. Data were analyzed using Proc GLM and means were separated by Tukey's means separation test (P=0.05).

No corn borer damage was detected in the plots and corn earworm pressure was light. No phytotoxicity was observed.

Treatment	Rate/Acre	Treatment Timing	Percent CEW Damaged Beans Aug 28
Belt SC	2 oz	Bud, Pin and 6 Days before harvest	0.00b
Belt SC	3 oz	Bud, Pin and 6 Days before harvest	0.09b
Blackhawk	3.3 oz	Bud, Pin and 6 Days before harvest	0.34ab
Acephate 97 Warrior II	1 lb 1.92 oz	Bud and Pin 6 days before harvest	0.77ab
Warrior II	1.92 oz	Bud, Pin and 6 Days before harvest	1.56ab
Beseige Warrior II	9 oz 1.92 oz	Bud and Pin 6 days before harvest	0.12b
Coragen 1.67 SC	3.5 oz	Bud, Pin and 6 Days before harvest	0.16b
Coragen 1.67 SC	5 oz	Bud, Pin and 6 Days before harvest	0.12b
Radiant SC	8 oz	Bud, Pin and 6 Days before harvest	0.092b
Untreated		------	2.04a

[1] Means within a column followed by the same letter are not significantly different (Tukey's; P=0.05).

Late Season Evaluation of Foliar Insecticides for Control of Lepidopterans on Sweet Corn, 2012**:** 'Xtra Tender 372A' sweet corn was planted on July 2 at the University of Delaware Research and Education Center located near Georgetown, Delaware. Plots were 25 ft long and two rows wide, planted on 30 inch centers. Each treatment was replicated 4 times and arranged in a RCB design. Silk sprays began at ear shank emergence. All applications were made using a CO^2 pressurized back pack sprayer and a two nozzle boom equipped with D2 hollow cone nozzles delivering 33 gpa at 40 psi. At harvest (Aug 27), 40 ears from each plot were husked and evaluated for damage as percent clean ears (fresh market) and percent clean plus tip damaged ears (less than 1.0 inches from the tip- processing ears). The total number of live larvae of each species were identified and counted. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Corn earworm was high. Fall armyworm pressure was low.

Treatment	Application Date	Rate/A
A,C,E – Besiege B,D, – Warrior II	A - 8/9, C– 8/16, E—8/22 B – 8/13, D – 8/20	Besiege - 9.0 oz Warrior II - 1.92 oz
A,B,C - Besiege D,E – Warrior II	A - 8/9, B – 8/13, C- 8/16 D – 8/20, E– 8/22	Besiege - 9.0 oz Warrior II - 1.92 oz
A,C,E – Coragen 1.67 SC B,D,F – Lannate LV + Asana XL	A - 8/9, C– 8/16, E—8/22 B – 8/13, D – 8/20	Coragen - 5 oz Lannate LV – 24.0 oz + Asana XL – 9.6 oz
A,B,C - Coragen 1.67 SC D,E,F - Lannate LV + Asana XL	A - 8/9, B – 8/13, C- 8/16 D – 8/20, E– 8/22	Coragen 1.67 SC – 5.0 oz Lannate LV - 24.0 oz +Asana XL - 9.6 oz
A,C,E-Belt 480 SC + NIS B,D -Baythroid XL	A - 8/9, C– 8/16, E—8/22 B – 8/13, D – 8/20	Belt - 3 oz + Li-700 0.25% v/v Baythroid XL - 2.8 oz
A,B,D,E -Belt 480 SC + NIS + Baythroid XL C -Lannate LV + Baythroid XL	A - 8/9, B – 8/13 D – 8/20, E– 8/22 C- 8/16	Belt -3.0 oz + Li-700 0.25% v/v + Baythroid XL 2.8 oz Lannate LV-24.0 oz/A + Baythroid XL -2.8 oz
Lannate LV + Warrior II	A - 8/9, B – 8/13, C- 8/116 D – 8/20, E– 8/22	Lannate LV – 24.0 oz+ Warrior II – 1.92 oz
Radiant	A - 8/9, B – 8/13, C- 8/116 D – 8/20, E– 8/22	6.0 oz
Warrior II	A - 8/9, B – 8/13, C- 8/116 D – 8/20, E– 8/22	1.92 oz
Untreated	-------	-------

Treatment	% Clean Ears (Fresh Market)	% Clean + Tip Damaged Ears (Processing)	Percent Damaged Ears	
			CEW	FAW
A,C,E – Besiege B,D, – Warrior II	86.25ab	96.88a	11.88c	0.00b
A,B,C - Besiege D,E – Warrior II	89.38a	96.88a	10.63c	0.00b
A,C,E – Coragen 1.67 SC B,D,F – Lannate LV + Asana XL	78.75ab	85.00ab	21.25bc	0.00b
A,B,C - Coragen 1.67 SC D,E,F - Lannate LV + Asana XL	88.13a	93.75ab	11.88c	0.00b
A,C,E-Belt 480 SC + NIS B,D -Baythroid XL	86.25ab	92.50ab	13.75bc	0.00b
A,B,D,E -Belt 480 SC + NIS + Baythroid XL C -Lannate LV + Baythroid XL	83.13ab	91.88ab	15.63bc	0.00b
Lannate LV + Warrior II	65.75ab	78.00ab	33.63bc	0.00b
Radiant	57.75b	72.75b	42.25b	0.00b
Warrior II	63.13ab	76.63ab	36.88bc	0.00b
Untreated	0.00c	0.00c	100.00a	1.25 a

Means in the same columns followed by the same letter are not significantly different (Tukey's; P=0.05).

Management of Brown Marmorated Stink Bugs in Lima Bean, 2012 – 'C-Elite' lima beans were planted on June 11th at the University of Delaware's Research farm located in Newark, DE. Plots consisted of four 20 ft long plots planted on 30-inch centers replicated four times in a RCB design. Foliar applications were applied on Aug 22 and Sept 6 with a CO_2 pressurized backpack boom sprayer delivering 18 gpa @ 40 psi. Brown marmorated stink bug (BMSB) population levels were evaluated on a weekly basis from July 11 to September 21 by taking 10 sweeps with a 15-inch diameter sweep net per plot and counting all stages of BMSB. All the beans from 6 ft of row were harvested on Sept 26 and pods and seeds were evaluated for stink bug damage. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Treatment	Rate/A	Mean Number BMSB Adults and Nymphs per 10 sweeps [1]				
		Aug 16	Aug 22	Aug 29	Sept 5	Sept 11
Baythroid XL	2.8 oz	1.25a	1.50a	0.00a	0.67b	0
Leverage 360	2.8 oz	0.50a	2.25a	0.00a	0.33b	0
Lannate LV	1.0 pt	0.25a	1.50a	1.75a	1.00ab	0
Lannate LV	1.5 pt	0.00a	0.75a	0.25a	0.67b	0
Endigo ZC	4.5 oz	0.75a	3.50a	0.25a	0.67b	0
Sniper	4 oz	0.50a	1.50a	0.25a	0.67b	0
Warrior II	1.92 oz	0.50a	0.50a	0.00a	1.00ab	0
Perm-Up	8 oz	0.75a	2.25a	0.00a	1.33ab	0
Untreated	---	0.00a	0.75a	1.75a	3.00a	0

[1] Means within a column followed by the same letter are not significantly different (Tukey's; P=0.05).

Treatment	Rate/Acre	Percent Damaged Pods [1]	Percent Damaged Beans[1]
Baythroid XL	2.8 oz	0.00a	0.29a
Leverage 360	2.8 oz	0.00a	0.03a
Lannate LV	1.0 pt	0.10a	1.67a
Lannate LV	1.5 pt	0.00a	0.79a
Endigo ZC	4.5 oz	0.19a	0.19a
Sniper	4 oz	0.09a	0.20a
Warrior II	1.92 oz	0.00a	0.09a
Perm-Up	8 oz	0.15a	0.50a
Untreated	---	0.00a	1.46a

[1] Means within a column followed by the same letter are not significantly different (Tukey's; P=0.05).

Evaluation of Pepper Cultivars for Brown Marmorated Stink Bug Susceptibility, 2012: The varieties ‘Paladin’ (bell pepper), ‘Bounty’ (Banana Pepper) and ‘Sparky’ (Jalapeno Pepper) were transplanted on June 1 at the University of Delaware’s Research farm located in Newark, DE. Four row plots 20 ft. long on 6 foot center were replicated 4 times in a RCB design. Five plants from each of the middle two rows (10 total plants) were examined for BMSB adults, nymphs, and egg masses twice a week by direct count from June 5 through August 20. The first adult BMSB adults were detected at low levels on July 9. All the marketable fruit from the center two rows were harvested on July 24, Aug 8 and Aug 20. The total number of damaged fruits was recorded and the number of feeding sites on each damaged fruit was also noted.

Table 1. BMSB Adults – Direct Visual Counts

	Average # BMSB Adults per 10 Plants		
Date	Paladin	Bounty	Sparky
July 9	0.25	0.25	0.25
July 12	0.00	0.00	0.00
July 16	0.00	0.00	0.00
July 19	0.00	0.00	0.00
July 23	0.25	0.00	0.00
July 26	0.50	0.25	0.00
July 30	0.00	0.75	0.25
Aug 2	1.25	0.50	2.75
Aug 6	2.00	2.25	1.25
Aug 9	0.50	0.75	0.50
Aug 13	0.50	0.50	1.25
Aug 20	3.50	1.75	4.25

Table 2. Harvest Data – BMSB Damage

Treatment	Percent BMSB Damaged Fruit [1]		
	July 4	Aug 7	Aug 20
Paladin	0.00a	1.74b	3.57a
Bounty	0.74a	10.63a	3.57a
Sparky	0.00a	2.18b	6.16a

[1] Means followed by the same letter are not significantly different (Tukey's; P=0.05).

Table 3. Mean Number BMSB "Stings" per Fruit

Treatment	Percent BMSB Damaged Fruit [1]		
	July 4	Aug 7	Aug 20
Paladin	0.00a	0.16ab	0.13a
Bounty	0.02a	0.42a	0.08a
Sparky	0.00a	0.08b	0.17a

[1] Means followed by the same letter are not significantly different (Tukey's; P=0.05).

Comments: BMSB populations in each variety were low throughout the season. On Aug 7, the 'Bounty' variety has the highest percentage of BMSB damaged fruit. This trend was similar for the mean number of BMSB "stings" per fruit. In general, no overall difference was observed in varietal susceptibility in 2012. These results were similar to our 2011 data.

Squash Bug Management in Pumpkins, 2012: 'Corvette PMR' pumpkins plants were transplanted on June 11 at the University of Delaware's Research and Education Center located near Georgetown, DE. Plots consisted of one row 25 ft-long on 7ft centers. Each treatment was replicated four times and arranged in a RCB design. Foliar treatments were applied with a CO_2 pressurized back pack sprayer (3 nozzles – 2 drops and one over the top) on July 13, 18 and 26 delivering 55 gpa at 40 psi. Squash bug population levels were evaluated by counting the number of egg masses and live squash bugs per 25 ft of row on all plants. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Treatment	Rate/ Acre	Mean Number Live Squash Bugs per 25 ft[1]			
		July 9 Pre-trt	July 16 3 DAT Trt #1	July 23 5 DAT Trt #2	Aug 8 13 DAT Trt #3
Baythroid XL	2.8 oz	11.75a	3.25b	1.25b	0.00a
Assail 30 SG	5.3 oz	10.75a	7.00b	4.75ab	3.50a
Warrior II	1.92 oz	7.50a	3.50b	1.00b	3.50a
Belay	4 oz	12.50a	5.00b	5.75ab	9.00a
Untreated	--	13.25a	17.75a	8.25a	1.25a

[1] Means in a column followed by the same letter are not significantly different (P= 0.05; Tukey's Test).

Brown Marmorated Stink Bug Management in Sweet Corn, 2012: ' WSS 0987' Bt sweet corn was planted on May 21 at the University of Delaware's Research farm located in Newark, DE. Two row plots 25 foot long planted on 5 foot centers were replicated 4 times in a RCB design. All materials were applied with a CO^2 pressurized back pack sprayer using a two nozzle boom equipped with D2 hollow cone nozzles delivering 33 gpa at 40 psi on Aug 2. BMSB populations were extremely low until late July when the first adults and nymphs were observed in the plots; therefore only one application was made at brown silk (Aug 2). The number of adults and nymphs were counted the day before treatment during a two minute search on brown silk stage corn (Aug 1). At harvest (Aug 6), all the ears from each plot were husked and evaluated for damage from BMSB (blemished kernels). Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Although BMSB could not be found earlier in the field, damage at this late stage occurred quickly. Treatments applied on a schedule basis will be needed in the future to evaluate the effectiveness of materials on BMSB in sweet corn. Data from research trials in 2012 aimed at identifying when BMSB damages sweet corn indicated that damage can occur from silking through harvest maturity. A timing study will be needed in 2013 to better evaluate the effectiveness of labeled and non-labeled insecticides.

Treatment	Rate/Acre	No. BMSB Adults & Nymphs per 2 minute count Aug 1[1]	Mean % Clean Ears Aug 6[1]	Mean % Damaged Ears Aug 6 [1]
Baythroid XL	2.8 oz	6.75a	36.67a	63.33a
Leverage 360	2.8 oz	5.50a	42.01a	57.99a
Lannate LV	1 pt	11.00a	19.08a	80.92a
Lannate LV	1.5 pt	8.50a	33.44a	66.56a
Sniper 2EC	4 oz	11.25a	35.10a	64.90a
Warrior II	1.92 oz	17.00a	58.97a	41.03a
Besiege	9 oz	3.00a	48.47a	51.53a
Endigo ZC	4.5 oz	6.75a	44.67a	55.33a
Untreated	--	11.00a	36.41a	63.59a

[1] Means in the same columns followed by the same letter are not significantly different (Tukey's; P=0.05).

Watermelon Spider Mite Management Trial, 2012 – 'Sangria' watermelons were transplanted on May 25 at the University of Delaware's Research and Education Center located near Georgetown, DE. Plots consisted of two 20 ft long rows on 7ft centers. Each treatment was replicated four times and arranged in a RCB design. Foliar treatments were applied with a CO_2 pressurized back pack sprayer delivering 28 gpa at 40 psi on June 15 and 18 gpa@ 40 psi on July 18. Mite populations were evaluated by counting the number of mites per 10 plants before vining, the number of mites per 50 leaves after vining and the number of mite infested plants from May 29 through June 27 for treatment timing #1 and on July 16 pre-treatments and July 23 post treatment for treatment timing #2. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

1. Early Season Treatment – June 15

Treatment	Rate/Acre	Percent Mite Infested Plants [1]					
		May 29 Pre-trt	June 4 Pre-Trt	June 11 Pre-Trt	June 18 3 DAT	June 22 7 DAT	June 27 12 DAT
Oberon 2SC	8.5 oz	12.50a	5.00a	17.50a	10.00a	2.50a	0.00a
Sniper	6.4 oz	12.50a	20.00a	12.50a	15.00a	10.00a	10.00a
Hero EC	10.3 oz	10.00a	12.50a	12.50a	25.00a	20.00a	7.50a
Zeal WSP	2 oz	10.00a	10.00a	10.00a	22.50a	7.50a	0.00a
Zeal WSP	3 oz	7.50a	12.50a	5.00a	22.50a	0.00a	0.00a
Agri-Mek 0.15 EC	16 oz	5.00a	12.50a	10.00a	27.50a	5.00a	0.00a
Portal	2 pts	17.50a	10.00a	10.00a	12.50a	7.50a	0.00a
Untreated	--	15.00a	17.50a	15.00a	27.50a	12.50a	2.50a

[1] Means within a column followed by the same letter are not significantly different (Tukey's; P=0.05).

Treatment	Rate/Acre	Mean Number Mites per 10 plants [1]		Mean Number of Mites per 50 Leaves[1]			
		May 29 Pre-trt	June 4 Pre-Trt	June 11 Pre-Trt	June 18 3 DAT	June 22 7 DAT	June 27 12 DAT
Oberon 2SC	8.5 oz	3.50a	2.00a	25.00a	1.50a	1.50a	0.00b
Sniper	6.4 oz	7.25a	11.25a	4.00a	14.75a	6.75a	10.75a
Hero EC	10.3 oz	11.50a	12.75a	6.25a	22.75a	12.75a	2.00ab
Zeal WSP	2 oz	1.75a	1.25a	48.50a	7.50a	0.00a	2.00ab
Zeal WSP	3 oz	6.00a	10.00a	0.75a	22.50a	0.75a	0.00b
Agri-Mek 0.15 EC	16 oz	1.75a	9.00a	3.00a	16.75a	0.00a	0.00b
Portal	2 pts	11.75a	2.25a	10.50a	2.50a	0.50a	0.00b
Untreated	--	7.50a	47.25a	172.75a	36.50a	15.25a	2.75ab

[1] Means within a column followed by the same letter are not significantly different (Tukey's; P=0.05).

2. Late Season Treatment – July 18

Treatment	Rate/Acre	Percent Mite Infested Plants [1]		Mean Number Mites per 50 leaves[1]	
		July 16- Pre-trt	July 23 – Post-trt	July 16- Pre-trt	July 23 – Post-trt
Oberon 2SC	8.5 oz	25.00ab	56.67a	140.5a	111.50a
Sniper	6.4 oz	45.00a	63.33a	479.8a	408.00a
Hero EC	10.3 oz	37.50ab	63.33a	341.3a	636.3a
Zeal WSP	2 oz	10.00b	10.00a	1.50a	11.30a
Zeal WSP	3 oz	17.50ab	26.67a	11.50a	25.00a
Agri-Mek 0.15 EC	16 oz	10.00b	26.67a	4.80a	7.50a
Portal	2 pts	20.00ab	23.33a	17.80a	17.50a
Untreated	--	45.00a	63.33a	230.00a	460.50a

[1] Means within a column followed by the same letter are not significantly different (Tukey's; P=0.05)

Final 2012 Delaware Soybean Board Report

Title: Management of the Stink Bug Complex in Delaware Soybean Fields

Personnel: Bill Cissel, Extension IPM Associate
Joanne Whalen, Extension IPM Specialist
Dept. of Entomology & Wildlife Ecology, University of Delaware

Objectives:

1. Determine the distribution of the brown marmorated stink bug (BMSB) in Delaware
2. Evaluate the effectiveness of perimeter treatments to manage brown mamorated stink bugs (BMSB) in soybeans
3. Evaluate the effectiveness of insecticides to control the brown marmorated stink bug (BMSB) on soybeans

Methods:

Distribution of the Brown Marmorated Stink Bug in Delaware

A statewide survey was conducted on 72 fields to determine the distribution of BMSB. Full season and double crop fields were included in the survey and sampled on a weekly basis from mid-June to mid-September. Fields were sampled by conducting one hundred sweep net counts and visually inspecting plants in ten locations for BMSB adults and nymphs on the field perimeters (0-100 ft) and field interiors (>100 ft). The data collected was used to determine the distribution of BMSBs in Delaware soybean fields and to track its movement within the state.

Perimeter Treatments to Manage Stink Bugs in Soybeans

Two fields were identified to evaluate the effectiveness of perimeter treatments as a control strategy to manage stink bugs in soybeans. Perimeter treatments were applied on one full-season soybean field located in Cecil County, Maryland and on one double crop soybean field located in New Castle County, Delaware (part of the statewide survey). Stink bug populations were monitored pre and post-treatment on a weekly basis by performing 300 sweep net samples in the field perimeters (0-100 ft) and in the field interiors (>100 ft). Although no threshold is available for BMSB in soybeans, we are using the same threshold established for native stink bugs (5 per 25 sweeps) to time insecticide applications.

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Once populations reached a “threshold” level, treatments were applied using commercial application equipment. The BMSB was the predominant species in both fields.

Brown Marmorated Stink Bug Insecticide Efficacy Trial

‘NK brand 539U2’ soybeans were planted on May 14 at the University of Delaware’s Research Farm located at Newark, Delaware. Plots 10 ft wide (4 rows) x 20 ft long were arranged in a randomized complete block design with four replications along a wooded field edge to take advantage of BMSB’s tendency to congregate field perimeters. Plots were sampled on a weekly basis from July 26 through August 21 using a sweep net and counting the total number of adults and nymphs of all stink bug species found in ten sweep net samples per plot. From August 21 to September 21, both sweep net counts and a timed two-minute visual inspection were used to evaluate population levels. Once BMSB populations reached levels high enough to evaluate efficacy; August 17, 30 and September 6, treatments were applied with a CO^2 pressurized back pack sprayer equipped with a 6 nozzle boom delivering 18 gpa at 40 psi. Treatments consisted of (1) Baythoroid XL, (2) Leverage 360, (3) Lannate LV, (4) Lannate LV + Asana XL, (5) Warrior II, (6) Cobalt Advanced, (7) Acephate 97UP, and (8) an untreated check.

As the plants began to senesce, the plots were evaluated for “stay green” effects by visually inspecting the plants for green leaves and by counting the number of green stems from 20 randomly selected plants in each plot. A five plant subsample was evaluated for the number of flat pods in each plot. Seed quality data was collected at full maturity (R8) on October 19, by randomly harvesting 20 plants per plot and evaluating a 100 seed subsample for the percent moldy and shriveled seeds as well of the number of seeds with purple stain disease.

Results:

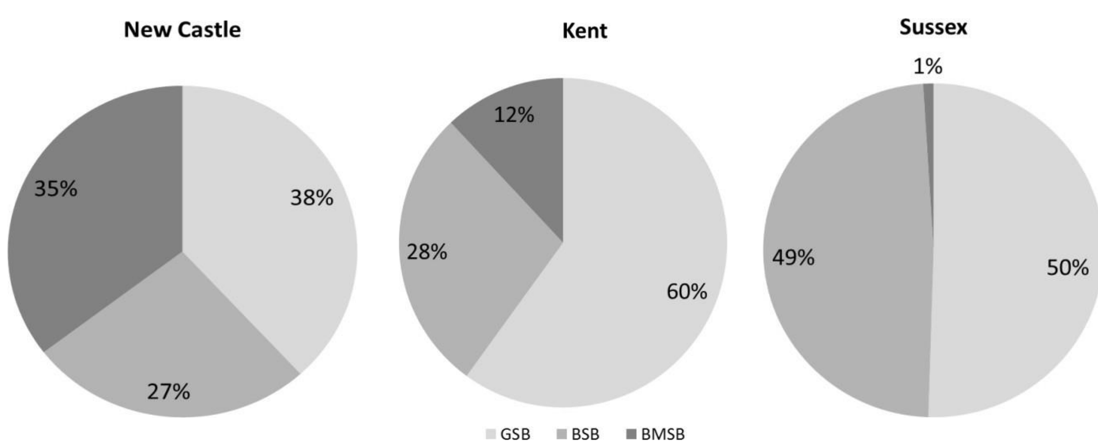
Distribution of the Brown Marmorated Stink Bug in Delaware

BMSB was first identified in Delaware soybean fields in 2010 in New Castle County. In 2011, a survey was conducted as part of a DSB funded project to determine how widely distributed the BMSB was in Delaware soybean fields. The findings of the survey documented BMSB infestations in eighty percent of the New Castle County soybean fields and in ten percent of the Kent County fields included in the survey. No BMSB were detected in soybean fields surveyed in Sussex County. Of the fields surveyed in New Castle County, ten percent were found to be at or above the tentative economic threshold of five BMSB per twenty-five sweeps. None of the Kent County fields had economic population levels of BMSB. When factoring in the complex of stink bug species within a field including green stink bug (GSB), brown stink bug (BSB) and BMSB, twenty percent of the New Castle County fields and nineteen percent of the Kent County fields were at threshold for the stink bug complex.

In 2012, the survey was expanded to include areas of the state not surveyed in 2011. Survey results confirm that BMSB continue to pose the greatest threat in New Castle and Kent County. Of the fields surveyed in New Castle County, sixty-eight percent were infested with BMSB. However, none of the fields were at an economic threshold when considering BMSB alone or when factoring in all the stink bug species. In Kent County, BMSB infestations were documented in fifty-two percent of the fields surveyed and three percent were at or above threshold, a significant increase compared to the 2011 survey results. When factoring in all the stink bug species including BMSB, GSB and BSB, twenty-three percent of the fields were at or above threshold. Twelve percent of the fields surveyed in Sussex County were infested with BMSB. This is a significant increase from the findings in 2011 in which none of the Sussex County fields surveyed had BMSB infestations. When only considering BMSB, none of the fields reached economic threshold. When factoring in all the stink bug species, eighteen percent of the fields reached or exceeded the economic threshold, attributed primarily to GSB and BSB populations.

BMSB have become fully established across New Castle County and are slowly expanding their range to parts of Kent and Sussex counties. While they do not currently pose as great a threat in Sussex Counties compared to New Castle and Kent County, the survey results indicate that they are increasing in population throughout the state. In 2012, BMSB accounted for thirty-five percent of the stink bug population in New Castle County, twelve percent in Kent County and one percent in Sussex County (Table 1). Despite the fact that BMSB populations are greatest in New Castle and Kent County, the addition of BMSB to the stink bug complex could ultimately result in an increase the number of fields that reach threshold for the stink bug complex.

Table 1. Stink Bug Distribution by County



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Evaluate the effectiveness of perimeter treatments to manage brown marmorated stink bug (BMSB) in soybeans

In 2011, research was conducted by University of Maryland and Virginia Tech researchers to evaluate whether or not perimeter treatments could be used as a management strategy for BMSB. Initial findings suggest that perimeter treatments can be successful in gaining control of BMSB in soybeans. However, it was determined that additional research was needed to confirm this. In 2012, perimeter treatments were evaluated on two grower fields and monitored on a weekly basis to determine if a timely perimeter treatment would be successful in reducing BMSB populations and prevent them from penetrating into the field interior. In each of the two fields where perimeter treatments were applied, BMSB populations were significantly reduced along the field perimeters and stink bug populations remained low in the field interiors (Table 2 and Table 3). The BMSB was the predominant species in both fields, although the data does include low levels of native green and brown stink bugs. These findings along with prior year's research suggest that perimeter treatments can be used as a successful management strategy to control BMSB in soybeans. There are exceptions however, that must be taken into consideration such as the size of the field and the timeliness of application which would have an impact on the success and practicality of using a perimeter treatment.

Table 2. Evaluation of Perimeter Treatment: Grower Field 1

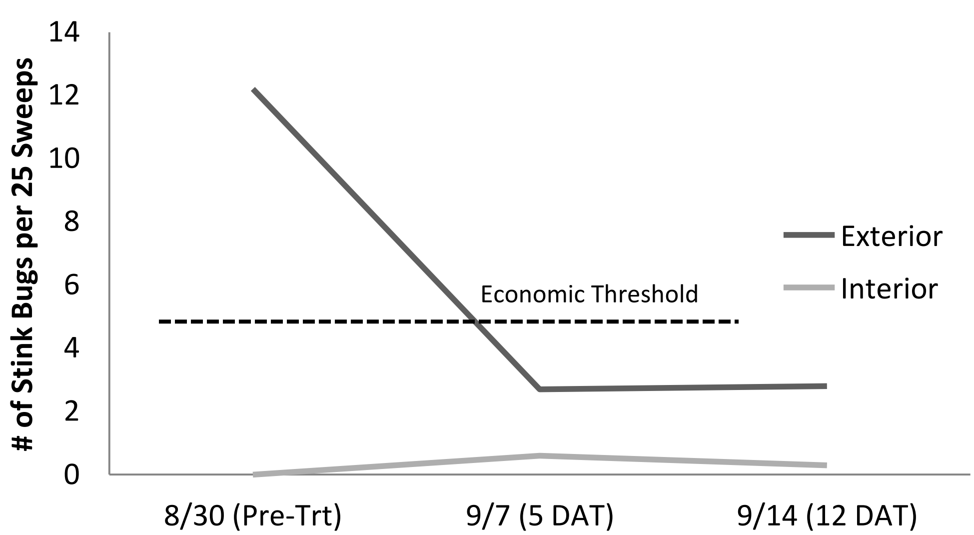

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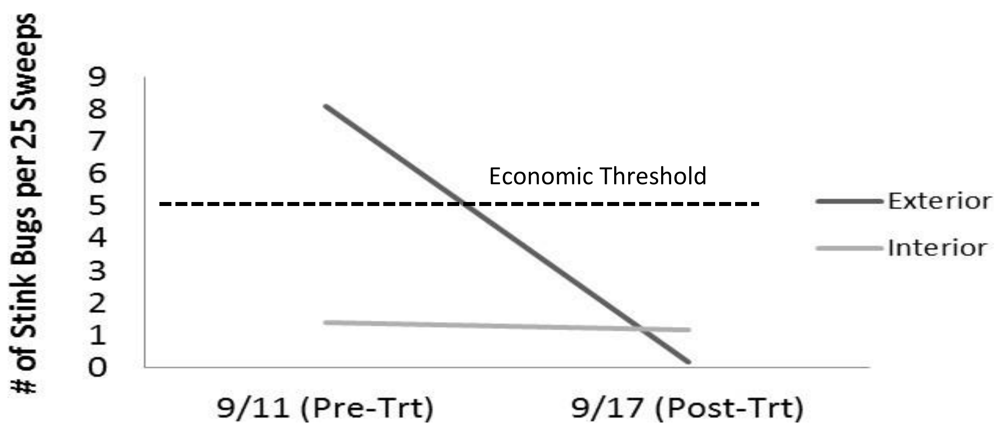
Table 3. Evaluation of Perimeter Treatment: Grower Field 2



Evaluate the effectiveness of insecticides to control the brown marmorated stink bug (BMSB) on soybeans

The treatments applied on August 17 were not successful in significantly reducing BMSB populations at 7 and 15 days after treatment (DAT) compared to the control (Table 4). The lack of control can be attributed to the observed re-infestation of plots from an adjacent wood lot. At (5DAT2) for the second application, all of the treatments provided a significant reduction in the number of BMSB per 2 minute search compared to control except Lannate LV at 1.5 pt/A (Table 5). There were no significant differences among treatments compared to the control based on sweep net sampling and 2 minute search at (5 DAT3) and (15 DAT3) for any of the sample dates after the third application applied on September 6. However, numerically, there were fewer BMSB adults and nymphs in each of the treated plots compared to the control except the stand alone Lannate LV treatment, which is consistent with the results of the second application (Table 5). All of the products tested provided some level of control for BMSB in soybeans.

A damage assessment was performed at harvest time, October 19, to detect symptoms of “stay green” and to evaluate the seed for quality and stink bug feeding injury. A visual inspection of the plots as the plants began to senesce found anywhere from 50% to 100% of the plots contained plants with green leaves. While significant, this is most likely a result of environmental conditions and soil moisture levels. Subsamples of 20 plants per plot were also selected to estimate the percent of plants with green stems which ranged from 75-85%.

However, there were no significant differences among treatments. A five plant subsample was collected from each plot and evaluated for flat pods. Acephate 97UP had significantly fewer flat pods compared to the Leverage 360 treatment but was not significantly different from the control. The Leverage 360 treatment had the greatest number of flat pods, however, it was not significantly different from the control (Table 6). There were significant differences among treatments for the percent moldy seed but the mold developed from not being properly stored and cannot be attributed to stink bug feeding injury. There were no significant differences among treatments for the percent shriveled seed and the percent seed with purple stain disease.

Table 4. Application 1 - Pre and Post-Treatment Sampling Results

Treatment	Rate/A	BMSB/10 sweeps Pre-Trt – Aug 14[1]	BMSB/2 minute Count (7 DAT1) Aug 21[1]	(15 DAT1) August 29[1]	
				BMSB/10 sweeps	BMSB /2 minute count
Baythroid XL	2.8 oz	2.00a	4.00a	1.75a	5.00a
Leverage 360	2.8 oz	2.25a	1.50a	1.00a	1.00a
Lannate LV	1.5 pt	4.75a	3.50a	5.75a	9.75a
Lannate LV + Asana XL	1.5 pt + 6 oz	2.50a	1.25a	2.00a	3.25a
Warrior II	1.92 oz	2.50a	1.00a	2.00a	3.25a
Cobalt Advanced	22 oz	3.50a	4.00a	1.25a	2.50a
Acephate 97UP	1 lb	2.00a	1.75a	1.00a	1.50a
Untreated	--	2.50a	4.75a	4.50a	10.75a

[1] Means within a column followed by the same letter are not significantly different (Tukey's; P=0.05).

Table 5. Application 2 and 3 - Post Treatment Sampling Result

Treatment	Rate/A	Number BMSB per 2 minute [1]			Number BMSB per 10 sweeps[1]		
		(6 DAT2) Sept 5	(5 DAT3) Sept 11	(15 DAT3) Sept 21	(6 DAT2) Sept 5	(5 DAT3) Sept 11	(15 DAT3) Sept 21
Baythroid XL	2.8 oz	2.25b	2.50a	5.25a	2.00a	3.75a	2.00a
Leverage 360	2.8 oz	3.75b	1.00a	3.25a	1.00a	0.75a	1.00a
Lannate LV	1.5 pt	8.00ab	15.50a	5.75a	2.75a	12.75a	3.75a
Lannate LV +Asana XL	1.5 pt + 6 oz	1.25b	0.75a	0.50a	1.50a	1.25a	1.50a
Warrior II	1.92 oz	2.25b	2.75a	2.25a	0.50a	2.00a	1.50a
Cobalt Advanced	22 oz	1.00b	0.75a	1.50a	0.00a	1.00a	0.50a
Acephate 97UP	1 lb	1.00b	1.50a	1.50a	1.25a	1.00a	1.75a
Untreated	--	20.25a	12.75a	1.50a	3.50a	5.50a	0.50a

[1] Means within a column followed by the same letter are not significantly different (Tukey's; P=0.05).

Table 6. Damage Evaluation

Treatment	Rate/A	Stay Green: % Plots with Green Leaves	Stay Green: % Green Stems[1]	Average Number of Flat Pods[1]	Seed Evaluation (100 Seed Subsample): % Moldy Seed[1]	% Shriveled Seed[1]	% Purple Stain[1]
Baythroid XL	2.8 oz	75	85.0a	13.25ab	5.5a	7.25a	1.0a
Leverage 360	2.8 oz	100	78.75a	32.25a	1.25ab	0.5a	4.75a
Lannate LV	1.5 pt	100	83.75a	10.0ab	1.5ab	2.25a	1.25a
Lannate LV + Asana XL	1.5 pt + 6 oz	100	77.5a	11.0ab	1.75ab	3.0a	3.25a
Warrior II	1.92 oz	75	75.0a	14.5ab	1.25ab	1.5a	1.75a
Cobalt Advanced	22 oz	75	71.25a	11.0ab	0.75b	3.25a	7.75a
Acephate 97UP	1 lb	75	81.25a	5.25b	0b	1.5a	1.75a
Untreated	--	50	70.0a	7.75ab	0.5b	1.5a	0.75a

[1] Means within a column followed by the same letter are not significantly different (Tukey's; P=0.05).

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Late Planted Field Corn Variety Trial, 2012
University of Delaware ***J. Whalen and B. Cissel***

Objective: Producers continue to have questions about the effect of fall armyworm feeding in whorl stage corn and ear damage from corn earworm in later plantings of field corn. Foliar insecticides have not provided effective control of these two insects. Research results from trials with newer BT technologies (i.e. Herculex, SmartStax and Viptera) indicate that these technologies can provide control of these two insect problems. This is the third year of a trial established to determine the effectiveness of “newer” Bt technologies in controlling worm pests in “double crop“ field corn under Delaware conditions.

Procedures: Six field corn hybrids were planted on June 21 at the University of Delaware’s Research and Education Center located near Georgetown, DE. Research plots 20 ft wide (8 rows on 30-inch centers) by 30 ft long were replicated four times in a randomized complete block design. Stand counts were taken from the center two rows of each plot (60 linear foot of row) on July 9. Observations on Aug 1 indicated that fall armyworm populations were low in the trial. Corn earworm damage was evaluated on Sept 4 before physiological maturity. All the ears were collected from a single row (30 linear feet) and evaluated for corn earworm damage. The following data was collected: total number of infested ears (1 or more larvae per ear) and total number of damaged ears (included ears with and without larvae present). Damage was rated as no damage, tip damage (1" or less), and damage >1" below tip. Plots were harvested at physiological maturity on October 22 and yields adjusted to 15.5 % moisture. Data were analyzed using Proc GLM and means were separated by Tukey’s mean separation test (P=0.05).

Results:

Variety	Traits	Stand Count July 9[1]	% FAW Infested Whorls Aug 1[1]	% Clean Ears Sept 4[1]	% Ears CEW Tip Damage Sept 4[1]	% Ears CEW Damage > 1 in Sept 4[1]	Yield BU/A Oct 22[1]
2K592 Mycogen	Herculex XTRA	82.75a	0.00b	7.98bc	4.92a	87.09ab	102.39ab
2K594 Mycogen	SmartStax	77.50a	0.00b	53.14ab	20.44a	26.42cd	114.94ab
2K591 Mycogen	Roundup Ready	87.50a	4.27a	0.00c	0.63a	99.38a	97.02b
N68B-3111	Viptera	83.50a	0.00b	98.33a	1.67a	0.00d	123.57ab
DKC 55-08	RR-2	73.00a	1.25ab	10.47bc	14.99a	75.20abc	99.44ab
DKC 55-09	GENSS SmartStax	84.75a	0.00b	60.44a	8.17a	31.40bcd	126.00a

Means in the same columns followed by the same letter are not significantly different (Tukey's; P=0.05).

2012 Western Bean Cutworm Trap Summary: New Castle County						
Week of:	Delaware City	Middletown	Newark	Port Penn	Townsend (east)	Townsend (west)
11-Jun	0	0	0	0	0	0
18-Jun	0	0	0	0	0	0
25-Jun	0	0	0	0	0	0
2-Jul	0	0	0	0	0	0
9-Jul	**4**	0	0	0	**1**	**1**
16-Jul	**2**	0	0	0	**1**	0
23-Jul	0	0	0	0	0	0
30-Jul	0	0	0	0	0	0
6-Aug	--	0	0	--	0	0
13-Aug	0	0	0	0	0	0
20-Aug	0	0	0	0	0	0

2012 Western Bean Cutworm Trap Summary: Kent County				
	Andrewsville	Harrington	Little Creek	Smyrna
11-Jun	0	0	0	0
18-Jun	--	0	0	0
25-Jun	--	--	0	0
2-Jul	0	0	0	0
9-Jul	0	0	--	--
16-Jul	0	0	**1**	**2**
23-Jul	0	0	0	0
30-Jul	0	--	0	--
6-Aug	--	--	0	0
13-Aug	--	0	0	0
20-Aug	0	0	0	**1**

2012 Western Bean Cutworm Trap Summary: Sussex County					
Week of:	Bridgeville	Frankford	Greenwood	Seaford	Seaford
11-Jun	0	0	0	--	--
18-Jun	0	0	0	0	0
25-Jun	0	0	0	0	0
2-Jul	0	**1**	0	0	0
9-Jul	--	0	0	--	0
16-Jul	0	0	0	--	0
23-Jul	0	0	0	0	0
30-Jul	0	--	0	0	0
6-Aug	0	0	0	0	--
13-Aug	0	0	0	0	0
20-Aug	0	--	--	0	0