2008 - Integrated Pest Management Program

University of Delaware

Joanne Whalen, Extension Specialist- IPM
Bill Cissel, Extension Associate - IPM

Contents

Vegetables

Field Crops

Title: Evaluation of Insect Damage in Non Bell Peppers Compared to Bell Peppers - 2008

Personnel: Joanne Whalen and Bill Cissel, University of Delaware

Cooperator: Bob and Chris Horsey –Laurel, DE

Plot Design: Four types of peppers were planted on June 19 on a commercial farm located near Laurel, DE. The varieties included Paladin (bell pepper), Bounty (banana pepper), Cherry Bomb (cherry pepper) and Sparky (jalapeno pepper). Single row plots 50 foot long were replicated 4 times in a randomized complete block design.

Methods: All plots were evaluated on a weekly basis from June 28 through August 7 for the number of green peach aphids and European corn borer egg masses per leaf. No insecticides were applied and maintenance fungicides were applied on a weekly basis starting at flowering.

Results:

Treatment	% European Corn Borer Damaged Fruit		% Beet Armyworm Damaged Fruit	
	Aug 12	Aug 25	Aug 12	Aug 25
Paladin	0.93a	5.95a	5.92a	1.02a
Cherry Bomb	0.00a	1.00bc	0.00a	0.12a
Sparky	0.61a	0.13c	0.00a	0.63a
Bounty	0.17a	2.43b	0.17a	1.54a

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

Comments: Leaf feeding insect pressure (aphids, beet armyworm) was light throughout the season and no differences were found between varieties. Overall, corn borer pressure was low early in the season and increased by the end of August. At the final evaluation, the percentage of corn borer damaged fruit was significantly lower in the non –bell plots compared to the bell pepper plots. This data provides data to support that a higher ECB threshold could be used to time sprays in non-bell peppers compared to bell peppers.

Control of Cucumber Beetles in Pickling Cucumbers with Seed Treatments and In-Furrow Insecticides – 2008

Joanne Whalen and William Cissel , Department of Entomology and Wildlife Ecology, University of Delaware
Alan Taylor, Department of Horticultural Sciences, Cornell University

The variety 'Vlaspik' was planted on June 9 at the University of Delaware's Research and Education Center located near Georgetown, DE. Plots consisted of four 20 ft-long plots planted on 30 inch centers. Each treatment was replicated four times in a randomized complete block design. All in-furrow treatments were applied to an open furrow on June 9 immediately before planting with a one nozzle sprayer delivering 7.7 gallons per acre at 40 psi. The Cruiser and Sepresto treatments were applied to seeds using a film-coating technique in Dr. Alan Taylor's laboratory.

On June 19, the excised leaf bioassay was conducted by placing the petioles of three cotyledon leaves in a small block of florist foam that was moistened with water. These leaves were placed in a small, square plastic take out container. Five field collected cucumber beetles were placed in each container and mortality and leaf damage were recorded at 24, 48, 72 and 96 hours. On June 30, a second bioassay was conducted using two fully expanded true leaves from plants that were in the 4 -leaf stage of development. Four field collected cucumber beetles were placed in each container and mortality and leaf damage recorded at 72 hours.

Field data was collected from plant emergence through early fruit formation. Data collected included stand counts and cucumber beetle counts (number of alive and dead beetle per 10 plants). Overall field populations were extremely light and beetles were not found in the plots until early July.

I. Laboratory Bioassays

Treatment	Rate	Laboratory Bioassay – Cotyledon Stage (June 19 -10 DAP) *							
		24 Hours		48 Hours		72 Hours		96 Hours	
		% Mortality	Defol.**	% Mortality	Defol.**	% Mortality	Defol.**	% Mortality	Defol.**
Untreated	----	0.00	2.00a	0.00c	3.00a	0.00b	3.00a	0.00b	3.00a
Admire Pro– in furrow	7 oz/A								
Platinum 2SC – in furrow	8 oz								
Sepresto (seed treatment)	1.00 mg ai/seed	10.00	1.00b	45.00b	1.50b	70.00a	1.50b	80.00a	1.50b
Cruiser (seed treatment)	0.75 mg ai/seed	15.00	1.00b	75.00a	1.25b	75.00a	1.25b	85.00a	1.25b
F 7.59		0.47		102.60	7.59	126.60	7.59	74.45	
Pr>F 0.0227		0.6481	<.0001	<.0001	0.0227	<.0001	0.0227	<.0001	

** Defoliation Rating – 1= light (<10%); 2 = moderate (10-50%); 3 = heavy (> 50%)
Means within a column followed by the same letter are not significantly different (P=0.05; Tukey's Mean Separation Test).

		Laboratory Bioassay – Four True Leaf Stage (June 30 -20 DAP)	
Treatment	**Rate**	**72 Hours**	
		% Mortality	**Defol.***
Untreated	----	0.00b	2.00a
Admire Pro– in furrow	7 oz/A	62.50a	1.00b
Platinum 2SC – in furrow	8 oz	75.00a	1.00b
Sepresto (seed treatment)	1.00 mg ai/seed	68.75a	1.00b
Cruiser (seed treatment)	0.75 mg ai/seed	81.25a	1.00b
F		15.11	
Pr>F		0.0001	<.0001

* Defoliation Rating – 1= light (<10%); 2 = moderate (10-50%); 3 = heavy (> 50%)
Means within a column followed by the same letter are not significantly different (P=0.05; Tukey's Mean Separation Test).

II. Field Evaluations

Treatment	Rate	Stand Count per 2 rows (40 ft)	Number of Beetles per 10 Plants			
			July 3		July 7	
		June 15	Alive	Dead	Alive	Dead
Untreated	----	88.75	1.00a	0.00	1.00	0.00
Admire Pro– in furrow	7 oz/A	85.75	0.00b	0.00	0.00	0.25
Platinum 2SC – in furrow	8 oz	74.00	0.00b	0.25	0.00	0.25
Sepresto (seed treatment)	1.00 mg ai/seed	76.75	0.00b	0.75	0.00	0.00
Cruiser (seed treatment)	0.75 mg ai/seed	90.00	0.50ab	0.00	0.00	0.00
F		2.75	4.80		0.81	3.00
0.69						
Pr>F		0.0783	0.0152		0.5426	0.0625
0.6114						

Means within a column followed by the same letter are not significantly different (P=0.05; Tukey's Mean Separation Test).

Insect Management In Late Planted Snap Beans, 2008*:* 'Slenderette' snap beans were planted on July 11 at the University of Delaware's Research and Education Center located near Georgetown, DE. Plots consisted of four 25 ft-long plots on 30-inch centers. Foliar treatments were applied on Aug 20(bud stage), Aug 27 (pin stage) and Sept 3 (one week from harvest) with a CO_2 pressurized backpack sprayer delivering 20 gpa @ 25 psi. Snap beans were harvested on September 8 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).

European corn borer pressure was extremely light. Corn earworm (CEW) pressure was light to moderate. All treatments provided a significantly lower percentage of CEW damaged beans compared to the untreated check except high rate of Coragen. No phytotoxicity was observed.

Treatment	Rate/Acre	Mean % Corn Earworm Damaged Beans [1]	Mean % Corn Borer Damaged Beans [1]
Avaunt 30WG	3.5 oz	0.11b	0.00a
Avaunt 30WG	6 oz	0.24b	0.00a
Spintor 2SC	6 oz	0.38b	0.00a
Radiant 1 SC	8 oz	0.00b	0.00a
Coragen 1.67 SC	5.1 oz	1.14ab	0.17a
Coragen 1.67 SC	3.4 oz	0.44b	0.09a
Tesoro 4EC	6.4 oz	0.20b	0.29a
Warrior T	3.2 oz	0.15b	0.25a
Alverde 2SC + LI- 700	16 oz + 0.5% V/V	0.15b	0.25a
Untreated	------	2.00a	0.90a

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

Insect Management in Non- Bell Peppers, 2008: "Cherry Bomb" hot cherry peppers were transplanted on June 18 at the University of Delaware Research and Education center located near Georgetown, DE. Two row plots 20 ft long on 8 ft centers were replicated 4 times in a RCB design. All foliar treatments receiving a weekly application of Warrior or Spintor/Intrepid were applied beginning at first flower/small fruit on July 15 and then on a weekly basis on Jul 18, 25 and 31; AUG 7, 14 AND 21. Applications were made with a CO_2 backpack sprayer with a one-row boom, having 3 hollow-cone nozzles per row (one over the top and one drop nozzle on each side) delivering 62.5 gpa at 37 psi. Plots were sampled on a weekly basis from June 25 through Aug 18 for green peach aphid (GPA) aphids, European corn borer (ECB) egg masses, beet armyworm (BAW) egg masses, and corn earworm(CEW) and fall armyworm(FAW) damaged fruit. All commercial size peppers were harvested on Aug 12 and Aug 25 and evaluated for ECB, BAW, CEW and FAW damage. Data were analyzed using Proc GLM and means were separated by LSD mean separation test (P=0.05).

Foliar insect populations were low throughout the season. Although aphid populations were generally low, we did see a significant increase late in the season in the plots receiving weekly Warrior applications. ECB Moths catches did not reach 5 per night before the first fruit evaluation. However, from the end of July until the first harvest corn borer trap catches averaged 2 per night. On Aug 12, corn borer damaged was overall significantly higher in the untreated plots suggesting that a threshold of 2 moths per night might be a better threshold for non bell threshold. Between the first and second harvest, traps catches increased to an average of 5 per night. Once again, there was significantly higher corn borer damage in the untreated plots. These results suggest that corn borers can cause economic loss in non-bell peppers at a level of 2-5 corn borer moths catches per night. No phytotoxicity was observed.

Treatment	Timing	Treatment Dates	Rate/A	Aphid per 50 leaves Aug 18	% ECB Damaged Fruit	
					Aug 12	Aug 25
Warrior	Weekly starting at ¼ inch fruit		3.2 oz	20.25a	0.00b	0.00b
Warrior	Threshold 5 ECB moths/ night in BLT	No Sprays	---	3.25b	5.25a	2.00ab
Spintor then switch to Intrepid	2 app – start at ¼ inch fruit 2 appl	July 26; Aug 2	6 oz 8 oz	3.25b	0.00b	0.01b
Spintor then switch to Intrepid	Threshold – 2 appl max Threshold5 ECB moths/ night in BLT	No Sprays	---	0.75b	1.25b	4.50a
Untreated	---		---	2.50b	3.50ab	4.75a

Means within a column followed by the same letter are not significantly different (LSD; P=0.05).

Two Spotted Spider Mite Management in Watermelons - 2008: 'Jamboree' watermelon transplants were planted on May 28 at the University of Delaware Research and Education Center located near Georgetown, DE. Plots consisted of two 20 ft-long rows on 8ft centers. Each treatment was replicated four times and arranged in a RCB design. Foliar treatments were applied as a broadcast spray on July 11. All foliar treatments applied with a CO_2 back pack sprayer delivering 22 gpa at 40 psi. Mite populations were evaluated on a weekly basis from July 10 through July 31 by looking at 10 plants per plot to determine the percent infested plants and by collecting 50 leaves per plot to determine the number of mites per leaf. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Spider population pressure was low. All treatments provided significantly better spider mite control 3 days after treatment compared to the untreated check. No phytotoxicity was observed.

Table 1. Spider Mite Counts on Leaves

Treatment	Rate/A	Pre-treatment July 7		Mean percent Mite infested plants	
		Number Spider Mites per leaf	Percent Mite Infested Plants	July 14 3 DAT	July 16 5 DAT
Untreated	----	0.16a	12.50a	48.50a	5.00a
Zeal 72WSP	2 oz	0.02a	2.50a	3.00b	5.00a
Oberon 2SC	8.5 oz	0.17a	12.50a	3.00b	0.00a
Capture 2EC	6.4 oz	0.32a	7.5a	0.00b	0.00a

Means within a column followed by the same letter are not significantly different (Tukey's mean separation test; P=0.05).

Control of Lepidopterous Larvae in Fall Cabbage - 2008: Promising new chemistry and labeled insecticides were evaluated for control of the cabbage insect complex. ' Blue Thunder' field-grown cabbage transplants were planted on July 25 at Papen Farms, Inc., Dover, DE. Plots consisted of one 20-ft-long row on 3-ft centers. Each treatment was replicated four times and arranged in a RCB design. The evaluated materials are listed in the tables. In furrow materials were applied at planting on July 25 using a CO_2 backpack sprayer with a one-nozzle boom delivering 15.2 gpa at 40 psi. All foliar materials were applied on Aug 5, 20 and Sept 4. Applications were made with a CO_2 backpack sprayer with a one-row boom, having 3 hollow-cone nozzles per row (one over the top and one drop nozzle on each side) delivering 52 gpa at 40 psi. The number of Lepidopterous larvae on each of 5 randomly selected plants per plot was recorded on a weekly basis from Aug 4 through September 22. The number of marketable heads was determined by examining feeding damage on the head and two wrapper leaves on September 30. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Diamond back moth (DBM) population levels were low to moderate. All treatments provided a significantly higher percentage of marketable heads compared to the untreated controls. Overall, all treatments resulted in significantly lower numbers of Diamondback larvae compared to the untreated control. No phytotoxicity was observed.

Table 1 – Diamondback Moth (DBM) Counts and Marketable Heads

Treatment [1]	Rate/acre	Treatment Dates/Method	% Marketable Heads [1] September 30	Mean Number DBM Larvae per 5 plants [1]				
				Aug 8	Aug 18	Sep 2	Sep 8	Sep 17
Synapse 24 WG + NIS	2 oz + NIS 0.25% v/v	Aug 5, 20; Sept4 Foliar	95.50ab	0.25b	0.00c	0.50ab	0.00c	0.75b
Synapse 24 WG + MSO	2 oz + MSO 0.25% v/v	Aug 5, 20; Sept4 Foliar	100.00a	0.00b	0.00c	0.00b	0.00c	0.50b
A15452	10.3 oz	July 24 – IF	95.25ab	0.25b	0.75bc	0.00b	0.25c	0.25b
A1542	13.0 oz	July 24- IF	91.75ab	0.25b	0.75bc	0.00b	0.25c	0.50b
Coragen	3.38 oz	Aug 5, 20; Sept4 Foliar	100.00ab	0.00b	0.50c	0.50ab	0.00c	0.75b
Coragen	5.07 oz	Aug 5, 20; Sept4 Foliar	98.25ab	0.00b	0.00c	0.25b	0.00c	0.50b
Rimon 0.83EC + LI 700	9 oz + LI 700 0.25% v/v	Aug 5, 20; Sept4 Foliar	98.25ab	0.25b	0.25c	0.00b	0.00c	0.25b
Alverde 2SC + LI 700	16 oz + 0.25% v/v	Aug 5, 20; Sept4 Foliar	83.25b	0.00b	2.50ab	1.50ab	1.75b	0.75b
Tesoro 4EC+ LI 700	6.4 oz + 0.25% v/v	Aug 5, 20; Sept4 Foliar	100.00a	0.00b	0.00c	0.75ab	0.00c	0.50b
Xentari + LI 700	1 lb+ 0.25% v/v	Aug 5, 20; Sept4 Foliar	89.75ab	0.00b	0.50c	0.75ab	0.25c	0.25b
Radiant 1SC	6 oz	Aug 5, 20; Sept4 Foliar	94.00ab	0.00b	0.25c	0.25b	0.00c	0.25b
Untreated Check	----	----	62.75c	2.00a	3.25a	2.25a	5.00a	4.25a

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

Insect Management in Late Planted Sweet Corn - 2008: *'* Sweet Ice ' sweet corn was planted on July 9 at the University of Delaware Research and Education Center located near Georgetown, DE. Plots consisted of one row, 25 ft-long plot planted on 30-inch centers. Each treatment was replicated 4 times and arranged in a RCB design. All treatments listed in the table were applied on a 3-4 day schedule (Aug 19, 22, 26, 29; Sep 2 and 5). Applications of foliar insecticides were applied with a CO_2 pressurized back sprayer using 2 nozzles per row delivering 76 gpa at 40 psi. At harvest (Sep 8), 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 (only within 1.0 inches from the tip- processing ears). The total number of larvae of each species was also counted. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Corn earworm pressure was high. Corn borer pressure and fall armyworm pressure was low. All treatments provided a significantly higher percentage of clean and processing ears compared to the untreated check. All treatments provided a significantly lower percentage of CEW damaged ears compared to the untreated check. Overall, the Belt and Radiant treatments provided the lowest level of corn earworm control. No phytoxicity was observed.

Treatment	Rate/A	# Appl.	% Clean Ears (Fresh Market)	% Clean + Tip Damaged Ears (Processing Ears)	% Corn Earworm Damaged Ears
Belt 480 SC + NIS	3 oz + 0.25% v/v	6	48.86b	63.11d	50.31b
Belt 480 SC + MSO	3 oz+ 0.25% v/v	6	54.62b	68.41cd	46.34b
Lannate LV+ Asana XL Coragen 1.67SC+ MSO	24 oz + 9.6 oz 3.4 oz + 0.5 %V/V	2 4	85.74a	92.70ab	14.26cd
Lannate LV+ Asana XL Coragen 1.67SC	24 oz + 9.6 oz 5 oz	3 3	82.93a	89.39ab	16.24cd
Coragen 1.67SC Lannate LV+ AsanaXL	Coragen 5 oz 24 oz + 9.6 oz	3 3	75.10a	78.59bcd	24.90c
Coragen 1.67SC+ MSO Lannate LV + Asana XL	5 oz + 0.5 %V/V 24 oz/A + 9.6 oz	3 3	76.06a	81.06abc	22.27cd
Lannate LV+ Asana XL	24 oz + 9.6 oz	6	78.18a	84.90abc	21.82cd
Warrior with Zeon Tech	3.84 oz	6	74.98a	83.92abc	25.02c
Radiant 1SC	6 oz	6	53.86b	62.35d	46.15b
Coragen 1.67SC+ MSO	5 oz+ 0.5 %V/V	6	77.00a	80.26abc	22.75cd
Voliam Xpress	8.2 oz	6	92.34a	96.30a	6.90d
Untreated Check	-----	---	4.37c	4.37e	94.73a

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

Insect Management in Bell Peppers, 2008: "Paladin" bell peppers were transplanted on June 18 at the University of Delaware Research and Education center located near Georgetown, DE. Two row plots 20 ft long on 8 ft centers were replicated 4 times in a RCB design. All foliar materials were applied beginning at first flower/small fruit on July 18 and then on a weekly basis on July 25; Aug 1, 7, 14 and 21. Applications were made with a CO_2 backpack sprayer with a one-row boom, having 3 hollow-cone nozzles per row (one over the top and one drop nozzle on each side) delivering 62.5 gpa at 40 psi. Plots were sampled on a weekly basis from June 25 through Aug 18 for green peach aphid (GPA) aphids, European corn borer (ECB) egg masses, beet armyworm (BAW) egg masses, and corn earworm(CEW) and fall armyworm(FAW) damaged fruit. All commercial size peppers were harvested on Aug 12 and Aug 25 and evaluated for ECB, BAW, CEW and FAW damage. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Corn borer pressure was moderate. Beet armyworm pressure was light. All treatments provided significantly better ECB control compared to the untreated check on Aug 25. Tesoro provided the lowest level of ECB control compared to the other treatments on Aug 25. No phytotoxicity was observed.

Table1. European Corn Borer (ECB) Damaged Fruit

Treatment	Rate/Acre	# appl	Mean No. Green Peach Aphids/50 lvs	Mean Percent ECB Damaged Fruit [1]	
				Aug 12	Aug 25
Synapse 24 WG + NIS	3 oz + 0.25% v/v	6	4.50b	0.00b	0.22c
Synapse 24 WG + MSO	3 oz+ 0.25% v/v	6	1.00b	0.00b	0.00c
Coragen 1.67SC Avaunt 30WDG	3.38 oz 3.5 oz	4 2	1.75B	0.52b	0.00c
Coragen 1.67 SC Avaunt 30WDG	5.07 oz/a 3.5 oz	3 3	4.00b	0.00b	0.00c
Radiant 1SC	5 oz	6	8.75ab	0.31b	0.00c
Tesoro 4EC	6.4 oz	6	1.00b	7.27ab	9.1b
Orthene 97 Warrior	1 lb 3.84 oz	2 4	2.00a	0.26b	0.97c
Avaunt 30WDG Coragen 1.67SC	3.5 oz 5.07 oz	4 2	7.50ab	0.00b	0.00c
Warrior	3.84 oz	6	20.50a	0.41b	0.39c
Untreated	----		2.50b	13.38a	20.66a

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

Melon Aphid and Cucumber Beetle Management in Watermelons, 2008: 'Jamboree' watermelons transplants were planted on May 28 at the University of Delaware's Research and Education Center located near Georgetown, DE. Plots consisted of two 20 ft-long rows on 8ft centers. Each treatment was replicated four times and arranged in a RCB design. Foliar treatments were applied on June 5 and June 14 for cucumber beetle control and on July 31 for melon aphid control with a CO_2 back pack sprayer delivering 20 gpa at 40 psi. Cucumber beetle population levels were evaluated by counting the number of cucumber beetle infested plants per 2 row plot. Aphid population levels were assessed on 10 plants per plot to determine the percent infested plants and the number of aphids per 50 leaves. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

The Assail and Warrior treatments provided the best cucumber beetle control seven days after the first application. All treatments provided better melon aphid control except the Movento treatments. No phytotoxicity was observed.

Table 1. Cucumber Beetle Data

Treatment	Rate/Acre	Treatment Dates	Mean Percent Cucumber Beetle Infested Plants				
			Pretrt June 5	4 DAT June 9	7 DAT June 12	4 DAT June 18	11 DAT June 25
Untreated Check	--	---	50.00a	77.50a	77.50a	47.50a	12.50a
Assail 30 SG	4 oz	June 5	75.00a	27.50a	22.50c	35.00ab	10.00a
Voliam Flexi + MSO	5.98 oz	June 5 ;14	39.29a	30.00a	85.00a	17.50ab	12.50a
Voliam Flexi+ MSO	6.98 oz	June 5 ; 14	42.86a	47.50a	72.50ab	17.50ab	10.00a
Baythroid XL	2.6 oz	June 5 ; 14	25.00a	50.00a	70.00ab	12.50b	12.50a
Warrior	3.2 oz	June 5	44.64a	30.00a	35.00bc	25.00ab	12.50a

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

Table 2. . Percent Melon Aphid Infested Plants

Treatment	Rate/A	Mean Percent Aphid Infested Plants			
		Pretrt July 28	4 DAT Aug 4	11 DAT Aug 11	15 DAT Aug 14
Untreated Check	--	15.00a	30.00a	92.50a	32.50a
Assail 30 SG	4 oz	15.00a	0.00c	2.50c	0.00c
A15645 + MSO	5.98 oz	2.50a	0.00c	5.00c	0.00c
A15645 + MSO	6.98 oz	2.50a	0.00c	10.00bc	0.00c
Movento 240 SC + NIS*	3 oz + 0.25% NIS V/V	17.50a	17.50ab	35.00b	25.00ab
Movento 240 SC + NIS*	5 oz + 0.25% NIS V/V	12.50a	7.50bc	32.50b	12.50bc

Means in a column followed by the same letter are not significantly different (P= 0.05; Tukey's Test).
* NIS used was LI-700

Table 3. Melon Aphid Counts

Treatment	Rate/A	Mean Number Aphids per 50 Plants			
		Pretrt July 28	4 DAT Aug 4	11 DAT Aug 11	15 DAT Aug 14
Untreated Check	--	14.00a	18.75a	57.50a	13.50a
Assail 30 SG	4 oz	23.50a	0.00b	2.75b	0.00b
A15645 + MSO	5.98 oz	0.50a	0.00b	1.50b	0.00b
A15645 + MSO	6.98 oz	0.50a	0.00b	3.50b	0.00b
Movento 240 SC + NIS*	3 oz + 0.25% NIS V/V	9.00a	2.50b	31.75ab	10.00ab
Movento 240 SC + NIS*	5 oz + 0.25% NIS V/V	13.75a	6.50ab	12.5b	5.25ab

Means in a column followed by the same letter are not significantly different (P= 0.05; Tukey's Test).
* NIS used was LI-700

Final Delaware Soybean Board Report – 2008

Title: Effectiveness of Seed Treatments for Yield Enhancement and Dectes Stem Borer Management

Personnel: Joanne Whalen, Extension IPM Specialist, Bill Cissel, Extension IPM Associate, Bob Uniatowski, Research Associate, Plant Science, Richard Taylor, Extension Agronomist, John Pesek, Assistant Professor, Food and Resource Economics

Cooperators: Delaware State University (D.Meyer), HB Farms (Harrington) and Gilpin Farms (Townsend)

Objectives: (1) To determine if seed applied treatments containing a insecticide/fungicide combination will provide a yield advantage for early planted soybeans.
(2) To determine if a seed applied treatment will provide effective control of Dectes stem borer.

Methods:

(A) Seed Treatment Trials to Evaluate Yield Enhancement: The variety Southern States RT 3851N was on planted on 15-inch center in replicated strip plots in three locations throughout the state: Townsend on May 4, Smyrna at the Delaware State Research farm on April 25 and Harrington on May 1. Treatments included: Untreated seed and Cruiser Max treated seed (combination of Apron Max plus Cruiser 5FS). Overall plot size at each location was: 320 X 400 at Smyrna; 180 x 500 at Harrington and 150 ft x 1700 ft long at the Townsend site. Stand counts were taken on a weekly basis for four weeks starting at plant emergence in all 4 locations. Insect counts were taken on a weekly basis from plant emergence through early pod set. Insect data collected included bean leaf beetle damaged plants per ft of row; number of leafhoppers, grasshoppers and bean leaf beetles per sweep; and number of soybean aphids and thrips per leaf. Yield data was taken in all plots at physiological maturity.

(B) Evaluation of a New, Non-Labeled Seed Treatment for Dectes Stem Borer Management: Replicated research plots were established in two locations: Baker Farms located near Middletown, DE on May 29 and the Carvel Research and Education located near Georgetown, DE on May 8. Two varieties were planted at each location: SS RT3851 N (Group III – SCN resistant) and SS RT3860 (Group II- SCN susceptible). As SCN susceptible variety was used due to past information that SCN resistance provides some level of suppression of Dectes stem borer. Plot size was 18 foot wide x 18 ft long. Treatments were established in a randomized complete block design and replicated six times. Treatments included 2 untreated checks and 2 rates of the fipronil seed treatment. Plots were sampled on a weekly basis from mid-June through early August to determine the abundance of Dectes adults. Prior to harvest, plots were evaluated for the percentage of lodged plants (counts per plot as well as number of stems that would lodge when pushed) and percentage of stems infested with Dectes. A section of the plots were harvested at physiological maturity to simulate a “timely harvest”. A second section of plot was harvested 2 -3 weeks after the “timely harvest” to determine the yield affects of late harvest.

Results:

(A) Seed Treatment Trials to Evaluate Yield Enhancement

Townsend Location

Table 1. Stand Counts and Yield

Treatment	Rate/100 lb seed	Yield BU/A Sept 22	Stand Count per 3 ft/row	
			June 3	June 13
Untreated	---	26.39	7.43	7.27
Cruiser Maxx	3 oz	26.71	7.60	8.33

Table 2. Bean Leaf Beetle and Thrips Counts

Treatment	Rate/100 lb seed	BLB Damaged Plants per 3 ft/row		Thrips per 5 Leaves				
		June 13	June 17	June 13	June 17	June 24	July 1	July 8
Untreated	---	6.3	5.7	2.8	6.5	3.4	3.6	4.3
Cruiser Maxx	3 oz	3.33	2.85	0.7	0.5	1.2	1.4	2.7

Table 3. Average Number of Bean Leaf Beetles per 10 Sweeps

Treatment	Rate/100 lb seed	Number of BLB per 10 Sweeps						
		June 13	June 17	June 24	July 1	July 8	July 15	August 11
Untreated	---	6.3	5.7	2.8	6.5	3.4	3.6	4.3
Cruiser Maxx	3 oz	3.33	2.85	0.7	0.5	1.2	1.4	2.7

Table 4. Average Number of Grasshoppers per 10 sweeps

Treatment	Rate/100 lb seed	Number of Grasshoppers per 10 Sweeps				
		June 13	**June 17**	**June 24**	**July 1**	**July 8**
Untreated	---	0.2	0.15	0.17	0.13	0.27
Cruiser Maxx	3 oz	0	0.1	0.03	0.3	0.03

Smyrna Location

Table 1. Stand Counts and Yield

Treatment	Rate/100 lb seed	Yield BU/A	Stand Count per 3 ft/row		% BLB Damaged Plants	
			June 13	June 19	June 13	June 19
Untreated	---	5.86	12.0	8.0	86.2	93.8
Cruiser Maxx	3 oz	3.94	8.9	9.3	51.5	65.5

Table 2. Thrips Counts

Treatment	Thrips per 5 leaves						
	June 13	June 19	June 19	June 24	July 1	July 15	July 29
Untreated	8.7	8.8	5.6	2.1	6.1	6.2	34.6
Cruiser Maxx	0.4	1.3	1.3	1.1	1.6	1.3	2.9

Table 3. Average Number of Bean Leaf Beetles per 10 Sweeps

Treatment	Bean Leaf Beetles per 10 Sweeps						
	June 13	June 19	June 19	June 24	July 1	July 15	July 29
Untreated	0.13	0.1	0.1	.27	0.1	0	0
Cruiser Maxx	0.2	0.2	0	0.3	0	0	0

Table 4. Average Number of Grasshoppers per 10 sweeps

Treatment	Rate/100 lb seed	Number of Grasshoppers per 10 Sweeps					
		June 13	**June 19**	**June 24**	**July 1**	**July 8**	**July 15**
Untreated	---	0.33	0.27	0.13	0.6	0.47	0
Cruiser Maxx	3 oz	0.57	0.47	0.77	0.67	0	0

Harrington Location

Table 1. Stand Counts and Yield

Treatment	Rate/100 lb seed	Yield BU/A Sept 24	Stand Count per 3 ft/row			% BLB Damaged Plants
			June 3	June 10	June 19	June 19
Untreated	---	8.3	7.7	7.6	6.5	94.49
Cruiser Maxx	3 oz	6.6	8.3	9.53	7.3	65.22

Table 2. Bean Leaf Beetle and Thrips Counts

Treatment	Rate/100 lb seed	BLB Damaged Plants per 3 ft/row		Thrips per 5 Leaves				
		June 3	June 10	June 10	June 19	June 24	July 1	July 8
Untreated	---	7.4	0.57	7.1	12.9	3.5	2.3	0.9
Cruiser Maxx	3 oz	1.0	2.7	3.5	2.0	2.6	0.9	0.1

Table 3. Average Number of Bean Leaf Beetles per 10 Sweeps

Treatment	Rate/100 lb seed	Number of BLB per 10 Sweeps		
		June 19	July 15	August 11
Untreated	---	0.07	0.2	1.5
Cruiser Maxx	3 oz	0.07	0	0.2

Table 4. Average Number of Grasshoppers per 10 sweeps

Treatment	Rate/100 lb seed	Number of Grasshoppers per 10 Sweeps					
		June 10	**June 19**	**June 24**	**July 1**	**July 8**	**July 15**
Untreated	---	1.43	1.2	2.13	1.3	1.0	1.03
Cruiser Maxx	3 oz	0.67	0.43	1.6	0.87	1.93	0.83

(B) Evaluation of a Seed Treatment for Dectes Stem Borer Management

Georgetown - First Harvest Data

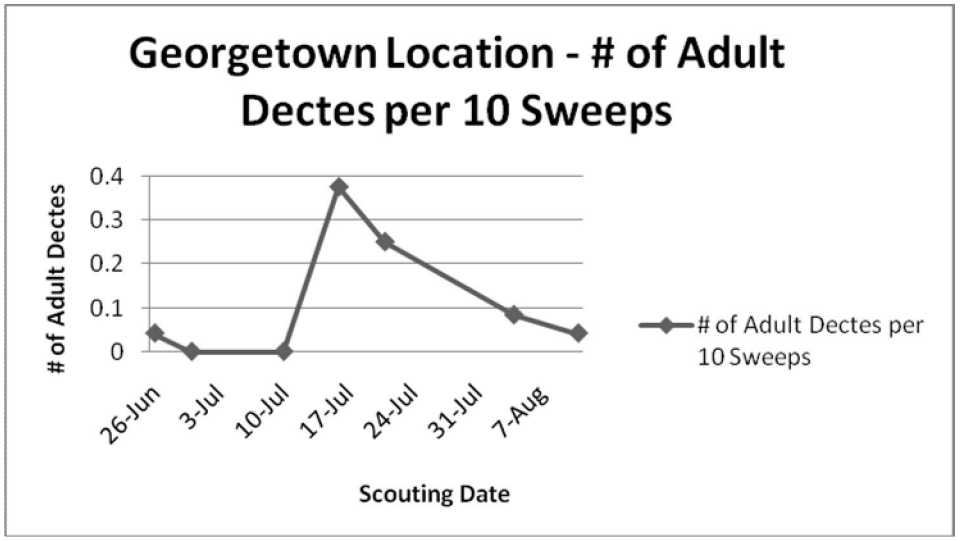
Treatment	Rate/ 100 kg seed	% Infested Stems Sept 23	# Larvae per Stem 15 stems Sept 23	% Lodged Stems* Sept 30	Yield BU/A Oct 3	Lodging Yield Loss BU/A
SS3851 Fipronil ST	50 g ai	0.00c	0.00b	0.00a	50.22ab	0.00b
SS3851 Fipronil ST	100 g ai	1.11c	0.00b	0.00a	62.18a	0.03b
SS3851	Untreated	15.56bc	2.33ab	2.67a	55.00ab	1.33ab
SS3851	Untreated	14.44bc	2.33ab	4.33a	49.68ab	1.18ab
SS3860 Fipronil ST	50 g ai	1.11c	0.17b	0.00a	39.59b	0.07b
SS3860 Fipronil ST	100 g ai	0.00c	0.00b	0.00a	46.02ab	0.00b
SS 3860	Untreated	32.22a	4.83a	5.33a	40.68b	1.88ab
SS 3860	Untreated	25.56ab	3.17a	6.33a	38.34b	2.39a

Means followed by the same letter are not significantly different (Tukeys; P=0.05).
*** 50 stem sample – pushed for lodging**

Georgetown– Second Harvest Data

Treatment	Rate/ 100 kg seed	% Lodging loss per acre (based on 170,000 plants/A)	Yield BU/A Oct 31	Lodging Yield Loss BU/A
SS3851 Fipronil ST	50 g ai	0.24d	61.96ab	0.51b
SS3851 Fipronil ST	100 g ai	0.35d	69.40a	0.54b
SS3851	Untreated	9.47c	53.88bcd	11.77a
SS3851	Untreated	10.73bc	47.28cde	12.36a
SS3860 Fipronil ST	50 g ai	0.25d	50.75bcde	0.39b
SS3860 Fipronil ST	100 g ai	0.00d	57.63abc	0.00b
SS 3860	Untreated	12.76ab	41.61de	13.13a
SS 3860	Untreated	13.86a	39.12e	14.06a

Means followed by the same letter are not significantly different (Tukeys; P=0.05).



Middletown – First Harvest

Treatment	Rate	% Infested Stems Sept 22	# Larvae per Stem 15 stems Sept 22	% Lodged Stems Oct 3	Yield BU/A Oct 6	Lodging Yield Loss Bu/A
SS3851 Fipronil ST	50 g ai	8.89c	1.33c	1.33d	14.36a	0.03c
SS3851 Fipronil ST	100 g ai	20.00bc	2.83bc	6.33cd	13.09a	0.17c
SS3851	Untreated	48.89ab	7.00ab	15.33bc	13.59a	0.57abc
SS3851	Untreated	67.78a	9.83a	13.33bcd	12.83a	0.38abc
SS3860 Fipronil ST	50 g ai	11.11c	1.50c	4.00cd	16.90a	0.30c
SS3860 Fipronil ST	100 g ai	6.67c	1.00c	4.33cd	14.23a	0.23c
SS 3860	Untreated	68.89a	10.00a	26.00ab	12.96a	0.91ab
SS 3860	Untreated	72.22a	10.50a	35.00a	11.44a	1.04a

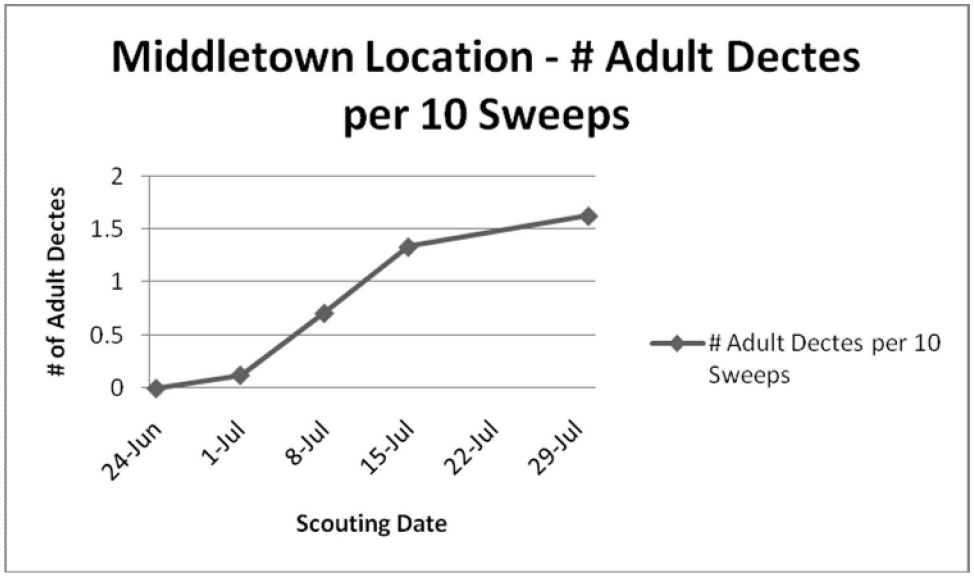
Means followed by the same letter are not significantly different (Tukeys; P=0.05).

2008- University of Delaware, Integrated Pest Management Program, J. Whalen -Extension Specialist IPM and B. Cissel- Extension Associate IPM

Middletown – Second Harvest

Treatment	Rate	Yield BU/A Nov 11	Lodging Yield Loss BU/A
SS3851 Fipronil ST	50 g ai	13.06a	0.72b
SS3851 Fipronil ST	100 g ai	12.96a	1.64b
SS3851	Untreated	10.03a	4.18ab
SS3851	Untreated	9.09a	4.05ab
SS3860 Fipronil ST	50 g ai	18.09a	2.29b
SS3860 Fipronil ST	100 g ai	15.73a	1.10b
SS 3860	Untreated	10.44a	7.59a
SS 3860	Untreated	8.99a	4.70ab

Means followed by the same letter are not significantly different (Tukeys; P=0.05**).**



Conclusion:

(A) Seed Treatment Trials to Evaluate Yield Enhancement : Overall, no significant differences were detected between the untreated control and the seed applied treatments for stand count and yield. Once again, the Cruiser treatments did provide significantly better bean leaf beetle control compared to the untreated check. Since bean pod mottle virus is now know to occur in Delaware, early season bean leaf beetle management using seed treatments could be part of a management program for bean leaf beetle. However, the seed treatments do not provide season long bean leaf beetle control so additional treatments will be needed later in the season.

(B) Evaluation of a Seed Treatment for Dectes Stem Borer Management : Overall, the fipronil seed treatment provided significantly better Dectes stem borer control in both varieties and locations. In general, yield losses from lodging were significantly higher in the untreated plots compared to both rates of the seed treatment. ***However, at this time fipronil is not labeled as a seed treatment for soybeans.***