Insect Management Reports

2010 Season

University of Delaware
Cooperative Extension -- IPM Program

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Control of Lepidopterous Larvae in Fall Cabbage - 2010: Labeled insecticides were evaluated for control of the cabbage insect complex. The cabbage variety "Artos" was transplanted on July 26 at Papen Farms, Inc., Dover, DE. The same variety was transplanted on July 28 at the University of Delaware's Research and Education Center located near Georgetown, 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 and treatment dates are listed in the tables. At planting materials were applied immediately after transplanting on July 28 at the Research Station and on July 30 at the Dover location simulating a drench application over each plant using a CO_2 backpack sprayer with a one-nozzle boom delivering 120 ml solution per plant at 32 psi. The first foliar application at both locations was applied with a single nozzle boom delivering 43 gpa at 42 psi. Subsequent 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 51 gpa at 35 psi. The number of Lepidopterous larvae on each of 5 randomly selected plants per plot was recorded on a weekly basis from the first week in August through mid September. The number of marketable heads was determined by examining feeding damage on the head and two wrapper leaves on September 16 at the Dover location and on September 20 at the Georgetown location. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Overall, insect pressure was moderate at both locations. The predominant insect species present at the Dover location was the diamond back moth larvae. At the Georgetown location, the populations was comprised of a mixture of worm species: (a) 90% of the population – cabbage looper, (b) 5% of the population – beet armyworm, and (c) remaining 5% - soybean looper, cabbage webworm , and imported cabbageworm. At the Dover location, all treatments provided: (1) significantly better DBM control 4 days after the first foliar treatment compared to the untreated control, and (2) a significantly higher percentage of marketable heads compared to the untreated control except the Avaunt and Xentari treatments. At the Georgetown locations, all treatments provided a significantly higher percentage of marketable heads compared to the untreated control. At this location, the foliar treatments of Vetica switch to Xentari, Synapse switch to Xentari and Coragen provided the best cabbage looper control. No phytotoxicity was observed.

Table 1 – Diamondback Moth (DBM) and Cabbage Looper (CL) Counts and Marketable Heads – Dover Location

Treatment [1]	Rate/A	Treatment Dates/ Method	% Marketable Heads [1] September 16	Mean Number DBM Larvae per 5 plants [1]			Mean Number CL per 5 plants [1]
				August 9- Pre-trt – foliars	August 14 4 DAT #1 – foliars 15 DAT - Drench	Aug 24 5 DAT #2 - foliar	September 7
Coragen 1.67 SC	5.13 oz	Drench – July 30	86.24ab	1.25b	4.00b	4.00a	0.50bc
Coragen 1.67 SC	7 oz	Drench – July 30	88.56ab	1.50b	1.25bc	1.25a	0.00c
Vetica + LI-700	13 oz + 0.25 % v/v	Foliar: Aug 10,19	95.90a	3.50ab	0.50c	0.50a	0.00c
Avaunt 30 WDG+ LI-700	3.5 oz + 0.25 %v/v	Foliar: Aug 10,19	81.95abc	4.25ab	0.75c	0.50a	1.50a
Xentari + LI-700	1 lb + 0.25 % v/v	Foliar: Aug10,19,25	78.10bc	4.25ab	0.00c	2.00a	0.00c
Synapse 24WG + LI-700	2 oz + 0.25% v/v	Foliar: Aug 10,19	89.32ab	4.00ab	1.00bc	0.00a	0.00c
Coragen 1.67 SC	5.0 oz/a	Foliar: Aug 10, 19	94.59ab	4.50ab	0.75c	0.00a	0.00c
Untreated Control	----		66.96c	5.50a	7.50a	4.25a	1.25ab

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

Table 2 – Cabbage Looper (CL) Counts and Marketable Heads – Georgetown Location

Treatment [1]	Rate/acre	Treatment Dates/ Method	% Marketable Heads Sept 20	Mean Number CL per 5 plants [1]				
				August 23	August 30	Sept 10	Sept 13	Sept 17
Coragen 1.67 SC	5.13 oz	Drench – July 28	82.00ab	1.25b	2.50ab	1.00b	1.75b	0.50b
Coragen 1.67 SC	7 oz	Drench – July 28	84.44ab	3.00ab	1.75ab	0.50b	1.75b	0.50b
Vetica + LI-700 Xentari + LI-700	13 oz + 0.25 v/v 1 lb+ 0.25% v/v	Foliar: Aug 4, 19 Foliar: Sept 7,14	75.38ab	0.00b	0.25b	1.75b	0.25b	0.75b
Avaunt 30WDG + LI-700	3.5 oz + 0.25 %v/v	Foliar: Aug 4, 19	81.20ab	0.00b	1.75ab	0.00b	0.00b	0.50b
Xentari + Li-700	1 lb + 0.25 % v/v	Foliar: Aug 4, 19, 25 Sept 7,14	70.05b	3.25ab	2.25ab	2.75ab	1.50b	1.50b
Synapse 24WG + LI-700 Xentari + Li-700	2 oz + 0.25% v/v 1 lb+ 0.25% v/v	Foliar: Aug 4, 19 Foliar: Sept 7,14	83.08ab	0.25b	0.50b	0.50b	0.75b	1.25b
Coragen 1.67 SC	5.0 oz/a	Foliar: Aug 4, 19	97.80a	0.00b	1.25b	0.00b	0.00b	0.00b
Untreated Control	----	----	0.00c	6.75a	9.25a	5.75a	12.00a	8.75a

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

Table 3 – Worm Complex [1] – Georgetown Location

Treatment [2]	Rate/acre	Treatment Dates/ Method	Mean Number Worms per 5 plants[2]				
			August 23	August 30	Sept 10	Sept 13	Sept 17
Coragen 1.67 SC	5.13 oz	Drench – July 28	2.75b	3.75ab	1.75b	2.50b	2.00ab
Coragen 1.67 SC	7 oz	Drench – July 28	4.00ab	2.00b	0.75b	2.75b	1.00ab
Vetica + LI-700 Xentari + LI-700	13 oz + 0.25 v/v 1 lb+ 0.25% v/v	Foliar: Aug 4, 19 Foliar: Sept 7,14	0.00b	0.75b	2.75ab	1.25b	2.50ab
Avaunt 30WDG + LI-700	3.5 oz + 0.25 %v/v	Foliar: Aug 4, 19	0.00b	2.50ab	0.25b	0.00b	0.50b
Xentari + Li-700	1 lb + 0.25 % v/v	Foliar: Aug 4, 19, 25 Sept 7,14	5.75ab	2.50ab	5.50ab	3.25b	2.75ab
Synapse 24WG + LI-700 Xentari + Li-700	2 oz + 0.25% v/v 1 lb+ 0.25% v/v	Foliar: Aug 4, 19 Foliar: Sept 7,14	0.50b	0.50b	1.25b	3.25b	2.00ab
Coragen 1.67 SC	5.0 oz/a	Foliar: Aug 4, 19	0.50b	1.25b	0.00b	0.00b	0.00b
Untreated Control	----	----	10.00a	11.00a	8.25a	16.50a	14.50a

[1] Worm Complex:: 90% CL, 5% Beet Armyworm, 5% -- soybean looper, cabbage webworm and imported cabbageworm

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

Control of Lepidopterous Larvae in Fall Cabbage - 2010: Labeled insecticides were evaluated for control of the cabbage insect complex. The cabbage variety "Artos" was transplanted on July 26 at Papen Farms, Inc., Dover, DE. The same variety was transplanted on July 28 at the University of Delaware's Research and Education Center located near Georgetown, 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 and treatment dates are listed in the tables. At planting materials were applied immediately after transplanting on July 28 at the Research Station and on July 30 at the Dover location simulating a drench application over each plant using a CO_2 backpack sprayer with a one-nozzle boom delivering 120 ml solution per plant at 32 psi. The first foliar application at both locations was applied with a single nozzle boom delivering 43 gpa at 42 psi. Subsequent 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 51 gpa at 35 psi. The number of Lepidopterous larvae on each of 5 randomly selected plants per plot was recorded on a weekly basis from the first week in August through mid September. The number of marketable heads was determined by examining feeding damage on the head and two wrapper leaves on September 16 at the Dover location and on September 20 at the Georgetown location. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Overall, insect pressure was moderate at both locations. The predominant insect species present at the Dover location was the diamond back moth larvae. At the Georgetown location, the populations was comprised of a mixture of worm species: (a) 90% of the population – cabbage looper, (b) 5% of the population – beet armyworm, and (c) remaining 5% - soybean looper, cabbage webworm , and imported cabbageworm. At the Dover location, all treatments provided: (1) significantly better DBM control 4 days after the first foliar treatment compared to the untreated control, and (2) a significantly higher percentage of marketable heads compared to the untreated control except the Avaunt and Xentari treatments. At the Georgetown locations, all treatments provided a significantly higher percentage of marketable heads compared to the untreated control. At this location, the foliar treatments of Vetica switch to Xentari, Synapse switch to Xentari and Coragen provided the best cabbage looper control. No phytotoxicity was observed.

Table 1 – Diamondback Moth (DBM) and Cabbage Looper (CL) Counts and Marketable Heads – Dover Location

Treatment [1]	Rate/A	Treatment Dates/ Method	% Marketable Heads [1] September 16	Mean Number DBM Larvae per 5 plants [1]			Mean Number CL per 5 plants [1]
				August 9- Pre-trt – foliars	August 14 4 DAT #1 – foliars 15 DAT - Drench	Aug 24 5 DAT #2 - foliar	September 7
Coragen 1.67 SC	5.13 oz	Drench – July 30	86.24ab	1.25b	4.00b	4.00a	0.50bc
Coragen 1.67 SC	7 oz	Drench – July 30	88.56ab	1.50b	1.25bc	1.25a	0.00c
Vetica + LI-700	13 oz + 0.25 % v/v	Foliar: Aug 10,19	95.90a	3.50ab	0.50c	0.50a	0.00c
Avaunt 30 WDG+ LI-700	3.5 oz + 0.25 %v/v	Foliar: Aug 10,19	81.95abc	4.25ab	0.75c	0.50a	1.50a
Xentari + LI-700	1 lb + 0.25 % v/v	Foliar: Aug10,19,25	78.10bc	4.25ab	0.00c	2.00a	0.00c
Synapse 24WG + LI-700	2 oz + 0.25% v/v	Foliar: Aug 10,19	89.32ab	4.00ab	1.00bc	0.00a	0.00c
Coragen 1.67 SC	5.0 oz/a	Foliar: Aug 10, 19	94.59ab	4.50ab	0.75c	0.00a	0.00c
Untreated Control	----		66.96c	5.50a	7.50a	4.25a	1.25ab

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

Table 2 – Cabbage Looper (CL) Counts and Marketable Heads – Georgetown Location

Treatment [1]	Rate/acre	Treatment Dates/ Method	% Marketable Heads Sept 20	Mean Number CL per 5 plants [1]				
				August 23	August 30	Sept 10	Sept 13	Sept 17
Coragen 1.67 SC	5.13 oz	Drench – July 28	82.00ab	1.25b	2.50ab	1.00b	1.75b	0.50b
Coragen 1.67 SC	7 oz	Drench – July 28	84.44ab	3.00ab	1.75ab	0.50b	1.75b	0.50b
Vetica + LI-700 Xentari + LI-700	13 oz + 0.25 v/v 1 lb+ 0.25% v/v	Foliar: Aug 4, 19 Foliar: Sept 7,14	75.38ab	0.00b	0.25b	1.75b	0.25b	0.75b
Avaunt 30WDG + LI-700	3.5 oz + 0.25 %v/v	Foliar: Aug 4, 19	81.20ab	0.00b	1.75ab	0.00b	0.00b	0.50b
Xentari + Li-700	1 lb + 0.25 % v/v	Foliar: Aug 4, 19, 25 Sept 7,14	70.05b	3.25ab	2.25ab	2.75ab	1.50b	1.50b
Synapse 24WG + LI-700 Xentari + Li-700	2 oz + 0.25% v/v 1 lb+ 0.25% v/v	Foliar: Aug 4, 19 Foliar: Sept 7,14	83.08ab	0.25b	0.50b	0.50b	0.75b	1.25b
Coragen 1.67 SC	5.0 oz/a	Foliar: Aug 4, 19	97.80a	0.00b	1.25b	0.00b	0.00b	0.00b
Untreated Control	----	----	0.00c	6.75a	9.25a	5.75a	12.00a	8.75a

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

Table 3 – Worm Complex [1] – Georgetown Location

Treatment [2]	Rate/acre	Treatment Dates/ Method	Mean Number Worms per 5 plants[2]				
			August 23	August 30	Sept 10	Sept 13	Sept 17
Coragen 1.67 SC	5.13 oz	Drench – July 28	2.75b	3.75ab	1.75b	2.50b	2.00ab
Coragen 1.67 SC	7 oz	Drench – July 28	4.00ab	2.00b	0.75b	2.75b	1.00ab
Vetica + LI-700 Xentari + LI-700	13 oz + 0.25 v/v 1 lb+ 0.25% v/v	Foliar: Aug 4, 19 Foliar: Sept 7,14	0.00b	0.75b	2.75ab	1.25b	2.50ab
Avaunt 30WDG + LI-700	3.5 oz + 0.25 %v/v	Foliar: Aug 4, 19	0.00b	2.50ab	0.25b	0.00b	0.50b
Xentari + Li-700	1 lb + 0.25 % v/v	Foliar: Aug 4, 19, 25 Sept 7,14	5.75ab	2.50ab	5.50ab	3.25b	2.75ab
Synapse 24WG + LI-700 Xentari + Li-700	2 oz + 0.25% v/v 1 lb+ 0.25% v/v	Foliar: Aug 4, 19 Foliar: Sept 7,14	0.50b	0.50b	1.25b	3.25b	2.00ab
Coragen 1.67 SC	5.0 oz/a	Foliar: Aug 4, 19	0.50b	1.25b	0.00b	0.00b	0.00b
Untreated Control	----	----	10.00a	11.00a	8.25a	16.50a	14.50a

[1] Worm Complex:: 90% CL, 5% Beet Armyworm, 5% -- soybean looper, cabbage webworm and imported cabbageworm

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

Control of Lepidopteran Larvae in Fall Spinach, 2010: Promising new chemistry and labeled insecticides were evaluated for control of webworms and beet armyworms. The spinach variety, 'Vancouver ', was planted on September 1 at the University of Delaware Research and Education Center located near Georgetown, DE. Plots were six rows wide and 20-ft-long planted on 12-inch 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 soon after plant emergence on September 3 by drenching materials over the row before plant emergence using a CO_2 backpack sprayer with a one-nozzle boom delivering 64 gpa at 42 psi. Foliar materials were applied on September 22 using a 4 nozzle boom delivering 30 gpa at 32 psi. The number of larvae on each of 10 randomly selected plants per plot was recorded on a weekly basis. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Webworm and beet armyworm population pressure was moderate. No phytotoxicity was observed.

Treatment [1]	Rate/A	Treatment Dates/Method	Mean Number Beet Armyworm per 10 plants [1]		Mean Number Garden Webworms per 10 plants [1]	
			Sept 20	Sept 29	Sept 20	Sept 29
Coragen 1.67 SC	5.0 oz/a	Sept 3-IF	0.00a	0.50a	0.00b	0.00a
Coragen 1.67 SC	5.0 oz/a	Sept 22-Foliar	1.50a	0.25a	0.50ab	0.00a
Synapse 24WG+ LI-700	3 oz/A + 0.25 v/v	Sept 22-Foliar	2.00a	0.00a	2.00a	0.25a
Radiant 1 SC	10 oz/A	Sept 22-Foliar	2.25a	0.00a	1.75ab	0.00a
Intrepid 2 F	10 oz/A	Sept 22-Foliar	1.00a	0.50a	1.50ab	0.00a
Untreated	---	---	1.75a	0.75a	1.75ab	0.75a

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

Treatment [1]	Rate/A	Treatment Dates/Method	Mean Number Worms per 10 plants [1]	
			Sept 20	Sept 29
Coragen 1.67 SC	5.0 oz/a	Sept 3-IF	0.00b	0.50a
Coragen 1.67 SC	5.0 oz/a	Sept 22-Foliar	2.00ab	0.25a
Synapse 24WG+ LI-700	3 oz/A + 0.25 v/v	Sept 22-Foliar	4.00a	0.25a
Radiant 1 SC	10 oz/A	Sept 22-Foliar	4.00a	0.00a
Intrepid 2 F	10 oz/A	Sept 22-Foliar	2.50ab	0.50a
Untreated	---	---	3.50ab	1.50a

[1] Means within a column followed by the same letter are not significantly different (Tukey's, P=0.05).
Mixture of worm species – beet armyworm (50%) and garden webworms (50%)

Late Planted Field Corn Variety Trial, 2010
University of Delaware

Objective: Five field corn hybrids were planted on June 29 at the Georgetown Research and Education Center to simulate a double crop planting system. In a typical year, a percentage of Delaware's field corn acreage is planted double crop, either behind barley or peas. For a number of years, producers have expressed concern over the presence of fall armyworm feeding in whorl stage corn and ear damage from corn earworm in these later plantings. Foliar insecticides have not provided effective control of these two insects in late planted field corn. Research results from trials with newer BT technologies (i.e. Herculex and SmartStax's) indicate that these technologies provide control of these two insect problems. This trial was established to determine the effectiveness under Delaware conditions as well as look at the yield response.

Procedures: Research plots 20 ft wide (8 rows on 30-inch centers) by 40 ft long were replicated four times in a randomized complete block design. Stand counts were taken from the center two rows of each plot (80 linear foot of row) on July 27. Fall armyworm damage was evaluated on July 27 by counting the number of damaged plants in the same two rows and calculating the percent damage. Corn earworm damage was evaluated on September 1 before physiological maturity. All the ears were collected from a single row (40 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 damage ears (damaged ears but may or may not have had 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 November 19 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:

TRT #	Variety	Stand Count July 27	% FAW Damaged Plants July 27	% Clean Ears Sept 1	% Ears CEW Tip Damage Sept 1	% Ears CEW Damage > 1 cm Sept 1	Yield BU/A
1	2K662 HXT/RR	117.25a	7.64b	19.20b	10.03a	70.78a	123.14a
2	ST 6208 RR	114.75ab	24.15ab	8.63b	17.08a	74.29a	93.05b
3	2D692 SmartStax	117.25a	1.71b	93.39a	3.99a	2.62b	127.56a
4	DKC 55-08 RR2	110.75b	42.47a	12.15b	14.13a	73.73a	88.66b
5	DKC 55-09 GENSS	118.50a	6.57b	98.08a	1.93a	0.00b	116.93a

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

Comments: Overall, the 2K662 HXT/RR, 2D692 SmartStax, and DKC 55-09 GENSS (newer Bt hybrids) all provided significantly better control of fall armyworm compared to the non –Bt hybrids (ST 6208 RR and DKC 55-08 RR2). In general, the 2D692 SmartStax and DKC 55-09 GENSS hybrids provided the best corn earworm control. All three Bt varieties provided significantly higher yields compared to the non-Bt hybrids.

Final Report – 2010

Title: Evaluation of Insecticide Applications to Control Dectes Stem Borer in Soybeans

Personnel: Joanne Whalen, Extension IPM Specialist
Bill Cissel, Extension IPM Associate
Bob Uniatowski, Research Associate, Dept. of Plant & Soil Sciences
John Pesek, Associate Professor, Dept. of Food & Resource Economics

Objectives:

1. Evaluate the use of foliar insecticide applications to control the Dectes Stem Borer
2. Determine the ideal timing for making a foliar application based on adult Dectes beetle emergence
3. Evaluate the effectiveness of making multiple foliar insecticide applications to control the Dectes Stem Borer

Procedures:

Group 4.4 soybean variety was planted on May 26 at the University of Delaware's Demonstration Farm located near Middletown, DE and on May 10 at the Carvel Research and Education Center located near Georgetown, DE. Plots drilled on 15 inch centers were 25 foot wide x 75 ft long at the Georgetown location and 25 ft wide x 36 ft long at the Middletown location, arranged in a randomized complete block design with four replications**.** The following treatments were applied: (1) One application of Hero @ 10.3 oz/A one week after the first adult was detected (July 1); (2) One application of Hero @ 10.3 oz/A one week after the first adult was detected (July 1) and an application of Tombstone Helios at 2.8 oz/A one week after the first application (July 8); and (3) untreated control.

Dectes adult beetle population levels were evaluated on a weekly basis from late June through early August by taking 20 sweeps per plot and counting the number of adult beetles. Before physiological maturity (August 17 at the Georgetown location and October 8 at the Middletown location), 20 stems were collected from each plot at both locations to determine the percentage of stems infested with Dectes larvae. At physiological maturity, soybeans were harvested on Oct 31 at the Middletown location and on Nov 10 at the Georgetown location. Either immediately before (Georgetown) or immediately after harvest (Middletown), all of the lodged stems were collected from each plot to calculate yield loss from Dectes stem borer. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Project funded by the Delaware Soybean Board

Results:

Table 1. Middletown Location

Treatment	Application Date	Rate/A	Number Dectes Adults per 20 sweeps				% Infested Stems Oct 8	# Larvae per 20 stems Oct 8	Yield (BU/A) Oct 31	Lodging Loss (BU/A) Oct 31	% Yield Loss
			Jun29	July 7	July 15	July 22					
Hero EC	July 1	10.3 oz/A	0.25a	0.00a	1.50a	0.50a	18.75a	3.50a	30.34a	0.14a	0.48a
Hero EC Tombstone Helios	July 1 July 8	10.3 oz/A 2.8 oz/A	0.00a	0.00a	0.75a	1.75a	27.50a	5.50a	27.20a	0.15a	0.61a
Untreated	---	---	0.00a	0.25a	0.50a	1.00a	16.25a	3.25a	31.58a	0.15a	0.44a

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

Table 2. Georgetown Location

Treatment	Application Date	Rate/A	Number Dectes Adults per 20 sweeps				% Infested Stems Aug 17	# Larvae per 20 stems Aug 17	Yield (BU/A) Nov 10	Lodging Loss (BU/A) Nov 10	% Yield Loss
			Jun22	June 28	July 6	July 12					
Hero EC	July 1	10.3 oz/A	0.00a	0.25a	1.00a	0.75a	51.25a	6.25a	24.20a	6.51a	21.26a
Hero EC Tombstone Helios	July 1 July 8	10.3 oz/A 2.8 oz/A	0.00a	0.00a	1.25a	0.25a	45.00a	7.75a	24.67a	6.45a	20.76a
Untreated	---	---	0.00a	0.00a	1.50a	0.75a	53.75a	5.50a	25.83a	7.37a	22.24a

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

Project funded by the Delaware Soybean Board

Conclusions: Although treatments were applied according to protocols developed by Kansas State Entomologist's and reported in industry literature, no significant differences were observed between treatments. However, significant yield losses were observed at the Georgetown location and can be used to develop treatment thresholds for early harvest. If a new insecticide is identified in the future, it could also be used to support the submission of a Section 18 or full section 3 registration.

Final Report – 2010

Title: Evaluate Soybean Varieties for Management of Dectes Stem Borer in Soybeans

Personnel: Joanne Whalen, Extension IPM Specialist
Bill Cissel, Extension IPM Associate
Bob Uniatowski, Research Associate, Dept. of Plant & Soil Sciences
John Pesek, Associate Professor, Dept. of Food & Resource Economics

Objectives: To further evaluate varieties that were identified in the 2009 University of Delaware's Variety trial that appeared to exhibit reduced amounts of lodging from Dectes stem borer.

Procedures:

Replicated research plots were planted on May 26 at the University of Delaware's Demonstration Farm located near Middletown, DE, and on May 10 at the Carvel Research and Education Center located near Georgetown, DE. Plots drilled on 15 inch centers were 20 foot wide x 18 foot long at the Georgetown location and 12.5 x 18 ft long at the Middletown location. Plots were arranged in a randomized complete block design with 6 replications. Four varieties in similar maturity groups (4.7- 4.8) were selected and evaluated for Dectes infestations and lodging losses.

Dectes adult beetle population levels were evaluated on a weekly basis from mid June through early August by taking 20 sweeps per plot at each location. Before physiological maturity (Aug 17), 10 stems were collected from each plot at both locations to determine the percentage of stems infested with Dectes larvae. At physiological maturity, soybeans were harvested on Oct 31 at the Middletown location and on Nov 10 at the Georgetown location. Either immediately before harvest (Georgetown) or immediately after harvest (Middletown), all of the lodged stems were collected from each plot to calculate yield loss from Dectes stem borer. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Project funded by the Delaware Soybean Board

Results:

Table 1. Middletown Location

Variety # (Maturity Group)	Number Dectes Adults per 20 sweeps				% Infested Stems Aug 17	# Larvae per 10 stems Aug 17	Yield (BU/A) Oct 31	Lodging Loss (BU/A) Oct 31	Percent Lodging Loss Oct 31
	June 29	July 8	July 15	July 22					
Variety #1 (4.8)	1.50a	0.17a	4.00a	1.67a	50.00a	5.83a	20.03b	0.46a	2.37a
Variety #2 (4.8)	0.67a	0.67a	5.00a	1.00a	35.00a	4.67a	24.44ab	0.55a	2.24a
Variety #3 (4.7)	1.67a	0.50a	4.33a	2.67a	40.00a	3.83a	26.33a	0.20a	0.76a
Variety #4 (4.8)	1.50a	0.33a	4.50a	2.33a	38.33a	4.00a	24.91a	0.16a	0.67a

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

Table 2. Georgetown Location

Variety # (Maturity Group)	Number Dectes Adults per 20 sweeps				% Infested Stems Aug 17	# Larvae per 10 stems Aug 17	Yield (BU/A) Nov 10	Lodging Loss (BU/A) Nov 10	Percent Lodging Loss Nov 10
	June 22	June 28	July 6	July 12					
Variety #1 (4.8)	0.00a	0.33a	1.67a	1.50a	85.00a	10.17a	30.60a	3.16b	9.05b
Variety #2 (4.8)	0.17a	0.67a	1.50a	0.67a	53.33b	6.17b	30.88a	7.68a	18.66a
Variety #3 (4.7)	0.17a	0.50a	0.83a	1.67a	65.00ab	6.33b	27.59a	0.79b	2.77c
Variety #4 (4.8)	0,33a	0.50a	1.33a	1.50a	70.00ab	7.17ab	30.78a	0.78b	2.25c

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

Conclusions: At the Middletown location, no significant difference was observed between the four varieties in all categories evaluated. At the Georgetown location, Variety #2 had significantly higher lodging losses and percent lodging loss compared to the other 3 varieties. The percent lodging loss for Variety #1 and Variety #2 was also significantly greater compared to Variety #3 and Variety #4. However, there was no significant difference between the varieties regarding final yield. It appears that the only true way to manage Dectes will be through host plant resistance. Although one variety has been identified in the national seed bank that exhibits true resistance to the Dectes stem borer, soybean breeders will need to incorporate this trait into commercially acceptable varieties.

Project funded by the Delaware Soybean Board

Foliar Insect Management In Snap Beans, 2010*:* 'Strike' snap beans were planted on June 7 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 July 14 (bud stage), July 21 (pin stage) and July 28 (one week from harvest) with a CO_2 pressurized wheel-barrow sprayer delivering 26 gpa @ 40 psi. Snap beans were harvested on August 2 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).

Corn earworm pressure was extremely light. No phytotoxicity was observed.

Treatment	Rate/Acre	Mean % Corn Earworm Damaged Beans [1]
Avaunt 30WG	3.5 oz	0.38abc
Avaunt 30WG	6 oz	0.35bc
Radiant 1 SC	6 oz	1.58ab
Intrepid 2F	10 oz	1.56ab
Synapse 24WG + LI-700	3 oz + 0.25% v/v	1.63a
Coragen 1.67 SC	5.0 oz/A	1.12abc
Warrior II	1.92 oz/A	0.12c
Untreated	--	0.32bc

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

Evaluation of Soybean Seed Treatments, 2010: 'NKS43-N6' soybeans were planted on May 10 at the University of Delaware's Research and Extension Center located near Georgetown, DE. Plots 30 ft wide x 46 ft long were planted on 15 inch centers. Each treatment was replicated four times and arranged in a RCB design. Manure was broadcast across the entire plot and a two-inch band of bone and meat meal was placed over 6 rows at planting at a rate of 320 grams per 20 foot of row to increase adult seed corn maggot fly egg laying. Stand counts were taken for four weeks starting at plant emergence. Insect counts were taken on a weekly basis from plant emergence through early pod set. Insect data collected included seed corn maggot; bean leaf beetle damaged plants per 3 ft of row; number of potato leafhoppers, grasshoppers and bean leaf beetles per sweep; and number of thrips per leaf. Yield data was taken in all plots at physiological maturity on November 10.

Overall, insect pressure was low and no significant yield difference was observed between the untreated control and the seed treatments.

Table 1. Stand Counts and Yield

Treatment	Rate/100 lb seed	Yield BU/A Nov 10	Stand Count per 3 ft/row [1]			
			May 19	May 27	June 4	June 15
Untreated	----	58.20a	5.58ab	10.50a	13.67a	11.25a
Maxim 4FS + Apron XL Cruiser 5FS	0.80 fl oz + 0.64 fl oz+ 1.28 oz	58.13a	5.00ab	14.25a	15.42a	13.03a
Trilex 2SC+ Allegience-FL + Yield Shield + Gaucho 600FS	0.32 fl oz + 0.75 fl oz + 1.0 fl oz + 1.60 fl oz	59.67a	8.58a	13.50a	14.92a	9.75a
Rancona XXTRA + V-10209 + Nipsit	3.5 fl oz+ 0.55 fl + 1.28 fl oz	61.87a	3.00b	14.50a	13.25a	11.75a

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

Table 2. Seed Corn Maggot (SCM) Counts

Treatment	Rate/100 lb seed	SCM Damaged Seeds per 3 ft May 19[1]	% SCM Infested Seeds[1]	
			May 19	May 27
Untreated	----	0.00a	0.75a	0.20a
Maxim 4FS + Apron XL + Cruiser 5FS	0.80 fl oz + 0.64 fl oz+ 1.28 oz	0.50a	0.00a	0.04a
Trilex 2SC+ Allegience-FL + Yield Shield + Gaucho 600FS	0.32 fl oz + 0.75 fl oz + 1.0 fl oz + 1.60 fl oz	0.08a	0.00a	0.05a
Rancona XXTRA + V-10209 + Nipsit	3.5 fl oz+ 0.55 fl + 1.28 fl oz	0.17a	0.00a	0.04a

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

Table 3. Bean Leaf Beetle Counts

Treatment	Rate/100 lb seed	Bean Leaf Beetle Damaged Plants per 3 ft of row[1]			
		June 4	June 8	June 15	June 22
Untreated	----	8.67a	9.67a	4.83ab	0.50a
Maxim 4FS + Apron XL+ Cruiser 5FS	0.80 fl oz + 0.64 fl oz+ 1.28 oz	4.75a	3.92b	3.83b	1.50a
Trilex 2SC+ Allegience-FL + Yield Shield + Gaucho 600FS	0.32 fl oz + 0.75 fl oz + 1.0 fl oz + 1.60 fl oz	4.09a	7.34ab	4.50ab	1.50a
Rancona XXTRA + V-10209 + Nipsit	3.5 fl oz+ 0.55 fl + 1.28 fl oz	4.08a	5.58ab	6.00a	2.50a

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

Table 4. Thrips Counts

Treatment	Rate/100 lb seed	Number of Thrips per 20 leaflets [1]				
		June 8	June 15	June 22	June 28	July 6
Untreated	----	18.50a	14.50a	7.75a	6.00a	3.75a
Maxim 4FS + Apron XL+ Cruiser 5FS	0.80 fl oz + 0.64 fl oz+ 1.28 oz	1.75b	6.25a	8.00a	5.00ab	3.75a
Trilex 2SC+ Allegience-FL + Yield Shield + Gaucho 600FS	0.32 fl oz + 0.75 fl oz + 1.0 fl oz + 1.60 fl oz	2.75b	10.00a	10.75a	2.25b	4.50a
Rancona XXTRA + V-10209 + Nipsit	3.5 fl oz+ 0.55 fl + 1.28 fl oz	4.50ab	11.75a	5.75a	2.75ab	6.75a

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

Table 5. Grasshopper Counts

Treatment	Rate/100 lb seed	Number of Grasshoppers per 20 Sweeps[1]			
		June 15	June 22	June 28	July 6
Untreated	----	0.75a	0.25a	1.75a	0.50a
Maxim 4FS + Apron XL+ Cruiser 5FS	0.80 fl oz + 0.64 fl oz+ 1.28 oz	0.75a	0.25a	0.75a	0.50a
Trilex 2SC+ Allegience-FL + Yield Shield + Gaucho 600FS	0.32 fl oz + 0.75 fl oz + 1.0 fl oz + 1.60 fl oz	0.75a	1.25a	1.75a	1.00a
Rancona XXTRA + V-10209 + Nipsit	3.5 fl oz+ 0.55 fl + 1.28 fl oz	0.50a	0.50a	1.00a	1.50a

[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, 2010*:** 'Xtra Tender 372A' sweet corn was planted on July 1 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. The purpose of the trial was to compare materials applied on a standard (3-4 day) schedule to newly labeled materials (Coragen and Voliam xpress) applied on a reduced spray schedule as indicated in the table below. All applications were made using a CO2 pressurized back pack sprayer and a two nozzle boom equipped with D2 hollow cone nozzles delivering 42 gpa at 42 psi. At harvest (Aug 23), 30 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 pressure was high. All treatments sprayed on a standard spray schedule (3-4 day), resulted in a higher percentage of clean ears compared to the untreated check, except the Proclaim treatment. All treatments resulted in a higher percentage of processing ears compared to the untreated check except the Proclaim treatment. Voliam xpress alternated with Warrior II, Belt + Baythroid alternated with Lannate + Baythroid, and the Lannate plus Warrior treatments on a 3-4 day schedule provided the best corn earworm control. Overall, the use of the reduced spray was not effective under the 2010 season conditions.

Trt #	Treatment	Application Date	Rate/A
1	A,C,E - Voliam Xpress B,D, – Warrior II	A - 8/6, B –8/10, C –8/13 D – 8/17, E – 8/20	Voliam Xpress - 8 oz Warrior II - 1.92 oz
2	A,C,E - Voliam Xpress D – Warrior II+Lannate LV	A - 8/6, C –8/13 D – 8/17, E – 8/20	Voliam Xpress - 9 oz Warrior II - 1.92 oz + Lannate LV – 24 oz
3	A,C,E - Voliam Xpress	A - 8/6, C –8/13, E – 8/20	Voliam Xpress - 9 oz
4	A, -Lannate LV + Asana XL B,D -Coragen 1.67 SC	A - 8/6, B –8/10, D – 8/17,	Lannate LV - 24 oz + Asana XL - 9.6 oz Coragen 1.67SC – 3.5 oz
5	A,B,C,D,E – Proclaim 5SG	A - 8/6, B –8/10, C –8/13 D – 8/17, E – 8/20	4.5 oz
6	A,B,C,D,E – Radiant 2SC	A - 8/6, B –8/10, C –8/13 D – 8/17, E – 8/20	6 oz
7	A,C,E-Belt 480 SC + LI-700 B,D,-Baythroid XL	A - 8/6, B –8/10, C –8/13 D – 8/17, E – 8/20	Belt - 3 oz + LI-700 - 0.25% v/v Baythroid XL - 2.8 oz
8	A,B,D,E -Belt 480 SC + LI-700 + Baythroid XL C - -Lannate LV +Baythroid XL	A - 8/6, B –8/10, C –8/13 D – 8/17, E – 8/20	Belt -3 oz + LI-700 - 0.25% v/v + Baythroid XL 2.8 oz LannateLV -24 oz + Baythroid XL -2.8 oz
9	A,B,C,D,E - Lannate LV + Warrior II	A - 8/6, B –8/10, C –8/13 D – 8/17, E – 8/20	Lannate LV -24 oz + Warrior II 1.92 oz
10	Untreated	-------	-------

	% Clean Ears (Fresh Market)	% Clean + Tip Damaged Ears	Percent Damaged Ears		
			CEW	FAW	Sap Beetles

Trt #		(Processing)			
1	61.67a	81.67ab	38.34c	0.00b	0.83a
2	18.33bc	40.84d	79.17b	0.00b	2.50a
3	15.00bc	43.33d	82.50ab	0.00b	1.67a
4	19.17bc	47.50cd	80.84ab	0.00b	0.00a
5	0.00c	4.14e	100.00a	0.00b	0.00a
6	21.67b	45.00d	77.50b	0.00b	0.83a
7	33.33b	65.84bc	65.84b	0.00b	0.83a
8	78.33a	90.00a	18.34c	0.00b	1.67a
9	71.67a	85.83a	27.50c	0.00b	0.83a
10	0.00c	0.00e	100.00a	12.50a	0.00a

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

***Mid-Season Evaluation of Foliar Insecticides for Control of Lepidopterans on Sweet Corn, 2010*:** 'Xtra Tender 372A' sweet corn was planted on June 8 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. The purpose of the trial was to compare material applied on a standard (3-4 day) schedule to newly labeled materials (Coragen and Voliam xpress) applied on a reduced spray schedule as indicated in the table below. All applications were made using a CO2 pressurized back pack sprayer and a two nozzle boom equipped with D2 hollow cone nozzles delivering 42 gpa at 42 psi. At harvest (Aug 5), 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. All treatments provided a higher percentage of fresh market and processing ears compared to the untreated check. The reduced spray schedule using Coragen alternated with Lannate plus Asana, and the standard schedule of Proclaim resulted in the poorest corn earworm and sap beetle control.

Trt #	Treatment	Application Date	Rate/A
1	A,C,E - Voliam Xpress B,D,F – Warrior II	A - 7/15, B – 7/19, C – 7/22 D – 7/26, E – 7/29, F – 8/2	Voliam Xpress - 8 oz Warrior II - 1.92 oz
2	A,C,E - Voliam Xpress D,F – Warrior II + Lannate LV	A - 7/15, C – 7/22, D – 7/26 E – 7/29, F – 8/2	Voliam Xpress - 9 oz Warrior II - 1.92 oz + Lannate LV – 24 oz
3	A,C,E - Voliam Xpress F – Warrior II +Lannate LV	A - 7/15, C – 7/22, E – 7/29 F – 8/2	Voliam Xpress - 9 oz Warrior II - 1.92 oz + Lannate LV – 24 oz
4	A, F -Lannate LV + Asana XL B, D -Coragen 1.67 SC	A - 7/15, B – 7/19, D – 7/26 F – 8/2	Lannate LV - 24 oz + Asana XL - 9.6 oz Coragen 1.67 SC - 3.5 oz
5	A,B,C,D,E,F – Proclaim 5SG	A - 7/15, B – 7/19, C – 7/22 D – 7/26, E – 7/29, F – 8/2	4.5 oz
6	A,B,C,D,E,F – Radiant 2SC	A - 7/15, B – 7/19, C – 7/22 D – 7/26, E – 7/29, F – 8/2	6 oz
7	A,C,E-Belt 480 SC + NIS B,D,F-Baythroid XL	A - 7/15, B – 7/19, C – 7/22 D – 7/26, E – 7/29, F – 8/2	Belt - 3 oz + NIS 0.25% v/v Baythroid XL - 2.8 oz
8	A,B,D,E -Belt 480 SC + NIS + Baythroid XL C,F-Lannate LV +Baythroid XL	A - 7/15, B – 7/19, C – 7/22 D – 7/26, E – 7/29, F – 8/2	Belt -3 oz + NIS - 0.25% v/v + Baythroid XL 2.8 oz LannateLV -24 oz + Baythroid XL -2.8 oz
9	A,B.C.D.E.F - Lannate LV + Warrior II	A - 7/15, B – 7/19, C – 7/22 D – 7/26, E – 7/29, F – 8/2	Lannate LV -24 oz + Warrior II 1.92 oz
10	Untreated	-------	-------

Trt #	% Clean Ears (Fresh Market)	% Clean + Tip Damaged Ears (Processing)	Percent Damaged Ears		
			CEW	FAW	Sap Beetles
1	83.85ab	95.79a	2.45c	0.00b	13.98bc

2	90.45a	93.80a	6.18bc	0.00b	3.82c
3	81.49ab	94.41a	6.74bc	0.00b	12.25bc
4	49.19cd	63.20c	18.70b	0.00b	31.68ab
5	36.40d	69.91bc	21.33b	0.00b	41.07a
6	67.40bc	81.87abc	7.23bc	0.00b	25.37abc
7	72.17ab	86.07ab	8.84bc	0.00b	18.99abc
8	92.08a	96.65a	2.07c	0.00b	5.85bc
9	94.39a	98.68a	2.20c	0.00b	2.96c
10	4.04e	4.04d	53.14a	16.73a	26.35abc

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

Two Spotted Spider Mite Management in Lima Beans - 2010: ' Cypress ' lima beans were planted on June 2 at the University of Delaware Research and Education Center located near Georgetown, DE. Plots consisted of four 25 ft-long rows on 30-inch centers. Each treatment was replicated four times and arranged in a RCB design. Foliar treatments were applied as a broadcast spray on July 14 with a CO_2 pressurized wheel barrow sprayer delivering 24 gpa at 32 psi. Mite populations were evaluated on a weekly basis from June 26 through Aug 12 by examining 20 leaflets per plot for the presence of spider mites. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Spider mite population pressure was low, even after inoculating plots with mites. All treatments appeared to provide numerically better spider mite control 5 days after treatment compared to the untreated check. No phytotoxicity was observed.

Table 1. Spider Mite Counts on Leaves

Treatment	Rate/A	Mean Number Mites per 20 leaflets		
		July 6 Pre-Treatment	July 12 Pre-Treatment	July 19 5 DAT
Oberon 2SC	8 oz	11.50a	24.50a	1.00a
Oberon 2SC	12 oz	4.50a	14.25a	0.25a
Brigade 2EC	6 oz	8,75a	35.00a	3.75a
Hero EC	10 oz	2.50a	37.00a	0.50a
Zeal WSP	2 oz	5.75a	34.00a	5.25a
Agri-Mek 0.15EC	16 oz/A	11.25a	27.75a	3.50a
Untreated	--	5.75a	35.00a	14.00a

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

Cucumber Beetle Management in Watermelons with At-Planting Insecticides, 2010: 'Sangria' watermelon plants were transplanted on May 27 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. At planting treatments (May 27) were applied as a drench treatment using a CO_2 pressurized back pack sprayer delivering 2 oz of spray solution per plant. The foliar treatment was applied with a CO_2 pressurized back pack sprayer on June 4 (single nozzle broadcast application delivering 30 gpa at 42 psi) and June 18 (four nozzle broadcast application delivering 25 gpa at 32 psi).Cucumber beetle population levels were evaluated by counting the number of live and dead insects per 10 plants and calculating the percentage of infested plants. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Table 1. Cucumber Beetle – Live Beetles

Treatment	Rate/ Acre	Trt Timing/ Dates	Mean Number Live Cucumber Beetles per 10 Plants[1]			
			June1	June 7	June 14	June 21
Belay 2.13 SC	9oz	Drench May 27	0.25a	0.50a	2.00a	0.00a
Belay 2.13 SC	12 oz	Drench May 27	0.25a	1.00a	0.75a	0.25a
Admire Pro	10.5 oz	Drench May 27	0.00a	0.50a	1.75a	0.25a
Assail 30 SG	5.3 oz	Foliar Jun 4,18	4.50a	0.00a	1.25a	0.00a
Untreated Check	--		3.00a	2.75a	3.00a	0.50a

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

Table2. Cucumber Beetle –Dead Beetles

Treatment	Rate/ Acre	Trt Timing/ Dates	Mean Number Dead Cucumber Beetles per 10 Plants[1]			
			June 1	June 7	June 14	June 21
Belay 2.13 SC	9oz	Drench May 27	0.75a	1.00a	0.50a	0.75a
Belay 2.13 SC	12 oz	Drench May 27	2.25a	7.50a	8.00a	6.00a
Admire Pro	10.5 oz	Drench May 27	0.50a	2.75a	1.25a	0.50a
Assail 30 SG	5.3 oz	Foliar Jun 4,18	0.00a	1.25a	2.25a	0.25a
Untreated Check	--		0.00a	0.00a	0.00a	0.00a

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

Table 3 – Percent Cucumber Beetle Infested Plants

Treatment	Rate/ Acre	Trt Timing/ Dates	Mean Percent Cucumber Beetles Infested Plants[1]			
			June1	June 7	June 14	June 21
Belay 2.13 SC	9oz	Drench May 27	5.00a	5.00a	15.00a	2.50a
Belay 2.13 SC	12 oz	Drench May 27	12.50a	2.50a	30.00a	27.50a
Admire Pro	10.5 oz	Drench May 27	5.00a	10.00a	17.50a	5.00a
Assail 30 SG	5.3 oz	Foliar Jun 4,18	30.00a	2.50a	22.50a	2.50a
Untreated Check	--		17.50a	5.00a	17.50a	5.00a

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

Cucumber Beetle Management in Watermelons, 2010: 'Sangria' watermelon plants were transplanted on May 27 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 on June 4 (single nozzle broadcast application delivering 30 gpa at 42 psi) and June 18 (four nozzle broadcast application delivering 25 gpa at 32 psi). Cucumber beetle population levels were evaluated by counting the number of live and dead insects per 10 plants and calculating the percentage of infested plants. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Table 1. Cucumber Beetle – Live Beetles

Treatment	Rate/ Acre	Trt Dates	Mean Number Live Cucumber Beetles per 10 Plants[1]				
			Pretrt June1	3 DAT #1 June 7	10 DAT#1 June 14	3 DAT #2 June 21	10 DAT #2 June 28
Baythroid XL	2.8 oz	June 4, 18	1.50a	1.25a	0.75a	0.00a	0.75b
Assail 30SG	5.3 oz	June 4, 18	3.75a	0.00a	1.00a	0.00a	1.00b
Voliam Flexi WDG	7 oz	June 4, 18	7.25a	1.00a	2.75a	0.00a	1.75ab
Belay 2.13SC	4 oz	June 4, 18	8.00a	0.25a	3.50a	0.50a	3.50a
Untreated Check	--		1.75a	10.25a	2.50a	0.25a	0.75b

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

Table2. Cucumber Beetle –Dead Beetles

Treatment	Rate/ Acre	Trt Dates	Mean Number Dead Cucumber Beetles per 10 Plants[1]			
			3 DAT #1 June 7	10 DAT#1 June 14	3 DAT #2 June 21	10 DAT #2 June 28
Baythroid XL	2.8 oz	June 4, 18	0.50a	0.00a	0.00a	2.00a
Assail 30SG	5.3 oz	June 4, 18	0.75a	0.50a	0.25a	0.00a
Voliam Flexi WDG	7 oz	June 4, 18	2.50a	0.50a	0.75a	0.00a
Belay 2.13SC	4 oz	June 4, 18	0.75a	0.00a	2.00a	0.75a
Untreated Check	--		0.00a	0.00a	0.50a	0.25a

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

Table 3 – Percent Cucumber Beetle Infested Plants

Treatment	Rate/ Acre	Trt Dates	Mean Percent Cucumber Beetles Infested Plants[1]			
			3 DAT #1 June 7	10 DAT#1 June 14	3 DAT #2 June 21	10 DAT #2 June 28
Baythroid XL	2.8 oz	June 4, 18	10.00a	5.00a	0.00b	17.50a
Assail 30SG	5.3 oz	June 4, 18	7.50a	15.00a	2.50ab	10.00a
Voliam FlexiWDG	7 oz	June 4, 18	17.50a	15.00a	2.50ab	17.50a
Belay 2.13SC	4 oz	June 4, 18	10.00a	22.50a	15.00a	25.00a
Untreated Check	--		47.50a	17.50a	5.00ab	10.00a

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