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%)

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).

Insect Management in Snap Beans with Seed Treatment Trial – 2010: The snap bean variety **"**Caprise" was planted on May 14 and June 7 at the University of Delaware's Research and Education Center located near Georgetown, DE. Plots consisted of two 20 ft-long plots planted on 30 inch centers with two unplanted guard rows flanking each plot. Each treatment was replicated five times in a randomized complete block design. At planting treatments (May 14 Planting only), were applied with a single nozzle CO_2 backpack sprayer delivering 32 gpa at 42 psi. Foliar treatments (May 14 planting only) were applied with a 3 nozzle boom delivering 30 gpa at 36 psi on June 25. **(A)** ***May 14 Planting*****:** A two-inch band of bone and meat meal was placed over the left hand row immediately after planting on May 14 (to increase seed corn maggot adult fly ovipoisition) at a rate of 320 grams per 20 foot of row. After seedling emergence, a 10 ft section within the right-hand row was marked and used for ECB egg mass releases and the collection of ECB data. For each 10 ft section of plot, neonates from 50 egg masses were released on June 23 and again on June 24 (50 EM x 2 releases= 100 egg masses total). The following data was collected: (1) Stand Count and Seed Corn Maggot Data (left hand row) - Plant stand count data was taken when most plants had emerged. Both the number of snake-heads (=SCM damaged) and normal appearing seedlings were recorded. Additionally, the number of seeds and or seedlings that were infested or damaged by seed maggots were recorded from 25 randomly selected seeds/seedlings in each plot ; (2) Potato Leafhopper (PLH) and Thrips Data: The number of potato leafhoppers and thrips nymphs were recorded weekly from 20 randomly selected leaflets per plot until harvest **;** and (3) European Corn Borer (ECB) Data**:** At harvest maturity (July 13), all the beans from the plants in the 10 ft marked section within the right-hand row were harvested and examined for ECB damage. **(B) June 7 Planting:** Natural infestations of insect populations were evaluated and data was taken from both rows from plant emergence including stand counts, seed corn maggot damaged plants, thrips and leafhopper populations per 20 leaflets. At harvest maturity (July 30), all the beans from 6 ft of row were harvested and examined for ECB and corn earworm (CEW) damage.

(A) May 14 Planting Date

Table 1. Stand Counts and Seed Corn Maggot (SCM) Seed Damage

Trt #	Treatment	Rate /Application Method	Stand Count per 20 ft of row [1]		SCM Seed Damage – May 24[2]	
			May 24	June 1	% Infested Seed	SCM per 25 Seeds
1	Untreated control	-------	59.20a	91.00a	66.40a	17.60a
2	DPX-E2Y45-91	91 µm active per target/ST	71.20a	107.40a	40.80a	3.80a
3	DPX-E2Y45-182	182 µm active per target/ST	74.60a	111.20a	42.40a	17.80a
4	DPX-E2Y45-273	273 µm active per target/ST	77.80a	116.00a	28.00a	4.20a
5	DPX-HGW86-91	91 µm active per target/ ST	80.40a	118.80a	30.40a	6.40a
6	DPX-HGW86-182	182 µm active per target/ST	61.40	110.00a	39.20a	21.60a
7	DPX-HGW86-273	273 µm active per target/ST	69.60a	114.00a	35.20a	5.60a
8	Cruiser - 91	91 µm active per target/ST	67.80a	96.00a	39.20a	15.80a
9	Coragen SC+ Cruiser[3]	5 fl oz/acre IF+ ST	68.80a	88.60a	39.20a	8.00a
10	Coragen SC + Crusier[3]	7 fl oz/acre – IF+ ST	64.80a	100.20a	48.80a	9.60a
11	Coragen SC + Cruiser[3]	3.5 fl oz/acre– Foliar + ST	84.80a	123.40a	37.60a	6.20a
12	Coragen SC+ Cruiser[3]	5.0 fl oz/acre- Foliar+ ST	83.80a	111.60a	51.20a	8.40a
13	Brigade EC+ Crusier[3]	3.5 fl oz/acre – Foliar + ST	64.20a	119.40a	43.20a	12.60a

[1] Means separated by LS Means

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

[3] Cruiser Seed Treatment applied at 91 µm active per target

Table 2. Harvest Damage and Seed Corn Maggot (SCM) – "Snake Heads"

Trt #	Treatment	Rate /Application Method	Percent Damaged Beans – July 13[1]		SCM Damaged Plants per 20 Fft of row (Snake Heads) [1]	
			ECB	CEW	May 24	June 1
1	Untreated control	-------	0.06a	2.13a	13.20a	19.20a
2	DPX-E2Y45-91	91 µm active per target/ST	1.24a	1.40a	9.60abc	4.20c
3	DPX-E2Y45-182	182 µm active per target/ST	0.18a	3.23a	6.80abc	7.40bc
4	DPX-E2Y45-273	273 µm active per target/ST	0.84a	0.18a	6.80abc	2.20c
5	DPX-HGW86-91	91 µm active per target/ ST	1.96a	1.61a	3.80c	5.60bc
6	DPX-HGW86-182	182 µm active per target/ST	1.82a	0.41a	4.60c	3.40c
7	DPX-HGW86-273	273 µm active per target/ST	0.18a	0.28a	6.60abc	4.20c
8	Cruiser - 91	91 µm active per target/ST	0.84a	1.01a	4.60c	5.20bc
9	Coragen SC+ Cruiser[2]	5 fl oz/acre IF+ ST	1.96a	0.07a	9.60abc	15.60ab
10	Coragen SC + Crusier[2]	7 fl oz/acre – IF+ ST	1.82a	1.74a	12.60ab	12.20abc
11	Coragen SC + Cruiser[2]	3.5 fl oz/acre– Foliar + ST	5.33a	2.00a	7.60abc	4.40c
12	Coragen SC+ Cruiser[2]	5.0 fl oz/acre- Foliar+ ST	3.24a	0.16a	7.00abc	3.60c
13	Brigade EC+ Crusier[2]	3.5 fl oz/acre – Foliar + ST	0.45a	0.61a	5.80bc	5.40bc

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

[2] – Cruiser Seed Treatment applied at 91 µm active per target

Table 3. Potato Leafhopper, Thrips and Bean Leaf Beetle

Treatment	Rate /Application Method	Potato Leafhopper per 20 leaflets June 22[1]	% Bean Leaf Beetle Damaged Plants - June 7[1]	Thrips per 20 Leaflets[1]	
				June 7	June 15
Untreated control	-------	2.20a	80.33a	29.60ab	6.60a
DPX-E2Y45-91	91 µm active per target/ST	0.40a	55.41ab	30.80a	7.40a
DPX-E2Y45-182	182 µm active per target/ST	3.40a	47.16ab	24.80abc	7.60a
DPX-E2Y45-273	273 µm active per target/ST	2.40a	54.46ab	23.80abc	6.20a
DPX-HGW86-91	91 µm active per target/ ST	0.80a	26.94b	9.40abc	4.80a
DPX-HGW86-182	182 µm active per target/ST	1.80a	27.93b	6.40abc	4.20a
DPX-HGW86-273	273 µm active per target/ST	2.00a	25.83b	3.40c	5.20a
Cruiser - 91	91 µm active per target/ST	0.40a	32.72b	9.40abc	1.60a
Coragen SC + Cruiser[2]	5 fl oz/acre IF + ST	0.60a	78.68a	26.20abc	6.20a
Coragen SC + Crusier[2]	7 fl oz/acre – IF + ST	3.40a	44.60ab	21.60abc	6.80a
Coragen SC + Cruiser[2]	3.5 fl oz/acre– Foliar + ST	0.40a	26.04b	6.20abc	4.00a
Coragen SC + Cruiser[2]	5.0 fl oz/acre- Foliar + ST	0.00a	30.29b	5.00bc	2.80a
Brigade EC + Crusier[2]	3.5 fl oz/acre -Foliar + ST	0.40a	29.72b	17.40abc	2.00a

[1] Means within a column followed by the same letter are not significantly different (Tukey's, P=0.05).
[2] – Cruiser Seed Treatment applied at 91 µm active per target

(B) June 7 Planting

Table 1. Stand Count, Seed Corn Maggot Damage and Thrips Counts

Trt #	Treatment	Rate /Application Method	June 22 [1]		Thrips per 20 leaflets [2]	
			Mean Stand Count per 20 ft of row	Mean # SCM Damaged Stems per 20 ft of row	June 28	July 6
1	Untreated control	----	110.29	4.18	3.40ab	2.20a
2	DPX-E2Y45-91	91 µm active per target/ST	112.09	5.97	3.80ab	2.00a
3	DPX-E2Y45-182	182 µm active per target/ST	111.59	2.72	10.40a	2.00a
4	DPX-E2Y45-273	273 µm active per target/ST	104.00	3.60	4.60ab	2.60a
5	DPX-HGW86-91	91 µm active per target/ ST	96.80	1.60	0.60b	1.80a
6	DPX-HGW86-182	182 µm active per target/ST	112.80	3.40	1.80ab	3.00a
7	DPX-HGW86-273	273 µm active per target/ST	105.20	2.60	0.60b	1.60a
8	Cruiser - 91	91 µm active per target/ST	104.60	4.00	1.20b	2.80a
9	Cruiser - 91	91 µm active per target/ST	104.59	3.97	2.60ab	1.20a
10	Cruiser - 91	91 µm active per target/ST	112.80	5.22	3.80ab	3.80a

[1] – Means separated by LS Means

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

Table 2. Potato Leafhopper Counts and Harvest Damage

Trt #	Treatment	Rate /Application Method	Percent Damaged Beans – 7/30[1]		Potato Leafhopper per 20 leaflets [1]	
			ECB	CEW	June 28	July 6
1	Untreated control	----	0.00a	3.10a	1.00ab	1.60a
2	DPX-E2Y45-91	91 µm active per target/ST	0.78a	2.65a	0.20b	1.00a
3	DPX-E2Y45-182	182 µm active per target/ST	0.21a	3.28a	0.80ab	1.80a
4	DPX-E2Y45-273	273 µm active per target/ST	0.00a	1.27a	2.40a	1.60a
5	DPX-HGW86-91	91 µm active per target/ ST	0.00a	3.88a	0.40b	0.80a
6	DPX-HGW86-182	182 µm active per target/ST	0.00a	3.16a	1.80ab	2.00a
7	DPX-HGW86-273	273 µm active per target/ST	0.00a	3.23a	0.40b	0.80a
8	Cruiser - 91	91 µm active per target/ST	0.00a	3.39a	0.20b	0.00a
9	Cruiser - 91	91 µm active per target/ST	0.29a	2.94a	0.80ab	0.80a
10	Cruiser - 91	91 µm active per target/ST	0.00a	2.77a	0.80ab	1.20a

[1] - Means within a column separated 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).

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	-------	-------

Trt #	% Clean Ears (Fresh Market)	% Clean + Tip Damaged Ears (Processing)	Percent Damaged Ears		
			CEW	FAW	Sap Beetles
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).

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).