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Final Delaware Soybean Board Report – 2007

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, Associate Scientist, Plant Science; Richard Taylor, Extension Agronomist; and John Pesek, Associate Professor, Food and Resource Economics

Cooperators: Murray Farms, Selbyville; Davis Farms, Georgetown, B.Uniatowski, Middletown, and Delaware State University (SORC), D. Myers

Objectives:

- (1) To determine if seed applied treatments containing an 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.
- (3) To compare the effectiveness of a seed applied treatment and a foliar insecticide spray for Dectes stem borer management.

Study # 1 - Seed Treatment Trials to Evaluate Yield Enhancement: The variety 'Southern States RT 3851N' was planted on 15-inch centers in replicated strip plots in four locations throughout the state: Georgetown - April 20; Smyrna - April 23; replanted June 13; Middletown - May 1; and Selbyville - May 4. The following treatments were evaluated and compared to an untreated control: Apron Maxx RTA, Cruiser 5FS, and Cruiser Maxx (combination of Apron Maxx and Cruiser 5FS). All treatments were commercially applied by Southern States in Seaford, DE. Overall plot size at each location was 320 to 480 foot wide by 400 to 500 ft long depending on land available at each location. Each plot was replicated 4 times in a randomized, complete block design. 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 in the Selbyville and Middletown plots. Insect data collected included bean leaf beetle damaged plants per ft of row; number of leafhoppers and bean leaf beetles per sweep; and number of soybean aphids and thrips per leaf. Due to severe drought stress and mite damage in the Georgetown plot (it was sprayed twice but mites still were not kept under control by the miticide), insect sampling was terminated in early July and no yields were taken. At the Smyrna location, extremely wet weather after planting and slug damage resulted in the need to replant the plot. However, only 2 treatments were established at re-planting on June 13. Stand and insect counts were taken on a weekly basis through early pod set. Yield data was taken at the plots in Selbyville, Smyrna and Middletown at or shortly after physiological maturity.

Results:

(A) Middletown Location

Table 1. Stand Counts and Yield

Treatment	Rate/100 lb seed	Yield BU/A	Stand Count per 3 ft of row			
			May 18	May 24	June 1	June 6
Untreated	---	40.64a	9.04a	8.84a	7.70a	8.01a
Apron Maxx RTA	5 oz	40.99a	8.84a	9.78a	7.88a	8.11a
Cruiser 5FS	1.28 oz	41.54a	8.98a	10.08a	7.91a	7.91a
Cruiser Maxx	3 oz	40.54a	9.21a	10.03a	8.51a	8.38a

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

Table 2. Bean Leaf Beetle and Thrips Counts

Treatment	Rate/100 lb seed	% BLB Damaged Plants			Thrips per 10 leaves	
		May 24	June 1	June 6	June 28	July 3
Untreated	---	34.10a	82.82a	94.29a	1.33ab	1.65a
Apron Maxx RTA	5 oz	29.37a	80.82a	89.31a	1.88a	1.23ab
Cruiser 5FS	1.28 oz	4.87b	39.27b	52.09b	0.83b	0.65ab
Cruiser Maxx	3 oz	5.77b	29.51b	52.71b	0.53b	0.53b

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

(B) Selbyville Location

Table 1. Stand Counts and Yield

Treatment	Rate/100 lb seed	Yield BU/A	Stand Count per 3 ft of row ¹			
			May 21	May 30	June 7	June 13
Untreated	---	54.17a	7.55ab	7.55b	6.64a	7.83a
Apron Maxx RTA	5 oz	55.79a	6.86b	7.89ab	6.75a	7.73a
Cruiser 5FS	1.28 oz	56.36a	7.89ab	8.07ab	6.41a	7.83a
Cruiser Maxx	3 oz	54.65a	8.95a	8.97a	8.00a	8.67a

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

Table 2. Bean Leaf Beetle and Thrips Counts

Treatment	Rate/100 lb seed	% BLB Damaged Plants ¹			Thrips per 10 leaves ¹	
		May 21	May 30	June 7	June 18	June 25
Untreated	---	1.94ab	55.81a	90.36a	16.75a	27.58a
Apron Maxx RTA	5 oz	3.77a	54.86a	88.28a	17.05a	22.20ab
Cruiser 5FS	1.28 oz	0.70b	28.89b	69.71a	11.83a	9.78b
Cruiser Maxx	3 oz	0.00b	17.73b	48.24b	11.05a	7.60b

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

(C) Georgetown Location

Table 1. Stand Counts

Treatment	Rate/100 lb seed	Stand Count per 3 ft of row			
		May 3	May 8	May 15	May 29
Untreated	---	6.78a	8.64a	9.29a	8.73a
Apron Maxx RTA	5 oz	6.61a	7.75a	7.97b	7.99a
Cruiser 5FS	1.28 oz	7.21a	8.64a	9.09ab	8.83a
Cruiser Maxx	3 oz	6.69a	8.29a	8.98a	8.58a

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

Table 2. Bean Leaf Beetle and Thrips Counts

Treatment	Rate/100 lb seed	% BLB Damaged Plants			Thrips per 10 leaves	
		May 15	May 29	June 4	June 13	June 27
Untreated	---	33.77a	74.46a	97.56a	8.43a	0.35a
Apron Maxx RTA	5 oz	31.39a	78.85a	96.88a	2.63a	0.23a
Cruiser 5FS	1.28 oz	2.34b	26.47b	53.10b	1.15a	0.10a
Cruiser Maxx	3 oz	2.36b	36.84b	51.66b	1.28a	0.13a

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

(D) Smyrna Location

Table 1. First Planting

Treatment	Rate/100 Lb seed	Stand Count per 3 foot of row			% BLB Damaged Plants		
		May 14	May 23	June 1	May 14	May 23	June 1
Untreated	---	3.18a	5.34a	4.06a	55.67a	69.62a	88.13a
Apron Maxx RTA	5 oz	2.22a	4.82a	3.91a	47.13a	60.32a	89.18a
Cruiser 5FS	1.28 oz	2.67a	4.61a	4.22a	3.49b	21.83b	55.73b
Cruiser Maxx	3 oz	3.22a	5.74a	4.84a	7.16b	21.95b	44.56b

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

Table 2. Second Planting

Treatment	Rate/100 lb seed	Stand Count per 3 ft of row				% BLB Damaged			Yield BU/A
		6/25	7/3	7/9	7/16	7/3	7/9	7/16	
Untreated	---	8.90	9.20	8.80	8.97	0.33	6.80	0.00	32.46
Cruiser Maxx	3 oz	8.40	9.27	9.03	8.23	0.00	2.20	1.22	28.88

Conclusions: Overall, no significant differences were detected between the untreated control and the seed applied treatments for stand count and yield. Overall, the Cruiser treatments did provide significantly better bean leaf beetle control compared to the untreated check and fungicide alone treatment. Since bean pod mottle virus was identified for the first time in DE in 2007, early season bean leaf beetle management may be important in the future. Data from the Mid-West indicates that the use of seed treatments may be one part of the management program.

Study #2 - Comparison of a Seed Treatment and Foliar Insecticide for *Dectes* Stem Borer Management : Replicated research plots were established in two locations: University of Delaware’s Middletown Demonstration site located near Middletown, DE on May 25 and the Carvel Research and Education located near Georgetown, DE on May 21. Two varieties were planted at each location: SS RT3851 N (Group III) and Asgrow 2802 (Group II). Plot size was 18 foot wide x 18 ft long. Treatments were established in a randomized, complete block design and replicated four times. Treatments included an untreated check, fipronil seed treatment, and one foliar treatment of Warrior. Plots were sampled on a weekly basis from plant emergence through mid-August to determine the abundance of *Dectes* adults. The foliar treatment plots were sprayed on July 17 in Middletown and July 18 in Georgetown with Warrior at a rate of 3.2 oz per acre (0.025 lb ai/A) . 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 was 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.

(A) Middletown

Table 1. First Harvest

#	Treatment	Rate	% Infested Stems Sept 19	# Larvae per Stem 20 stems Sept 19	% Lodged Stems Oct 2	# Lodged Stems/Plot Oct 2	Yield BU/A Oct 2
1	AG2802 Untreated	---	25.00a	5.00a	4.00a	3.50a	28.13b
2	AG2802 + Fipronil ST	3 oz. /100 lb seed	0.00b	0.00b	0.00a	0.00b	28.27b
3	AG2802 + Warrior	3.2 oz/A	15.00ab	3.00ab	3.00a	0.00b	28.63b
4	SS RT3851 Untreated	---	11.25ab	2.25ab	5.00a	0.00b	34.40ab
5	SSRT3851 + Fipronil ST	3 oz/100 lb seed	2.50b	0.50b	0.00a	0.00b	40.54a
6	SS RT3851 + Warrior	3.2 oz/A	18.75ab	4.00ab	5.00a	0.00b	35.50ab

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

Table 2. Second Harvest

#	Treatment	Rate	Losses from First Harvest – 8 DAH		# Lodged Stems/Plot Oct 16	% Lodged Stems Oct 16	Yield BU/A Oct 22
			# Lodged Stems/plot Oct 10	Yield Loss Bu/A			
1	AG2802 Untreated	---	14.25a	1.38a	27.25a	8.50a	19.83c
2	AG2802 + Fipronil ST	3 oz/100 lb seed	0.00b	0.00b	0.00c	0.00b	28.19bc
3	AG2802 + Warrior	3.2 oz/A	5.50b	0.56ab	18.50ab	4.00ab	24.03bc
4	SS RT3851 Untreated	---	6.25b	0.75ab	11.25bc	6.00ab	33.65ab
5	SSRT3851 + Fipronil ST	3 oz/100 lb seed	0.00b	0.00b	0.00c	0.00b	41.65a
6	SS RT3851 + Warrior	3.2 oz/A	2.50b	0.26b	11.25bc	5.00ab	38.05ab

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

(B)Georgetown

Table 1. First Harvest

Treatment	Rate	% Infested Stems Sept 20	# Larvae per Stem 20 stems Sept 20	% Lodged Stems Oct 10	# Lodged Stems/Plot Oct 10	Yield BU/A Oct 18
AG2802 Untreated	---	10.00ab	2.00ab	1.50ab	16.50a	38.86a
AG2802 + Fipronil ST	3 oz/100 lb seed	0.00b	0.00b	0.00b	0.00b	46.07a
AG2802 + Warrior	3.2 oz/A	11.25ab	2.25ab	0.50b	0.00b	36.77a
SS RT3851 Untreated	---	21.25a	4.25a	5.00a	8.50ab	50.50a
SSRT3851 + Fipronil ST	3 oz/100 lb seed	0.00b	0.00b	0.00b	0.00b	51.86a
SS RT3851 + Warrior	3.2 oz/A	15.00ab	3.00ab	5.00a	8.00ab	53.12a

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

Table 2. Second Harvest

Treatment	Rate	% Lodged Stems Oct 30	# Lodged Stems/Plot Oct 30	Yield BU/A Nov 1
AG2802 Untreated	---	2.50a	7.75ab	41.54a
AG2802 + Fipronil ST	3 oz/100 lb seed	0.00a	0.00b	35.76a
AG2802 + Warrior	3.2 oz/A	1.00a	9.50a	31.75a
SS RT3851 Untreated	---	0.00a	26.25a	32.73a
SSRT3851 + Fipronil ST	3 oz/100 lb seed	0.00a	0.00b	37.75a
SS RT3851 + Warrior	3.2 oz/A	3.00a	22.00a	46.51a

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

Two Spotted Spider Mite Management in Soybeans, 2007: Southern States Variety 'RT 3851N 'was planted on April 20 in a commercial field located near Georgetown, DE. Plots twenty five foot long and nine foot wide on 15-inch centers were replicated four times in a randomized block design. All treatments were broadcast applied on July 27 with a CO₂ pressurized back pack sprayer delivering 19 gallons per acre at 37 psi. Mite populations were evaluated before treatment on July 26 and 4 and 11 days after treatment by collecting 20 leaflets per plot and using a mite brushing machine to count the number of mites per leaflet. Data were analyzed using Proc GLM and means were separated using Tukey's mean separation test (P=0.05).

Spider mite pressure was extremely heavy in this field throughout the season. At the time of treatment, populations were starting to decline. On both evaluation dates, both treatments provided significantly better spider mite control compared to the untreated check. No phytotoxicity was observed.

Treatment	Rate/A	Number of Mites per leaflets		
		July 26 Pre-Trt	July 30 4 DAT	Aug 6 11 DAT
Oberon 2SC	8.5 oz	103.57a	31.75b	1.39b
Agri-Mek 0.15EC	16 oz	133.24a	28.25b	1.35b
Untreated	---	117.19a	68.05a	4.84a

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 - 2007: 'Silver King ' sweet corn was planted on July 6 at the University of Delaware Research and Education Center located near Georgetown, DE. Plots consisted of two rows, 25 ft-long plots 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 20, 23, 27, 30; Sep 4,7). Applications of foliar insecticides were applied with a CO₂ pressurized back sprayer using 4 nozzles per row delivering 63 gpa at 37 psi. At harvest (Sep 10), forty 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 significantly better corn borer control compared to the untreated check. All treatments provided a significantly higher percentage of clean ears compared to the untreated check except the Belt and Alverde alone. All treatments provided a significantly higher percentage of processing ears compared to the untreated check except the Alverde alone. No phytotoxicity was observed.

Results

Treatment	Rate/A	% Clean Ears (Fresh Market)	% Clean + Tip Damaged Ears (Processing Ears)	% Damaged Ears	
				CEW	ECB
Belt 4SC	3 oz	23.13de	32.50d	75.63ab	0.00b
Volium Xpress 1.27 ZC	8.2 oz	83.13a	90.00a	17.50d	0.00b
Coragen 1.69 SC	6.7 oz	55.63bc	67.50bc	43.75cd	0.00b
Alverde 1.69 EC plus LI- 700	16 oz plus 0.5% V/V	2.50e	11.25e	96.88a	0.00b
Alverde 1.69 EC plus Mustang MAX 0.8EC plus LI-700	13.7 oz + 4 oz + 0.5% V/V	47.50bcd	64.38bc	52.50bc	0.00b
Mustang MAX 0.8EC	4 oz	34.38cd	54.38c	59.38bc	1.25b
Capture 2EC	4 oz	51.88bc	69.38abc	46.88c	1.25b
Baythroid 2EC	2.8 oz	58.75abc	79.38ab	39.38cd	1.25b
Proaxis 0.5EC	3.84 oz	36.25cd	61.88bc	61.88bc	0.00b
Warrior 1CS	3.84 oz	61.25ab	80.00ab	37.50cd	0.00b
Untreated	-----	0.00e	0.00e	100.00a	10.00a

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

Insect Management in Bell Peppers, 2007: “Paladin” bell peppers were transplanted on June 20 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. A maintenance spray of Intrepid was applied on July 18 for beet armyworm before flowers were present on the plants. All foliar materials were applied beginning at first flower/small fruit on July 19 and then on a weekly basis on July 26; Aug 2, 10 and 16. Applications were made with a CO₂ 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 57 gpa at 37 psi. Plots were sampled on a weekly basis from June 27 through Aug 9 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 9 and Aug 20 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).

Aphid populations were low throughout the season therefore no differences were detected between the treatments and the untreated check. All treatments provided significantly better ECB control compared to the untreated check on Aug 20. No phytotoxicity was observed.

Table1. European Corn Borer (ECB) Damaged Fruit

Treatment	Rate/Acre	Mean Percent ECB Damaged Fruit ²	
		Aug 9	Aug 20
A15397 1.27SC	4.11 oz	0.00a	0.00b
A15397 1.27SC	5.50 oz	0.00a	0.76b
A15365 2.1SC	1.64 oz	0.00a	0.00b
A15365 2.1SC	2.20 oz	0.00a	0.00b
Warrior 1CS	3.20 oz	0.00a	0.00b
Coragen 1.69SC	5.1 oz/A	0.00a	0.00b
Volium Xpress 150 ZC	6.8 oz	0.00a	1.00b
Alverde 2SC ¹ + LI 700	16 oz + 0.5% V/V	0.00a	1.25b
Synapse 24 WG	3 oz	0.00a	0.00b
Untreated	---	6.34a	7.09a

¹ EC formulation used on the first 3 application dates; SC formulation used on last 2 application dates.

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

Table 2. Beet Armyworm (BAW) Damaged Fruit

Treatment	Rate/Acre	Mean Percent BAW Damaged Fruit ²	
		Aug 9	Aug 20
A15397	4.11 oz	0.00a	1.00ab
A15397	5.50 oz	0.00a	3.00ab
A15365	1.64 oz	0.00a	0.63ab
A15365	2.20 oz	0.00a	2.00ab
Warrior	3.20 oz	3.33a	3.33ab
Coragen 200 SC	5.1 oz/A	0.00a	0.83ab
Volium Xpress 150 ZC	6.8 oz	0.00a	0.00b
Alverde + LI 700 ¹	16 oz + 0.5% V/V	0.00a	1.63ab
Synapse 24WG	3 oz	0.00a	3.83ab
Untreated	---	0.96a	7.61a

¹ EC formulation used on the first 3 application dates; SC formulation used on last 2 application dates.

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

Insect Management in Non- Bell Peppers, 2007: “Cherry Bomb” hot cherry peppers were transplanted on June 20 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. A maintenance spray of Intrepid was applied on July 18 for beet armyworm before flowers were present on the plants. All foliar treatments receiving a weekly application of Warrior or Spintor/Intrepid were applied beginning at first flower/small fruit on July 26 and then on a weekly basis on Aug 2, 10 and 16. No treatments were applied to the “threshold” plots due to low moth counts. Applications were made with a CO₂ 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 56 gpa at 37 psi. Plots were sampled on a weekly basis from June 27 through Aug 9 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 15 and Aug 24 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).

Foliar insect populations were low throughout the season with the exception of an early beet armyworm infestation. Although aphid populations were generally low, we did see a significant increase late in the season in the plots receiving weekly Warrior applications. All treatments provided significantly better ECB control compared to the untreated check on Aug 20. No phytotoxicity was observed.

Treatment	Timing	Treatment Dates	Rate/A	Aphid per 100 leaves Aug 9	% ECB Damaged Fruit	
					Aug 15	Aug 24
Warrior	Weekly starting at ¼ inch fruit	July 26; Aug 2, 10 and 16	3.2 oz	32.00a	0.50a	0.38a
Warrior	Threshold	None	---	9.00b	0.00a	0.25a
Spintor then switch to Intrepid	2 app – start at ¼ inch fruit 2 appl	July 26; Aug 2	6 oz 8 oz	10.50a	0.00a	0.00a
Spintor then switch to Intrepid	Threshold – 2 appl max Threshold	None	---	4.25a	0.25a	0.00a
Untreated	---		---	6.50a	1.50a	0.00a

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

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

Personnel: Joanne Whalen and Bill Cissel, University of Delaware

Cooperator: David Marvel – Harrington, DE

Plot Design: Four types of peppers were planted on June 20 on a commercial farm located near Harrington, 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 1 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		
	Aug 9	Aug 15	Aug 24
Paladin	5.10 a	3.25a	1.75a
Cherry Bomb	0.00b	0.17a	0.22a
Sparky	0.00b	0.00a	0.16a
Bounty	0.00b	0.00a	0.00a

Comments: Overall, insect pressure was extremely low throughout the season. Only one ECB egg mass was detected in the control block on July 26. The percentage of damaged fruit was lower in the non –bell plots compared to the bell pepper plots. It will be important to repeat this study under heavier pressure to determine if these results hold up under heavy pressure. If so, this data can then be used to develop new thresholds to manage ECB in non-bell peppers.

Control of Lepidopterous Larvae in Fall Cabbage - 2007: 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 20 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 20 using a CO₂ backpack sprayer with a one-nozzle boom delivering 39 gpa at 37 psi. All foliar materials were applied on Jul 30, Aug 7, August 24, and Sept 7 except Novaluron at the high rate (12 oz/A) which was applied on Jul 30 and Aug 24. Foliar applications were made with a CO₂ backpack sprayer with a single-row boom, having 3 hollow-cone nozzles per row (one over the top and one drop nozzle on each side) delivering 47 gpa at 37 psi. Penetrator Plus was applied on all plots at 0.5% vol./vol. The number of Lepidopterous larvae and harlequin bugs on each of 5 randomly selected plants per plot was recorded on a weekly basis from July 27 through September 13. The number of marketable heads was determined by examining feeding damage on the head and two wrapper leaves on September 20. 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. Cabbage looper and harlequin bug populations were low throughout the season and no differences were seen between the treatments and the untreated check. All treatments provided significantly better DBM control on Aug 10 compared to the untreated. The Synapse, Avaunt and Voilium Flexi/Spintor treatments provided a significantly higher percentage of marketable heads compared to the untreated check. No phytotoxicity was observed.

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

Treatment ¹	Application Method	Treatment Dates	Rate/A	% Marketable Heads ² September 20	Mean Number DBM Larvae per 5 plants ²				
					Aug 3	Aug 6	Aug 10	Aug 16	Sept 3
A15452 2.5SC	In – furrow	7/20	6.84 oz	75.24ab	0.00b	0.50ab	0.00b	1.50ab	0.50b
A15452 2.5 SC	In – furrow	7/20	10.27 oz	84.22ab	1.00ab	0.25ab	0.00b	0.50ab	0.50b
A15365 2.1SC	In - furrow	7/20	2.74 oz	74.46ab	1.50ab	1.75ab	0.25ab	0.75ab	0.50b
A15365 2.1SC	In - furrow	7/20	4.11 oz	75.92ab	0.00b	0.25ab	0.00b	0.25ab	0.00b
Synapse 24WG	Foliar	7/30; 8/7, 24; 9/7	2 oz	98.33a	0.25ab	0.00b	0.00b	0.00b	0.00b
Novaluron 0.83EC	Foliar	7/30; 8/24	12 oz	91.99ab	0.25ab	0.00b	0.00b	0.50ab	0.00b
Novaluron 0.83EC	Foliar	7/30; 8/7, 24; 9/7	8 oz	96.83ab	0.25ab	1.50ab	0.00b	0.00b	0.00b
Alverde 2SC	Foliar	7/30; 8/7, 24; 9/7	16 oz	97.06ab	1.25ab	0.75ab	0.00b	0.00b	0.00b
Coragen 1.69 SC	Foliar	7/30; 8/7, 24; 9/7	5.1 oz	97.06ab	0.00b	0.00b	0.00b	0.00b	0.00b
Avaunt 30WDG	Foliar	7/30; 8/7, 24; 9/7	3.5 oz	98.22a	0.00b	1.25ab	0.25b	0.25ab	0.00b
Volium Flexi 40WG Spintor 2SC	Foliar (2 appl) Foliar(2 appl)	7/30; 8/7 8/24; 9/7	4 oz 4 oz/A	100.00a	0.00b	0.25ab	0.00b	0.00b	0.00b
Untreated	----	----	---	62.33b	2.25a	2.50a	1.50a	1.75a	2.50a

¹ All foliar sprays were applied with Penetrator at a rate of 0.5% V/V

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

Insect Management In Late Planted Snap Beans, 2007: ‘Slenderette’ snap beans were planted on July 20 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 23(bud stage), Aug 29 (pin stage) and Sept 5 (one week from harvest) with a CO₂ pressurized backpack sprayer delivering 17.4 gpa @ 37 psi. Snap beans were harvested on September 11 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; therefore, no damaged beans were detected at harvest. Corn earworm pressure was moderate.

All treatments provided a significantly lower percentage of damaged beans compared to the untreated check except the Spintor, Intrepid, the high rate of Coragen and the Alverde. No phytotoxicity was observed.

Treatment	Rate/Acre	Mean % Corn Earworm Damaged Beans ¹
Avaunt 30WG	3.5 oz	0.08b
Avaunt 30WG	6 oz	0.16b
Spintor 2SC	6 oz	1.46ab
Intrepid 2F	10 oz	3.44ab
Coragen 1.69 SC	5.1 oz	0.92ab
Coragen 1.69 SC	3.4 oz	0.35b
Volium Xpress 1.27 ZC	5.5 oz	0.17b
Warrior T	3.2 oz	0.17b
Alverde 2SC + LI- 700	16 oz + 0.5% V/V	1.41ab
Untreated	-----	5.00a

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

Control of Seed Corn Maggot in Processing Peas, 2007:

Investigators: Joanne Whalen and William Cissel, University of Delaware, Department of Entomology and Wildlife Ecology; Alan Taylor, Cornell University, Department of Horticulture Science

'Bolero' peas were planted on March 28th at the University of Delaware's Research and Education Center located near Georgetown, DE. Plots consisted of nine 25 ft-long rows on 7.5 inch centers. Each treatment was replicated four times and arranged in a RCB design. A 2-inch band of bone and meat meal was placed over each row at planting to increase the seed corn maggot (SCM) oviposition at a rate of 320 grams per 20 foot of row. In addition to the insecticide seed treatments, all plots were treated with Captan 400 2.5 fl oz/cwt + Allegiance 0.75 fl oz/cwt. Stand counts were evaluated by counting the number of healthy plants in 3 ft of row in 3 locations per plot. Seed corn maggot (SCM) infestation levels were evaluated by digging up five consecutive plants in 3 locations per plot to determine the % damaged seeds and number of larva per seed. In addition, plant damage was evaluated by examining five consecutive plants in 3 locations per plot to determine the percent infested stems.

Seed corn maggot populations were extremely heavy. A combination of extremely cool, wet weather immediately after planting and heavy seed corn maggot pressure resulted in stand counts that were below commercially acceptable levels in all treatments. As a result, no yield data was taken. The Lorsban seed treatment provided significantly better early stand counts (April 13) compared to the untreated check. At the final stand count, all treatments provided significantly better control compared to the untreated check. All treatments resulted in a significantly lower percentage of damaged seeds and stems compared to the untreated check. However, under these extremely adverse conditions, none of the treatments provided commercially acceptable levels of control.

Table 1. Stand Counts

Treatment	Rate	Mean Stand Count per 3 ft of row ¹		
		April 13	April 18	May 12
Untreated	----	3.25b	3.92a	2.15b
Diazinon 50W	0.5 oz/Bu seed	8.00ab	10.08a	11.75a
Lorsban- SL	62.5 mg ai/100 g seed	10.09a	10.08a	13.75a
Cruiser 5FS	50 mg ai/100 g seed	8.84ab	10.58a	9.50a
Entrust	50 mg ai/ 100 g seed	8.17ab	9.83a	11.25a

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

Table 2. Seed Corn Maggot Damage Evaluations

Treatment	April 18 ¹		% Damaged Stems April 24 ¹
	% damaged seed	% dead larvae	
Untreated	87.50a	0.00b	82.50a
Diazinon 50W	27.50b	12.50ab	27.50c
Lorsban	7.50b	40.00a	30.00c
Cruiser 5FS	22.50b	17.50ab	60.00b
Entrust	40.00b	22.50ab	32.50c

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

Aphid Management in Watermelons, 2007: ‘Jamboree’ watermelons transplants were planted on May 24 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 as a broadcast spray on July 6. All foliar treatments applied with a CO₂ back pack sprayer delivering 22 gpa at 40 psi. Aphid population levels were evaluated on a weekly basis from May 29 through July 24. 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).

Aphid populations were low. No differences were seen between the treatments and the untreated check. No phytotoxicity was observed.

Table 1. Percent Melon Aphid Infested Plants

Treatment	Rate/A	Mean % Infested Plants (Pre-treat)		
		June 7	June 19	June 26
Untreated	--	2.50a	2.50a	0.00a
Movento + NIS	5 oz + 0.25%V/V	2.50a	0.00a	0.00a
Assail 30SG	4 oz	10.00a	5.00a	0.00a
Assail 30 SG	5.3 oz	0.00a	0.00a	0.00a
Volium Flexi 40WG	4 oz	2.50a	0.00a	0.00a
Beleaf 50SG	2.8 oz	0.00a	0.00a	0.00a

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

Table 2. Melon Aphid Count

Treatment	Rate/A	Aphids per 10 plants June 7 Pre-trt	Mean Number of Aphids per 50 Leaves		
			June 19 Pre-trt	July 17 11 DAT	July 24 18DAT
Untreated	--	0.75a	7.00a	15.75a	18.00a
Movento + NIS	5 oz + 0.25%V/V	0.25a	0.00a	5.25a	15.00a
Assail 30SG	4 oz	2.00a	0.25a	7.25a	27.50a
Assail 30 SG	5.3 oz	0.00a	0.00a	2.00a	8.50a
Volium Flexi 40WG	4 oz	0.25a	0.00a	0.00a	6.50a
Beleaf 50SG	2.8 oz	0.00a	0.00a	0.25a	10.50a

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

Two Spotted Spider Mite Management in Watermelons - 2007: 'Jamboree' watermelon transplants were planted on May 24 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 12. All foliar treatments applied with a CO₂ 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-moderate. All treatments provided significantly 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	Pre-treatment July 10		Mean # Spider Mites per 50 Leaves Post Counts		
		Number Spider Mites per 50 leaves	Percent Mite Infested Plants	July 17 5 DAT	July 24 12 DAT	July 31 19 DAT
Untreated	----	17.25a	40.00a	63.75a	50.50a	126.25a
Oberon 2SC	8.5 oz/A	11.75a	32.50a	12.00b	17.75a	5.75a
Acramite 50WS + LI-700	1 lb + 0.5% v/v	15.00a	37.50a	16.75b	11.50a	6.00a
Zeal	2 oz	46.00a	47.50a	11.25b	18.75a	2.25a

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

Summary of Pheromone Trapping and Orchard Scouting in 2007 – Dagsboro, DE

Methods:

(1) **Pheromone trapping Program:** Traps were placed in the orchard by the producer on April 1 and the first moths were caught in the traps on May 1. Three trapping locations per species were established and traps were checked on a weekly basis. Insects monitored included: Oriental fruit moth, Lesser peach tree borer, Greater peach tree borer and Tufted apple bud moth. Lures were changed every 2-3 weeks.

(2) **Orchard Scouting:** The orchard was scouted on a weekly basis from May 1st to August 16th to help monitor the success of using mating disruption pheromones for oriental fruit moth and to insure that other pest populations remained below a treatment level. The orchard was split into three zones by the producer, with a total of nineteen varieties distributed among each of the zones. In each variety, the following sampling was done each week:

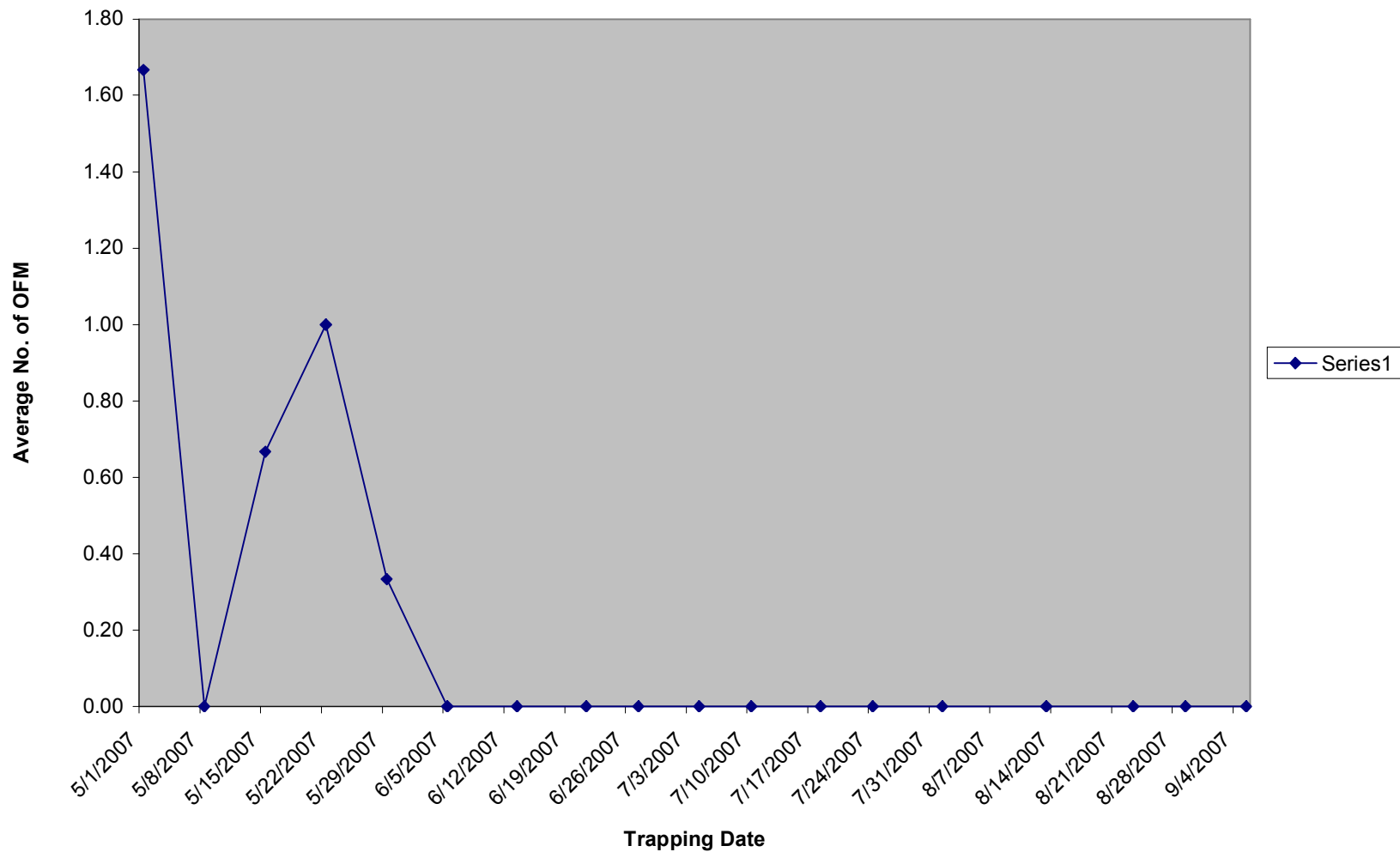
(a) **Ten Sweeps Using a Standard 15-inch Diameter Sweep Net:** In general, this method was used to look for fast moving insects including leafhoppers, grasshoppers, lygus bugs and stinkbugs.

(b) **One Beat cloth sample:** Five limbs were beat and insects that dropped on a beat cloth were counted. The primary focus of this sampling method was for detection of plum curculio.

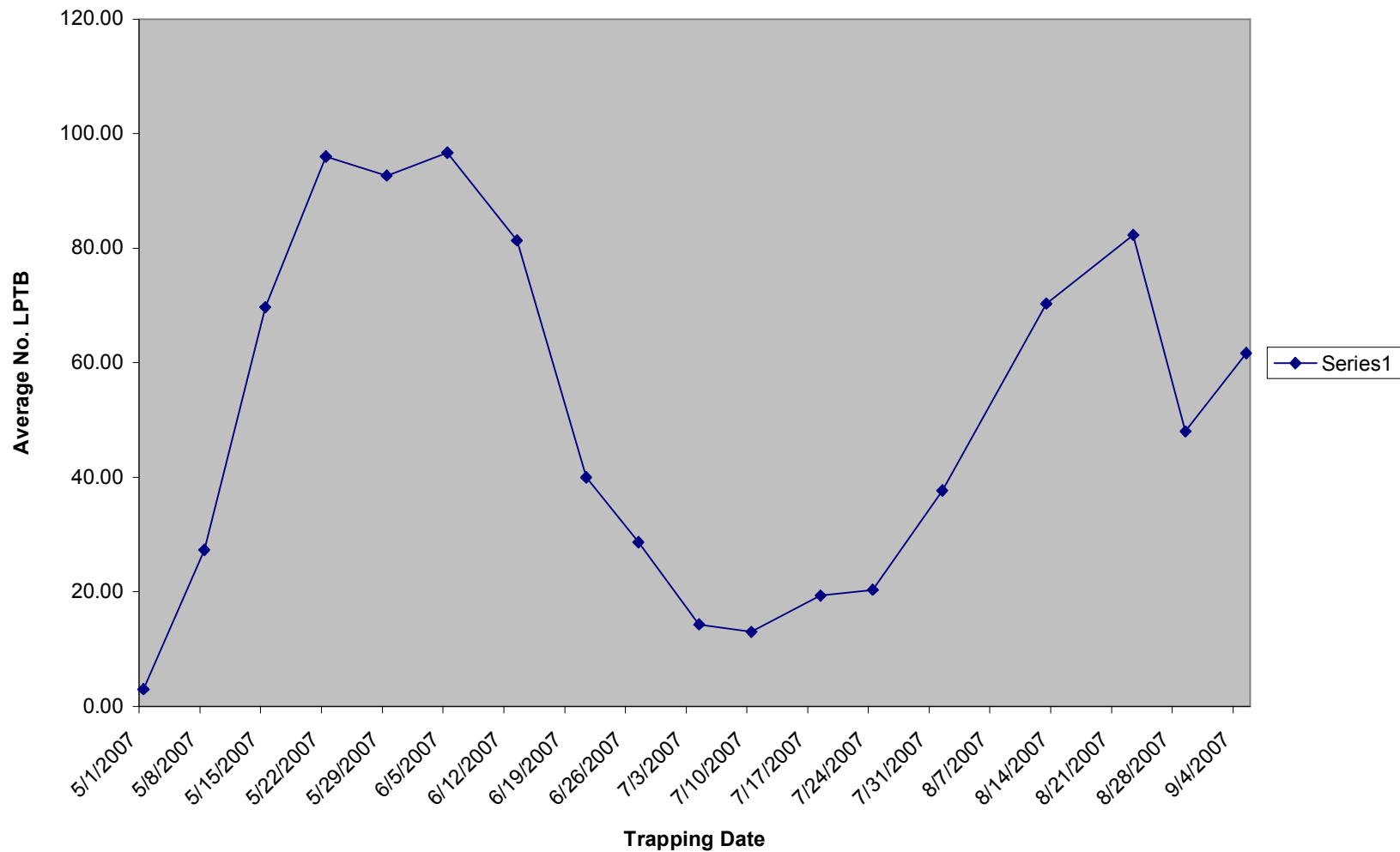
(c) **Whole Tree Samples:** Two trees were also examined in each of the varieties to locate possible flagging caused by oriental fruit moths and used as an indication to the success of mating disrupting.

Results: Overall, mating disruption appeared to work again for oriental fruit moth control. Although early season sprays were applied, no insecticide sprays were applied in the main part of the season for this pest. Lesser peach tree and Greater peach tree borer populations required treatment at the end of the season. All other insect populations remained low throughout the season with Japanese beetle and Green June beetles being the most common insects encountered. Low levels of leafhoppers and stinkbugs were also encountered. No plum curculio or tufted apple bud moth damage was detected. After two years of evaluation, it appears that mating disruption can be successfully used to manage oriental fruit moth in peach orchards.

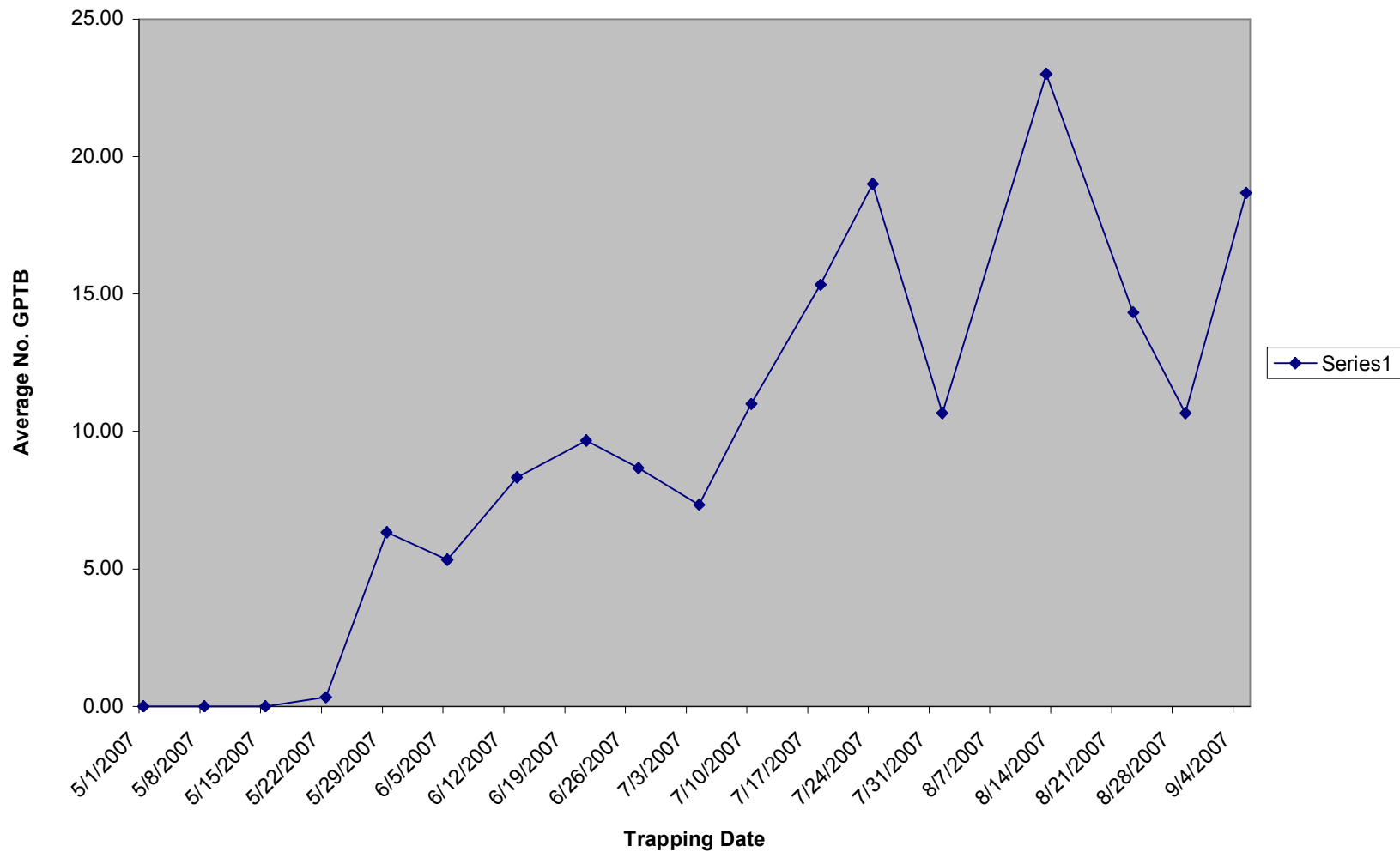
Oriental Fruit Moth Trap Catches



Lesser Peach Tree Borer Trap Catches



Greater Peach Tree Borer Trap Catches



Tufted Apple Bud Moth Trap Catches

