

Final Report – 2009

Title: Dectes Stem Borer in Soybeans: Evaluating New Controls and Determining the Economic Impact

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Objectives:

(A) Evaluation of registered pyrethroid insecticides for their effectiveness in managing Dectes stem borer populations:

Grower Demonstrations: Three grower demonstrations were established in locations having a history of Dectes stem borer populations and yield loss from stem lodging. All fields were sampled on a weekly basis for Dectes adult beetles from late June through mid-August by taking 10 sweeps in 10 locations in each of the treated and untreated areas. Treatments were applied 21 days after detection of the first adults. At the time of application, adult populations were either just below, at or above the proposed "action threshold" of one Dectes adult beetle per 10 sweeps. Prior to harvest, 30 stems were collected from the treated and untreated areas to determine the percentage of Dectes infested stems.

Location 1 (Milford, DE) – The variety Asgrow 4801 was planted in 7.5 inch rows. Treatments were applied 21 days after first adult emergence on July 14.

Location 2 (Middletown, DE) – The variety Asgrow 3905 was planted in 30 inch rows. Treatments were applied 21 days after first adult emergence on July 22. Plots were harvested before lodging occurred.

Location 3 (Redden, DE) – The variety Dekalb 4404 was planted in 7.5 inch rows. Treatments were applied 21 days after first adult emergence on July 22

Results:

Location 1 – Milford, DE – Insect Population Data

Treatments	Rate/A	Adults/ 10 sweeps Pre-Treatment	% Infested Stems Pre-harvest
Hero	10.3 oz	0.9	10
Hero	5 oz	0.7	20
Untreated	----	1.0	30

Location 1 – Milford, DE - Yield Data

Treatment *	Rate/A	Yield BU/A	Lodging Loss BU/A
Hero	10.3 oz	49.77	----
Hero	5 oz	50.70	-----
Hero	5 oz	48.40	2.42
Untreated	-----	48.12	2.70

* NOTE: Since soil variations resulted in variations in plant growth; therefore, paired yield comparisons were taken from 2 areas of the field.

Location 2 – Middletown, DE

Treatment	Adults/10 sweeps – Pre Treatment	% Infested Stems Pre-harvest
Hero – 10.3 oz/A	0.6	36
Warrior II – 1.92 oz/A	0.5	24

Location 3 - Redden

Treatment	Adults/10 sweeps Pre-treatment	% Infested Stem Pre-harvest
Hero – 5 oz/A	3	12
Untreated	3	20

Conclusions: Overall, the Hero treatments resulted in a lower percentage of infested stems compared to the untreated areas in all locations. In the Milford location, yield and lodging loss data was also collected. There was no difference in yield or lodging loss when comparing the Hero treatments to the untreated control at this location

Replicated Research Trials: Research plots were established in two locations. At the University of Delaware's Research and Education Center near Georgetown, DE, 'SS4451N' soybeans were planted on May 19. Plots were 30 ft wide by 200 foot long planted on 15-inch centers. Foliar treatments were applied on July 14 with a high clearance spider sprayer delivering 20 gpa at 40 psi. Each treatment was replicated three times and arranged in a RCB design. At the on-farm Bridgeville location, 'Asgrow 4404' soybeans were planted on June 3. Plots were 20 ft wide by 50 foot long planted on 15 inch centers. Treatments were applied on July 14 with a CO₂ pressurized wheelbarrow sprayer delivering 26 gpa at 40 psi. Each treatment was replicated four times and arranged in a RCB design.

Dectes adult beetle population levels were evaluated on a weekly basis from June 1 through Aug 5 by taking 20 sweeps per plot at the Bridgeville location and 200 sweeps per plot at the Georgetown location. Before physiological maturity, 20 stems were collected from each plot at the Bridgeville location and 50 stems per plot at the Georgetown location to determine the percentage of stems infested with Dectes larvae. At physiological maturity, soybeans were harvested on Nov 9 at the Bridgeville location. At the Georgetown location, one half of the plot was harvested on Nov 4 at physiological maturity. The second half of the plot was harvested on Nov 30 to simulate a late harvest. Data were analyzed using Proc GLM and means were separated by Tukey's mean separation test (P=0.05).

Table 1. Bridgeville Location

Treatment	Rate/A	Number Dectes Adults per 20 sweeps				% Infested Stems Aug 25	# Larvae per 20 stems Aug 25	Yield (BU/A) Nov 9	Lodging Loss (BU/A)
		July 13 Pre-Count	July 20 6 DAT	July 27 13 DAT	Aug 5 22 DAT				
Hero	10.3 oz/A	4.50a	0.00b	0.25a	2.25a	41.25b	7.00b	18.31a	0.24a
Tombstone Helios	2.8 oz/A	4.50a	0.00b	0.50a	0.25a	46.25b	8.00b	19.21a	0.27a
Untreated	---	4.50a	1.75a	1.75a	1.00a	77.5a	12.25a	18.00a	0.38a

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	Rate/A	Number Dectes Adults per 200 sweeps				% Infested Stems Aug 25	# Larvae per 30 stems Aug 25	Yield (BU/A) First Harvest Nov 4	Lodging Loss (BU/A) Nov 5	Yield (BU/A) Second Harvest Nov 30
		July 13 Pre-Count	July 20 6 DAT	July 27 13 DAT	Aug 4 21 DAT					
Hero	10.3 oz/A	9.00a	7.33b	8.33a	1.33a	23.33a	4.00a	56.15	0.47a	59.13a
Tombstone Helios	2.8 oz/A	11.33a	3.67b	8.67a	1.67a	23.33a	3.67a	55.45	0.39a	56.89a
Untreated	---	13.67a	13.33a	6.00a	0.67a	26.67a	6.33a	51.91	0.44a	53.54a

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

Conclusions: The Hero and Tombstone Helios treatments at both locations resulted in a significant reduction in the number of adult beetles at 6 DAT compared to the untreated control. At the Bridgeville location, there was also a significant reduction in the percent infested stems for both insecticide treatments compared to the untreated control. However, there were no differences in yield or lodging loss for both locations.

(B) Field Surveys to determine the percentage of the Delaware soybean acreage affected by Dectes stem borer and to calculate yield loss : Thirty eight full season soybeans fields were surveyed on a weekly basis from late June until early August to determine the seasonal abundance of Dectes stem borer adults. These same fields were sampled prior to harvest in an attempt to determine the percentage of infested plants and identify fields needing early harvest. In most cases, the majority of the fields were harvested on time; therefore, limited yield loss data was collected. Out of the 38 fields sampled, only 10 fields reached the proposed action threshold of one dectes adult borer per 10 sweeps. In fields with these adult levels, the final percentage of infested stems varied from zero to eighty-three percent of stems infested with larvae pre-harvest. In locations where the percentage of infested stems was 20% or greater, growers were advised to harvest early. Although we were not able to correlate levels of infestations with lodging losses, we were able to determine from one location that a 13 % infested stem level could result in a 5 BU/A loss if harvest was delayed. In a previous season, data collected from one location indicated that a 30% infestation level could result in a 15 BU/A loss when harvest was delayed. Additional surveys are needed to develop correlations between infested stems and lodging losses under varying environmental conditions.