INSECTICIDE EFFICACY ON HELIOTHINE AND STINK BUG INFESTATIONS IN NON*BT* COTTON

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Introduction

We have conducted field tests evaluating insecticide performance in non*Bt* cotton at the Southeastern Branch Research and Education Center (SEBRC) near Midville for over 30 years. Sex pheromone trapping of male moths indicates that the SEBRC usually has higher proportion of bollworm, *Helicoverpa zea* (Boddie), to tobacco budworm, *Heliothis virescens* F., infestations in cotton during late July-August. Populations of various species of stink bugs tend to increase in cotton throughout the season at the SEBRC and significant injury to fruit may occur during July-September. This research was conducted to evaluate performance consistency of registered insecticides for control of heliothine and stink bug infestations for comparison to previous years and to assess efficacy of new chemical materials for the pests.

Materials and Methods

A field test was conducted at the UGA Southeastern Branch Research and Education Center (SEBRC) in Burke County. The cotton was DP494R and four row plots (with one buffer row separating each plot) were established that were 40 feet long with 38 inch row width, separated by 15 foot alleys arranged in a randomized complete block design replicated four times. Plots were sprayed with a high cycle sprayer equipped with a four row boom using three TX 4 spray nozzles/row. The sprayer traveled at 3 mph and applied 10 gallons per acre finished spray volume. Sprays were initiated when 8% squares showed damage in the field on July 10 and applications were continued on July 17, 24, 31, and August 8. Adult bollworm and budworm (heliothine) populations were monitored weekly using a Hardstack pheromone trap for each species placed adjacent to the test field. Heliothine infestations were surveyed by examining the fruiting structures in plots for damage by selecting five plants in the two middle rows of each plot and examining all fruiting structures in the upper half of the plant for injury and larvae. Stink bug populations were monitored with sweep nets by sweeping over the upper third of plants in 25 feet of row in random locations in non-sprayed cotton in the field area. Stink bug injury to cotton in each plot was assessed on August 27 by randomly selecting four plants in each plot, removing all the bolls, freezing the samples, and then microwaving frozen bolls for four minutes to aid in opening for examination of stylet injury, hyperplasia (warts), and lint staining. The two middle rows of each plot were harvested with a cotton picker on November 20. Infestation and harvest data were analyzed using SAS Anova ($P<0.05$) procedures and Tukey's Studentized Range (HSD) Test for means separation.

Results and Discussion

Higher numbers of tobacco budworm as compared to bollworm were captured in sex pheromone traps on 7/10/08 and 7/17/08, but this reversed on 7/22/08 with higher percent bollworm to budworm through the last collection on 8/12/08 (Table 1). The most severe heliothine infestations were sampled on 7/22/08 and 7/29/08 (Table 3). Belt™, Tracer™, Coragen™, and Baythroid™ provided best control of heliothine infestations during this period in comparison to treatments with Leverage™, Endigo™, Orthene™, and Baythroid™ (Table 3). On the other hand, the data on stink bug injury (Table 4) shows these latter four treatments had best control whereas the first three compounds Belt™, Tracer™, and Coragen™ had poor suppression of stink bug damage. Yield (Table 4) was highest in Baythroid™, Belt™, Coragen™, Leverage™, and Endigo™ treatments.

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Table 1. Adult male moths caught in Hardstack pheromone traps during 2008 at the SEBRC.

Pheromone Trap Counts		
Date	**# *zea***	**# *virescens***
7/10/08	313	919
7/17/08	367	646
7/22/08	889	219
7/29/08	448	149
8/05/08	427	48
8/12/08	410	75

Table 2. Insecticide treatments used in 2008 SEBRC field experiment.

Treatment	Rate
Belt (flubendiamide) 4SC+ NIS (nonionic surfactant)	0.094 lbs ai/A + 0.5 lbs ai/A
Belt SC+ MSO	0.094 lbs ai/A + 0.5 lbs ai/A
Leverage (low rate) (imidacloprid, 17% + cyfluthrin 12%) 2.7 SC + NIS	0.048 lbs ai /A imidacloprid+ 0.033 lbs ai/A cyfluthrin + 0.5 lbs ai/A NIS
Leverage (high rate) + NIS	0.063 lbs ai/A imidacloprid+ 0.043 lbs ai/A cyfluthrin + 0.5 lbs ai/A NIS
Endigo (L-cyhalothrin 9.48% + thiamethoxam 12.6%) ZC+ NIS	0.0344 ai/A L-cyhalothrin + 0.0461 ai/A thiamethoxam + 0.5 lbs ai/A NIS
Orthene (asephate) 97S	0.8 lbs ai/A
Baythroid (beta-cyfluthrin) 1XL + NIS	0.017 lbs ai/A + 0.5 lbs ai/A
Tracer (spinosad) (480g/l) XL	0.063 lbs ai/A
Intrepid (methoxyfenozide) 2F	0.094 lbs ai/A
Coragen (rynaxypyr) 1.67 SC	0.088 lbs ai/A

Table 3. SEBRC helothine infestations during 2008.

	Damage assessment and larval counts on cotton by percentages and dates									
	7/14/08		7/22/08		7/29/08		8/5/08		8/12/08	
Treatments	Square	Larvae	Square	Larvae	Square	Larvae	Square	Larvae	Square	Larvae
Check	6.1a	1.0a	15.5abc	0.25a	25.4ab	2.3b	5.3b	0.5a	2.1b	0.0b
Orthene	6.6a	1.0a	19.9ab	0a	44.7a	5.8a	45.6a	1.5a	8.1a	1.3a
Endigo+NIS	6.6a	1.3a	23.7a	0a	23.9ab	1.8b	9.1b	0.5a	0.5b	0.3ab
Intrepid	4.0a	0.3a	10.9bcd	0a	13.6bc	1.5b	12.5b	1.3a	3.2b	0.5ab
Leverage (L) +NIS	4.9a	0.8a	10.3cde	0a	9.6bc	1.5b	1.3b	0.0a	1.3b	0.0b
Leverage (H) +NIS	4.3a	0.3a	9.9cde	0a	15.2bc	1.3b	3.8b	0.0a	0.0b	0.0b
Baythroid +NIS	3.1a	0.0a	9.8cdef	0a	4.2bc	0.5b	2.5b	0.0a	0.0b	0.0b
Tracer	1.7a	0.0a	3.1def	0a	11.9bc	0.3b	1.2b	0.3a	1.3b	0.0b
Belt+NIS	3.9a	0.3a	0.4f	0a	1.9c	0.3b	0.6b	0.0a	0.0b	0.0b
Belt+MSO	3.1a	0.3a	1.2ef	0a	0.0c	0.0b	0.0b	0.0a	0.0b	0.0b
Rynaxypyr	1.1a	0.3a	1.3ef	0a	0.0c	0.0b	1.7b	0.0a	0.0b	0.0b

Table 4. Stink bug injury to cotton bolls on 8/27/08 and yield in SEBRC experiment.

	Percent damage assessment by stink bug on cotton bolls				
Treatments	% Warts	% Staining + Stylet Punctures	% Stylet Punctures Only	% Damaged Bolls Overall	Lint Yield (Lbs/A)
Check	39.5abcd	4.1a	2.1a	43.5abc	1133.3cd
Orthene	31.7bcde	3.8a	5.0a	37.0abc	825.8d
Endigo+NIS	16.0cde	2.0a	0.6a	18.2c	1585.9ab
Intrepid	60.8a	2.4a	3.4a	63.1a	1332.4bc
Leverage (L) +NIS	17.3cde	3.7a	1.9a	21.9bc	1632.0ab
Leverage (H) +NIS	10.9e	4.4a	1.3a	15.9c	1426.7abc
Baythroid+NIS	12.7de	6.4a	1.5a	19.3c	1805.2a
Tracer	41.4abc	4.5a	6.4a	47.7ab	1441.2abc
Belt+NIS	39.2abcd	4.3a	3.9a	44.1abc	1568.0ab
Belt+MSO	36.9abcde	5.0a	5.6a	43.5abc	1634.6ab
Rynaxypyr	55.7ab	3.4a	6.1a	60.0a	1637.3ab