HELIOTHINE CONTROL WITH NEW AND EXISTING INSECTICIDES IN SOUTHEAST ARKANSAS

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Abstract

The Heliothine complex, comprised of the cotton bollworm, *Helicoverpa zea* (Boddie), and the tobacco budworm, *Heliothis virescens* (F.), was the major pest complex of conventional cotton varieties in Southeast Arkansas during 2001. The development of resistance to organophosphates, carbamates, and pyrethroids has facilitated the development of new chemistries of insecticides that may aid in controlling this pest complex, and our trials addressed the effectiveness of these new insecticides when compared with existing materials. Overall, Denim, Steward, XR-225, and F0570 provided good control of the Heliothine pest complex, especially when tank-mixed with a pyrethroid such as Baythroid or Asana.

Introduction

The development of new pest control measures is necessary for successful cotton production in Southeast Arkansas. The Heliothine (cotton bollworm, *Helicoverpa zea,* and the tobacco budworm, *Heliothis virescens*) pest complex continues to develop resistance to over-used classes of insecticides, but the development of new insecticides such as Denim, Steward, Tracer, Intrepid, and advanced pyrethroids should help ease the resistance problem. Previous research has addressed some of these new products (Kharboutli 2001, Reaper et al. 2001, Leonard et al. 2001), but their effectiveness needs evaluation over time. In trials conducted at the Southeast Branch Experiment Station, the effectiveness of these new insecticides was compared with that of existing standards.

Materials and Methods

Plots of cotton (Stoneville 474) planted on 4 June 2001 in loam soil at the Southeast Branch Experiment Station near Rohwer, Arkansas, were four rows (38 in) by forty feet. Treatments were randomly assigned to plots and were replicated four times. Standard field preparation and fertilization procedures were followed using Arkansas Recommendations (Chapman et al. 2000). Standard irrigation practices included four irrigations applied as needed according to the irrigation scheduler model.

Insecticides applied on 21, 27, and 29 August and 6 September for the Heliothine Trial (Test 1) and 17, 24, and 29 August 2001 for the Tank-mix Trial (Test 2) included the following insecticides: emamectin benzoate (Denim 0.16, Syngenta, Greensboro, NC, 0.0075 and 0.01 lb [AI]/A), indoxacarb (Steward 1.25, DuPont, Wilimington, DE, 0.104 lb [AI]/A), spinosad (Tracer 4, Dow AgroSciences, Indianapolis, IN, 0.067 lb [AI]/A), lambda-cyhalothrin (Karate 2.08, Syngenta, 0.025 lb [AI]/A), F0570 (FMC, Philadelphia, PA, 0.016 lb [Ai]/A), bifenthrin (Capture 2, FMC, 0.05 lb [AI]/A), cyfluthrin (Baythroid 2, Bayer, Kansas City, MO, 0.025 lb [AI]/A), imidacloprid/cyfluthrin (Leverage 2.7, Bayer, 0.0634 lb [AI]/A), methoxyfenozide (Intrepid 2F, Rohm and Haas, Philadelphia, PA, 0.2 lb [AI]/A), XR-225 (Dow AgroSciences, 0.00974 lb [AI]/A), acetamiprid (Assail 70WP, Aventis Crop Science, Research Triangle Park, NC, 0.05 lb [AI]/A), esfenvalerate (Asana XL, DuPont, 0.036 lb [AI]/A), profenofos (Curacron 8E, Syngenta, 0.5 lb [AI]/A), thiodicarb (Larvin 3.2, Aventis, 0.25 lb [AI]/A), and methomyl (Lannate LV, DuPont, 0.25 lb [AI]/A). Insecticides were applied using a 4-row CO2-powered plot boom attached to a hi-cycle sprayer calibrated to apply 10 GPA at 42 psi. Insect and damage data were collected by examining 25 terminals, 25 squares (below the terminal), and 25 bolls in each plot. Data were processed using Agriculture Research Manager (ARM) (Gylling Data Management, Inc., Brookings, SD), and means were separated using Least Significant Difference (LSD) procedures following significant F tests using Analysis of Variance (ANOVA).

Results and Discussion

Test 1 (Heliothine)

A large moth flight near the end of August resulted in trap counts that were approximately 55% tobacco budworm and 45% bollworm. All insecticide treatments provided significant suppression of budworm/bollworm larval populations at three days after the first application (3DAT1), while the compound F0570 and both rates of Denim provided the best control (Table 1). On the same date, all treatments resulted in significantly lower damage levels when compared with the UTC. Two days after the second application (2DAT2), both rates of Denim along with XR-225 provided the best control of Heliothines. On the same date, applications of Steward and XR-225 resulted in the lowest damage levels. Overall, some of the newest insecticides (XR-225, F0570, Denim, and Steward) demonstrated potential for use as budworm/bollworm materials, while most of the other materials did not provide satisfactory control of mixed budworm/bollworm populations. Similar results were seen for most of these new chemistries in other tests conducted (Kharboutli 2001, Reaper et al. 2001, Leonard et al. 2001).

Test 2 (Tank-Mix)

At four days after the first application (4DAT1), Denim + Baythroid (0.01 + 0.025) provided good control of mixed populations of budworm (55%) and bollworm (45%), while Steward + Asana, Lannate + Baythroid, and Tracer + Baythroid provided significant control as well. All tank-mixed insecticides provided adequate control of Heliothines following the second application (3DAT2), with Tracer, Denim, and Steward (all with Baythroid) all providing the best control. In a test conducted in 2000 at the same location, Tracer, Denim, and Steward were effective treatments in reducing worm count and damage (Kharboutli 2001).

Disclaimer

The mention of trade names in this report is for informational purposes only and does not imply an endorsement by the University of Arkansas Cooperative Extension Service.

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References

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Table 1. Average larvae and damage counts (damaged terminals, squares, and bolls) per 25 plants from Heliothine Trial 2001.

		15-Aug-01 (PT)		24-Aug-01 (3DAT1)		29-Aug-01 (2DAT2)	
Treatment (lb AI/A)	**$/acre**	***Avg. Larvae***	***Total Damage***	***Avg. Larvae***	***Total Damage***	***Avg. Larvae***	***Total Damage***
UTC	N/A	2.0 a	8.3 a	19.0 a	27.0 a	15.0 a	16.8 ab
Denim (0.0075)	$8.64	2.8 a	7.0 a	6.8 cd	12.0 b	7.8 cd	11.3 bc
Denim (0.01)	$11.53	4.5 a	6.3 a	6.5 cd	11.3 b	6.8 d	11.3 bc
Steward (0.104)	$13.77	2.3 a	5.0 a	7.0 cd	16.0 b	10.5 bcd	9.8 c
Tracer (0.0670)	$12.26	3.3 a	6.5 a	10.3 bc	12.0 b	9.8 bcd	11.8 bc
Karate Z (0.025)	$4.96	2.8 a	5.5 a	7.3 cd	11.8 b	10.0 bcd	12.5 abc
FO570 (0.016)	N/A	4.3 a	5.3 a	5.5 d	10.3 b	11.0 a-d	18.5 a
Capture (0.05)	$9.20	3.3 a	6.0 a	8.3 bcd	17.3 b	13.0 ab	13.8 abc
Baythroid (0.025)	$4.52	3.0 a	6.3 a	10.0 bc	13.3 b	8.3 cd	11.3 bc
Leverage (0.0634)	$9.04	3.0 a	6.0 a	7.0 cd	15.5 b	8.5 cd	10.0 c
Intrepid (0.2)	$18.60	2.3 a	4.8 a	9.8 bcd	14.0 b	11.8 abc	12.3 bc
XR-225 (0.00974)	N/A	2.3 a	5.0 a	8.8 bcd	13.3 b	7.5 cd	9.3 c
Assail (0.05)	N/A	3.5 a	6.3 a	12.3 b	14.8 b	9.5 bcd	14.8 abc

PT, pretreatment.
DAT, days after treatment.
$, insecticide costs not including application costs.

Table 2. Average larvae and damage counts (damaged terminals, squares, and bolls) per 25 plants from Tank-Mix Trial 2001.

		16-Aug-01 (PT)		**21-Aug-01 (4DAT1)**		**27-Aug-01 (3DAT2)**	
Treatment (lb AI/A)	**$/acre**	***Avg. Larvae***	***Total Damage***	***Avg. Larvae***	***Total Damage***	***Avg. Larvae***	***Total Damage***
UTC	N/A	3.3 a	5.5 ab	7.5 a	12.3 a	13.5 a	20.3 a
Intrepid (0.06) + Baythroid (0.025)	$10.10	2.5 a	5.3 b	4.3 abc	4.8 c	3.5 c	8.0 bc
Steward (0.09) + Asana (0.036)	$16.83	4.3 a	7.5 ab	2.3 bc	6.0 bc	4.0 c	6.3 c
Tracer (0.0626) + Baythroid)0.025)	$15.98	3.8 a	5.0 b	2.5 bc	5.3 bc	3.3 c	5.3 c
Denim (0.01) + Baythroid (0.025)	$16.05	3.5 a	4.5 b	1.5 c	5.3 bc	3.8 c	6.0 c
Assail (0.05) + Baythroid (0.025)	N/A	4.3 a	6.3 ab	3.5 bc	5.3 bc	5.0 bc	8.8 bc
Curacron (0.5) + Karate (0.025)	$10.98	4.0 a	6.0 ab	4.8 abc	6.3 bc	4.3 c	9.8bc
Larvin (0.25) + Baythroid (0.025)	$8.90	5.5 a	6.5 ab	5.5 ab	9.0 ab	5.3 bc	10.5 bc
Lannate (0.25) + Baythroid (0.025)	$9.68	3.8 a	6.3 ab	2.3 bc	3.3 c	4.0 c	10.0 bc
Baythroid (0.025)	$4.52	3.8 a	8.5 a	3.3 bc	6.3 bc	7.5 b	12.5 b

PT, pretreatment.

DAT, days after treatment.

$, insecticide costs not including application costs.