CONTROL OF LEPIDOPTERA PESTS IN COTTON WITH INTREPID™ EXPERIMENTAL INSECTICIDE

W. E. Harrison, L. C. Walton, and A. E. Duttle
Rohm and Haas Company
Philadelphia, PA

Abstract

Intrepid insecticide was evaluated for control of lepidopterous pests in cotton during the 1994-1996 growing seasons. The focal point of this research was to evaluate control of *Heliothis virescens* and *Heliocoverpa zea* larvae. During the course of these studies, efficacy data on foliar pests, cabbage and soybean looper, was also obtained. Intrepid was evaluated at 0.2-0.4 lb ai/acre alone and at 0.2-0.3 lb ai/acre in tank mixtures with Larvin, Curacron, and pyrethroids. Results from these studies indicated that Intrepid was equal to or better than the commercial standards for the control of the *Heliothis* complex. Control of the foliar feeding pests, cabbage and soybean looper, was excellent.

Introduction

Intrepid is a new and novel insecticide with a unique mode of action on lepidopterous pests. Intrepid is a molt accelerating compound, and when ingested, it mimics ecdysone, the insect molting hormone. It binds to the ecdysone receptor site of lepidoptera, causing the larvae to undergo a premature, lethal molt. After ingestion, larvae cease feeding within 24 hours and die, usually within 3 to 7 days.

For several decades, much of the cotton insect research has centered around control of *Helicoverpa zea*, the bollworm and *Heliothis virescens*, the tobacco budworm. With the development of resistance by *H. virescens* to many of the insecticide classes of chemistry, there is a continuing need to develop new approaches for control of *H. virescens* and other cotton insect pests. Further, there is a desire to develop new chemistries that will fit current and future resistance management programs, minimize impact on the environment and beneficial insects, while providing effective control of cotton insect pests.

Intrepid is being developed by Rohm and Haas Company for control of insect pests in cotton. Field evaluations of Intrepid insecticide on cotton began in 1994. Studies were established to (1) define the efficacy of Intrepid for control of the bollworm and tobacco budworm, (2) determine if tank mixing with other insecticides improves the performance of Intrepid for control of the *Heliothis* complex, and (3) define the efficacy against foliar feeding insect pests on cotton.

Results were obtained from small plot replicated trials conducted by Rohm and Haas personnel in the states of Texas, Arkansas, Mississippi, Alabama, and Georgia. The trials were applied by ground equipment at a volume of 10 gallons per acre. Treatments were arranged in a randomized complete block design with four replications. Plot size consisted of 4-6 rows x 50 feet. Efficacy was determined at 3-7 days following each application by counting *Heliothis* eggs, larvae, damaged terminals, damaged squares, and damaged bolls. Treatment and retreatment thresholds for *Heliothis* were based on parameters of 15% eggs and/or 8% larvae infestations. The efficacy of the foliar feeding pests was determined by counting the number of larvae per 3-6 feet of row and the defoliation caused by these pests. Intrepid was evaluated at rates from 0.2-0.4 alone and at 0.2-0.3 in tank mixtures with ovicidal rates of Larvin, and the lowest commercial rates of Curacron and a pyrethroid (Karate or Baythroid) for control of *Heliothis*. Rates from 0.125-0.4 were evaluated for control of foliar pests. The spray adjuvant Penetrator Plus was included with all Intrepid treatments.

Results and Discussion

Results of efficacy trials for control of *H. zea*, the bollworm, are shown in Tables 1-2. Table 1 represents a summary from 6 studies of the percent square damage caused by *H. zea* on cotton. Intrepid effectively reduced square damage over the untreated control, with the most effective reduction observed at rates from 0.3-0.4 lb ai/acre. Intrepid was comparable to the pyrethroid standards in these studies. Tank mixing with ovicidal rates of Larvin showed a further reduction in square damage. Tank mixes with low commercial rates of Curacron and the pyrethroid insecticides did not improve performance over Intrepid alone.

Table 2 shows boll counts and boll damage caused by *H. zea*. Intrepid applied alone showed an increase in undamaged bolls over the untreated control. As the rate of Intrepid was increased, the boll damage was decreased. A further decrease in boll damage was observed in tank mixes with Larvin, Curacron, and pyrethroid insecticides.

Results of the efficacy studies on *H. virescens* are shown in Tables 3-5. Table 3 shows egg and larvae precounts taken at various application timings from studies conducted in Alabama and Mississippi locations in 1995. Moderate to heavy infestation occurred at all sites.

Table 4 shows the percent square damage caused by *H. virescens*. Under the heavy infestation levels of *H. virescens* in these studies, Intrepid demonstrated an effective reduction in square damage over the untreated control and was better in performance when compared to

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 2:1091-1093 (1997)
National Cotton Council, Memphis TN

the pyrethroid standard. Tank mixing with ovicidal rates of Larvin further improved the performance of Intrepid in reducing square damage.

All treatments showed an increase in the number of undamaged bolls over the untreated control (Table 5).

Intrepid provided very effective control and further reduced the feeding damage caused by cabbage and soybean looper in cotton at rates from 0.125-0.4 lb ai/acre. Intrepid was more effective in control of the cabbage and soybean looper than the commercial standards (Table 6).

Conclusions

In all trials, Intrepid provided very effective control of *H. zea* and performed similar to the commercial standards. Intrepid demonstrated activity on *H. virescens*. This activity was most notably influenced by population dynamics and the rates of Intrepid applied. Tank mixing with Curacron and ovicidal rates of Larvin improved the performance against *H. virescens*. Intrepid provided excellent control of the foliar feeding pests, cabbage and soybean looper, at all rates evaluated.

Table 1. Evaluation of Intrepid Insecticide for Control of Bollworm in Cotton

Treatment[a]	Rate lb ai/A	% Square Damage[b]	
		1-2 Appl.	4-6 Appl.
Intrepid 80W	.20-.25	9.60	8.90
Intrepid 80W	.30-.40	9.20	5.80
Intrepid 80W+Larvin	.20-.30 + .25-.45	7.30	4.00
Intrepid 80W+Curacron	.20-.30 + .50	5.00	6.30
Intrepid 80W+Pyrethroid	.20-.30 + .025-.04	5.60	6.90
Pyrethroid	.025-.04	5.40	6.40
None	0.00	30.10	21.10

[a] Penetrator Plus included with all Intrepid treatments
[b] Data represents average of 6 studies, 1994-1996

Table 2: Evaluation of Intrepid Insecticide for Control of Bollworm in Cotton.

Treatment[a]	Rate lb ai/A	Number Undamaged Bolls/5 Plants	Percent Damaged[b] Bolls
Intrepid 80W	.20-.25	40.98	5.03
Intrepid 80W	.30-.40	39.32	4.78
Intrepid 80W + Larvin	.20-.30+.25-.45	32.68	3.13
Intrepid 80W+Pyrethroid	.20-.30+.025-.04	51.09	2.65
Pyrethroid	.025-.04	44.27	3.90
None	0.00	20.36	4.90

[a] Penetrator Plus included with all Intrepid treatments
[b] Data represents average of 6 studies, 1994-1996

Table 3: Percent Egg and Live Larvae Counts of Tobacco Budworm

Calhoun City, MS			Inverness, MS			Shorter, AL		
Date	Egg	Larvae	Date	Egg	Larvae	Date	Egg	Larvae
8/12	16	18	7/21	15	8	6/23	15	13
8/15	20	25	7/26	12	10	7/18	13	20
8/18	100	32	8/02	9	19	7/24	105	73
8/22	248	156	8/09	11	17			
8/25	800	220	8/16	7	14			
8/28	256							

Studies conducted in 1995

Table 4: Evaluation of Intrepid Insecticide for Control of Tobacco Budworm in Cotton

Treatment[a]	Rate lb ai/A	% Square Damage[b]	
		1-2 Appl.	3-6 Appl.
Intrepid 80W	.20-.25	4.20	17.30
Intrepid 80W	.30-.40	4.20	17.60
Intrepid 80W+Larvin	.20-.30+.25-.45	2.00	8.10
Intrepid 80W+Curacron	.20-.30+.50	4.00	19.20
Intrepid 80W+Pyrethroid	.20-.30+.025-.04	7.90	24.20
Pyrethroid	.025-.04	7.90	24.20
None	0.00	27.00	62.00

[a] Penetrator Plus included with all Intrepid treatments
[b] Data represents average of 3 studies, 1995

Table 5: Evaluation of Intrepid Insecticide for Control of Tobacco Budworm in Cotton

Treatment[a]	Rate lb ai/A	Number Undamaged Bolls/5 Plants	Percent Damaged[b] Bolls
Intrepid 80W	.20-.25	39.05	0.70
Intrepid 80W	.30-.40	49.93	0.70
Intrepid 80W + Larvin	.20-.30+.25-.45	44.80	0.70
Intrepid 80W+Pyrethroid	.20-.30+.025-.04	40.70	0.80
Pyrethroid	.025-.04	43.50	0.50
None	0.00	31.50	3.20

[a] Penetrator Plus included with all Intrepid treatments
[b] Data represents average of 3 studies, 1995

Table 6: Evaluation of Intrepid Insecticide for Control of Foliar Feeding Pests in Cotton

Treatment[a]	Rate lb ai/A	Looper[b]			
		Cabbage		Soybean	
		# Larvae	% Def.	# Larvae	% Def.
Intrepid 80W	0.125	4.30	13.50	7.50	15.00
Intrepid 80W	0.25	0.00	0.00	5.65	23.75
Intrepid 80W	0.35-.40	0.00	0.00	0.00	0.00
Larvin	0.40-0.60	17.00	9.30	30.00	27.50
None	0.00	36.10	31.90	68.90	45.00

[a] Penetrator Plus or Latron CS-7 included with all treatments
[b] Represents summary of 4 studies