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CONTROLLING COTTON PESTS WITH INSECTICIDES APPLIED ON BAND VERSUS BROADCAST APPLICATIONS

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Abstract

Field tests in 2000 and 2001 were conducted to determine the entomological and economic impact of controlling cotton pests with insecticides applied by ground on a 20-inch band versus broadcast applications. In 2000, there were no measurable differences between broadcast and banded treatments in terms of insect control, boll retention and yield. In 2001 there were no differences between treatments in terms of insect control and boll retention, but yield data were quite variable due to the extreme weather conditions in August and early September.

Introduction

Insect control costs, depending on a given year, are quite often the single most expensive input associated with producing cotton in the Mid South. Cotton insecticides are generally applied broadcast (2-nozzles/row) with ground equipment. In 2000, research was initiated by ARS scientists located at the Jamie Whitten Delta States Research Center (Stoneville, MS) in cooperation with the Mississippi State University Delta Research and Extension Center at Stoneville to determine the impact of banded insecticides (1-nozzle/row) on insect control, boll retention, insect control, cost, and yield.

Methods and Materials

In 2000, two farm cooperators were selected to begin testing the entomological and economic impact of banded versus broadcast applications of insecticides. Field size varied from 47 to 72 acres. In 2001, five farm cooperators were identified and field size varied from 40 to 90 acres. During both years, plots were sprayed with a John Deere High Clearance sprayer fitted with 8004E Evenspray nozzle tips and calibrated to deliver a total of 10 gallons/acre for the broadcast treatment and 5 gallons/acre for the banded treatment. Insecticide usage was determined by the target pest(s) at time of application. Plots were 32 rows wide, ran for the entire length of the field, and averaged from 7 to 12 acres. Each treatment was replicated 4 times at each location. Insect data and green boll counts collected through the end of July were analyzed by ANOV (SAS Institute 1989), and means separated by LSD. Yield data were collected by harvesting 8 rows from each plot using a 4-row cotton picker and weighed on a boll buggy equipped with load cells. Tests both years were conducted utilizing conventional cotton varieties without the *Bt* technology.

Results and Discussion

During both years, there were no significant differences in the level of control of insect pests (terminal larvae and tarnished plant bugs) or green boll counts between the broadcast and banded treatment. The number and type of insecticides and the target pest for 2 farms in 2000 are shown in Table 1. Farm A was dry land cotton and received only 2 insecticide applications because of light insect pressure. Farm B was irrigated and received 6 applications. At both locations tarnished plant bug and bollworm/budworm were targeted pests. Yield data for the two locations in 2000 in Table 2 showed no yield differences between the broadcast and banded treatment at each farm. Table 3 shows the number and type of insecticides and target pests for 5 farms in 2001. Insect pressure from plant bugs and worms were somewhat greater in 2001 as reflected in the increased number of applications per farm. Yield differences in the broadcast versus banded treatments for 2001 are shown in Table 4. Yield between the five farm locations varied from 13 to 93 lbs of lint/A less in the banded than broadcast treatment. Lint yields on each farm were from 300 to 400 lbs/acre less in 2001 than that harvested in 2000 (conversation with growers). The difference in insect control costs on broadcast and 20-inch band by farm can be seen in Table 5. The difference in cost of controlling insect pests with insecticide applied on 20-inch band was considerably less than observed in the broadcast applications. The value of the yield on broadcast and 20-inch band by farm is shown in Table 6. Regardless of whether the value was determined for

control cost per acre at $.50 per pound on lint for broadcast over banded applications. Returns were in favor on three of five farms for the banded treatment. Table 8 shows the returns above difference in insect control cost per acre for cotton at $.60 per pound of lint. Again, returns were in favor on three of five farms for the banded treatment.

The Stoneville, Mississippi weather for August and early September as compared to the long-term averages can be seen in Table 9. Total rainfall for August and the first week of September was the highest on record. Also recorded were approximately 40% less heat units during this same time period. Because of extreme inclement weather in 2001 and the destruction of cracked and open bolls to boll rot on the lower fruiting positions, the 2001 yield data did not reflect what would happen on a more normal year.

Table 1. Number and type of insecticide applications, 2 locations, Mississippi, 2000.

Location	Date	Material	Insecticide Rate lbs/AI/acre	Air (A) or Ground (G)
Holly Ridge	6/27	Bidrin	0.30	G
Holly Ridge	7/19	Orthene	1.0	G
Tribbett	6/6	Orthene	0.33	A
Tribbett	5/5	Orthene	0.33	G
Tribbett	7/3	Bidrin	0.30	G
Tribbett	7/12	Orthene	1.0	G
Tribbett	7/18	Steward	0.09	G
Tribbett	8/10	Denim	0.011	A

Table 2. Estimated lint yield per acre, 2 treatments, 2 locations, Mississippi, 2000.

Location	Broadcast	Banded
Holly Ridge	469	488
Tribbett	962	965

Table 3. Applications, rate, and target pest, 2001.

Farm Number	Date	Insecticide rate lbs/AI/acre	Target Pest
1	6/4	Bidrin .30	TPB[1]
	6/19	Leverage .06	TPB
	7/18	Baythroid .04	TPB/Worms[2]
	7/26	Orthene 1.0	Worms/TPB
	8/3	Orthene .75 (airplane)	TPB
2	5/30	Bidrin .30	TPB
	6/8	Bidrin .45, Larvin .77 (airplane)	TPB
	6/14	Bidrin .30, Larvin .125	TPB
	6/20	Leverage .07	TPB
	7/10	Bidrin .30	TPB
	7/19	Baythroid .04	TPB/Worms
	7/25	Orthene 1.0	Worms/TPB
3	6/18	Bidrin .30	TPB
	7/2	Bidrin .22	TPB
	7/18	Baythroid .037	TPB
	7/31	Curacron 1.0	Worms/TPB
4	5/30	Bidrin .3	TPB
	6/19	Leverage .06	TPB
	7/19	Baythroid .04	TPB/Worms
	7/26	Orthene 1.0	Worms/TPB
	8/3	Orthene .75 (airplane)	Worms/TPB
5	6/11	Bidrin .30	TPB
	6/21	Baythroid .03	TPB
	7/17	Baythroid .04	TPB
	7/25	Orthene 1.0	Worms/TPB
	8/13	Decis .03, Orthene .50 (airplane)	SMC[3]/Eggs/TPB

[1] Tarnished plant bug.
[2] Bollworm/tobacco budworm.
[3] Saltmarsh caterpillar.

Table 4. Yield difference in broadcast versus banded insect control study, 2001.

	Yield – lbs/acre		
Farm Number	Broadcast	Banded	Difference
1	721	648	73
2	701	608	93
3	652	628	24
4	698	648	50
5	443	430	13

Table 5. Difference in insect control costs on broadcast and 20-inch band, by farm, 2001.

	Yield – lbs/acre		
Farm Number	Broadcast	Banded	Difference
1	$ 75.78	$ 45.42	$ 30.36
2	$ 90.98	$ 53.57	$ 37.41
3	$ 61.69	$ 33.34	$ 28.35
4	$ 76.46	$ 45.62	$ 30.84
5	$ 48.82	$ 33.34	$ 15.48

Table 6. Value of yield on broadcast and 10-inch band, by farm, 2001.

	$0.50/lb lint		$0.60/lb lint	
Farm Number	**Broadcast**	**20" band**	**Broadcast**	**20" band**
1	$ 360.50	$ 324.00	$ 432.60	$ 388.80
2	$ 350.50	$ 304.00	$ 420.60	$ 364.80
3	$ 326.00	$ 314.00	$ 391.20	$ 376.80
4	$ 349.00	$ 324.00	$ 418.80	$ 388.80
5	$ 221.50	$ 215.00	$ 265.80	$ 258.00

Table 7. Returns above difference in insect control costs per acre at $.50 per pound of lint, 2001.

Farm No.	Added Lint Value	Added Insect Control Costs	Additional Returns
1	$ 36.50	$ 30.36	$ 6.14
2	$ 46.50	$ 37.41	$ 9.09
3	$ 12.00	$ 28.35	$- 16.35
4	$ 25.00	$ 30.84	$- 5.84
5	$ 6.50	$ 15.48	$- 8.98

Table 8. Returns above difference in insect control costs per acre at $.60 per pound of lint, 2001.

Farm No.	Added Lint Value	Added Insect Control Costs	Additional Returns
1	$ 43.80	$ 30.68	$ 7.12
2	$ 55.80	$ 67.41	$ 18.39
3	$ 14.40	$ 28.35	$ -13.95
4	$ 30.00	$ 30.84	$ - 0.84
5	$ 7.80	$ 15.48	$ - 7.68

Table 9. Stoneville weather records.

	Actual 2001		Normal 1964 - 1993	
Date	**Rainfall (in)**	**AV Solar Radiation**	**Rainfall (in)**	**AV Solar Radiation**
8/01-15/01	3.77	370	1.12	526
8/16-31/01	4.70	342	1.21	500
9/01-06/01	2.62	205	.65	462
TOTAL	11.09	917	2.98	1488