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THE ECONOMICS OF FULL SEASON BANDED INSECTICIDE APPLICATIONS IN COTTON

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Abstract

Small plot research conducted by USDA, ARS at Stoneville, MS, indicated that there was a potential for significant savings in the use of banded insecticide applications versus broadcast applications. Two large fields were chosen for this study in 2000, one treatment being 20-inch band and the other treatment broadcast. Due to the dry year, no aerial applications were required. On these two farms, there was a significant savings in insecticide costs in 2000 as the yields between the two treatments on each farm were the same. The test was expanded to five farms in 2001. In all cases, yields were slightly better on the broadcast treatments than on the banded treatments. However, when the cost of the broadcast treatments versus banded treatments were taken into account, returns were maximized as a result of yield increases on two farms and maximized on three farms due to a savings in insecticide costs. This study will be repeated in 2002.

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. Insect control costs include insecticides and application costs as well as scouting to determine the need for an insecticide application. Insect control costs may or may not include Bt technology in the Mid-South. Some preliminary research conducted by ARS indicated that there is a potential for achieving fully satisfactory insect control at reduced costs by applying 20-inch bands of insecticides rather than broadcasting it over the entire 40-inch row. As this potential savings appeared to be considerable, a full-scale, on-farm study was initiated in 2001.

Materials and Methods

Two farm cooperators were identified in 2000 to begin testing the entomological and economic impact of banded versus broadcast applications of insecticides. One of the two fields was Dundee and Dubbs silt loam soil types and included approximately 72 acres. The other field was Dubbs silty clay loam and Foresdale silty clay and included approximately 47 acres. Thirty-two row plots the length of the field were identified and randomized with four replications of banded applications and four replications of broadcast applications. This work was initiated to make a preliminary evaluation of banded insecticide applications before a full scale test was undertaken. The decision to only test two farms in 2000 was based on the high cost associated with such tests. These tests were carried out throughout the growing season by ARS/ USDA, Stoneville. Boll counts were made at node above white flower five (NAWF5) and again one week after defoliation. The tests were harvested using the farmers' 4-row cotton pickers and weighed on an ARS boll buggy equipped with load cells. Exactly the same procedures were used in 2001 except that the test was expanded to five farms. The fields for both 2000 and 2001were planted to conventional varieties, that is varieties not incorporating the Bt technology.

The cost of insect scouting was not included in the marginal analysis because ARS entomologists were responsible for the scouting and decision making as to when and what to apply for the insect infestations. Insecticides and application costs used for ground equipment and aerial application were those published in Ag Econ Report 110 for the year 2000 (Parvin, 1999) and Ag Econ Report 116 (Parvin, 2000).

Results

Entomology

During both years (2000 and 2001) 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 treatments. Farm A was dryland cotton and received only two insecticide applications because of light insect pressure. Farm B was irrigated and received six applications. Insect pressure from plant bugs and worms were somewhat greater in 2001 as reflected in the increased number of applications per farm. Lint yields on each farm were from 300 to 400 pounds less in 2001 than that harvested in 2000.

Economics

Results of the study on the two farms in 2000 indicated that two insecticide applications were made on one farm and six on the other. The farm in which six applications were made was irrigated. All applications were made by ground machine as it was an extremely dry growing season. On the dryland farm, the broadcast yield was 469 pounds of lint per acre and the banded treatment yield was 488 pounds. On the irrigated farm, the broadcast yield was 962 pounds versus 965 pounds for the banded treatments. As only two applications were made on the dryland farm, a savings of $5.20 per acre in insecticides was realized. On the irrigated farm with six applications, a savings of $29.54 was realized due to banded applications. These numbers are absolute as there was no significant difference in yield between the broadcast and banded treatments on either farm.

The potential shown for significant savings to farmers by the banded application method in 2000 justified expansion of this study in 2001. Five farms were identified and included in the study in 2001. Field size varied from 68 to 120 acres and plots of banded and broadcast application treatments were arranged in randomized blocks replicated four times in each field. The procedures were the same as used in the year 2000. Table 1 reports the difference in yield between banded and broadcast applications of insecticides. In all cases, broadcast insecticides made a higher yield which ranged from as high as 93 pounds of lint per acre down to 13 pounds per acre (Table 1). Four to seven insecticide applications were made on these farms in 2001. The tarnished plant bug was the principal insect pest. Appendix Table 1 indicates the material, rate applied, and target pest for each application on each of these farms. Aerial applications are indicated where they are used. Aerial applications required during this year represent broadcast applications on both banded and broadcast plots and the cost of broadcast applications are included with each respective treatment. Table 2 shows the insecticide cost for both broadcast and banded applications and the difference in costs for each farm. Table 3 presents the value per acre at $0.50 and $0.60 per pound of lint for each treatment on each farm. Tables 4 and 5 show the marginal returns for the two treatments at $0.50 and $0.60 per pound of lint. Price paid for lint would be a factor in the decision to use broadcast treatments.

Conclusions

Results of the 2-year study indicate a considerable potential for use of banded ground applications wherever possible. Due to extremely inclement weather in 2001 and the destruction due to boll rot of the open, i.e. lower position bolls on the plants, the 2001 data may not reflect what would happen in a more normal year. For this reason, coupled with the potential that appears to exist for banded applications, this test will be conducted again in 2002.

References

Parvin, D. W., W. P. Scott, and F. T. Cooke. 2001. The economics of banded versus broadcast insecticides. MSU/MAFES, Dept of Agri. Econ. Research Report 2001-002.

Parvin, D. W., et al. 1999. Delta 2000 planning budgets. Mississippi Agricultural & Forestry Experiment Station, Mississippi State University Extension Service, Mississippi State University, Agricultural Economics Report 110.

Parvin, D. W., et al. 2000. Cotton 2001 planning budgets. Mississippi Agricultural & Forestry Experiment Station, Mississippi State University Extension Service, Mississippi State University, Agricultural Economics Report 116.

Table 1. Yield difference in broadcast versus banded insect control study, 2001.

	Yield - pounds/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 2. Difference in insect control costs on broadcast and 20-inch band, by farm.

	Insect control costs - $ per acre		
Farm Number	**Broadcast**	**20" band**	**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 3. Value of yield on broadcast and 20-inch band, by farm.

	$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 4. Difference in return to the broadcast insecticide application treatment based on its added lint value and added insect control costs relative to the banded insecticide application treatment, when lint value is $0.50 per pound.

Farm No.	Added lint value	Added insect control costs	Marginal 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 5. Difference in return to the broadcast insecticide application treatment based on its added lint value and added insect control costs relative to the banded insecticide application treatment, when lint value is $0.60 per pound.

Farm No.	Added lint value	Added insect control	Marginal returns
1	43.80	30.68	7.12
2	55.80	37.41	18.39
3	14.40	28.35	-13.95
4	30.00	30.84	-0.84
5	7.80	15.48	-7.68

Appendix table 1. Date of treatment, material and rate, and target pest for the five farms studied in 2001.

Farm number	Date	Insecticide rate	Target
1	6/4	Bidrin .3	TPB
	6/19	Leverage .06	TPB
	7/18	Baythroid .04	TPB/worms
	7/26	Orthene 1	worms/TPB
	8/3	Orthene .75 (airplane)	TPB
2	5/30	Bidrin .3	TPB
	6/8	Bidrin .45, Larvin .77 (airplane)	TPB
	6/14	Bidrin .3, Larvin .125	TPB
	6/20	Leverage .07	TPB
	7/10	Bidrin .3	TPB
	7/19	Baythroid .04	TPB/worms
	7/25	Orthene 1	worms/TPB
3	6/18	Bidrin .3	TPB
	7/2	Bidrin .22	TPB
	7/18	Baythroid .037	TPB
	7/31	Curacron 1	worms/TPB
4	5/30	Bidrin .3	TPB
	6/19	Leverage .06	TPB
	7/19	Baythroid .04	TPB/worms
	7/26	Orthene 1	worms/TPB
	8/3	Orthene .75 (airplane)	worms/TPB
5	6/11	Bidrin .3	TPB
	6/21	Baythroid .03	TPB
	7/17	Baythroid .04	TPB
	7/25	Orthene 1	worms/TPB
	8/13	Decis .03, Orthene .5 (airplane)	SMC/eggs/TPB

*Worms = heliothine, TPB = tarnished plant bug, SMC =salt marsh caterpillars, eggs = heliothine