ECONOMIC EVALUATION OF INSECTICIDE TERMINATION BY COTMAN

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Abstract

The COTMAN system suggests that insecticide treatments after NAWF=5 plus 350 heat units are no longer protecting bolls that likely contribute to harvestable yield and hence are uneconomical. This paper reports on efforts to test this hypothesis. Mean yields were statistically different in only 3 of 32 cases. The number of applications saved by terminating based on the COTMAN recommendations averaged 1.66 reducing insect control cost by $19.33 /acre

Introduction

Cotton producers in the Mid-South have been concerned over the high cost of insect control for several years. This is especially true in regions that have experienced resistance problems with the tobacco budworm. The use of a plant monitoring system to terminate late-season insecticide treatments poses great potential to reduce control costs (Cochran et al. 1994).

COTMAN is a computer aided Cotton Management system which enables growers to make more informed management decisions. COTMAN allows a producer to time insecticide termination based on crop growth patterns and accumulation of heat units past cutout (King et al. 1996). Cutout is reached when the Nodes Above White Flower count is equal to five (NAWF=5). Termination of insecticide applications is recommended when 350 heat units have been accumulated after NAWF=5 (King et al. 1996). Therefore, the COTMAN system suggests that "treatments after NAWF=5 plus 350 heat units are no longer protecting bolls that likely contribute to harvestable yield and hence are uneconomical" (Cochran et al. 1994). This paper reports on efforts to test this hypothesis.

Methods and Data

To test the hypothesis that insecticide treatments after NAWF=5 plus 350 heat units are uneconomical, tests were conducted on grower fields in Arkansas from 1995 to 1998, in Mississippi from 1995 to 1996, and in Texas in 1995. These were replicated tests using plots ranging in size from 0.2 acres to 7 acres with anywhere from 2 to 10 replications per test. Treatments consisted of; 1)terminating insecticide applications as recommended by COTMAN, or 2) terminating insecticide treatments following the grower's conventional economic thresholds. Each field was scouted for insects. The COTMAN system of plant monitoring, daily weather data, individual field information and computer software was used to recommend insecticide termination. All blocks for a single field were treated identically until the NAWF=5 plus 350 heat unit level was reached. At that point insecticide treatments for weevils and worms were terminated on one-half of the blocks. The remaining blocks received insecticide treatments until the grower or consultant felt it was safe to terminate. Any treatments made beyond that recommended by COTMAN were noted and the cost of each treatment was determined. The yields for each block were taken at harvest. Statistical methods were then used to determine if mean yields between treatments were statistically different.

Results

Yields, number of late season applications, and additional control costs are presented in Table 1. Mean yields were statistically different in only 3 of 32 cases. Across all years and locations, yields when terminating insecticide applications as recommended by COTMAN averaged 829.3 lb/acre while yields receiving the full season of applications averaged 830.52 lb/acre. The number of applications saved by terminating based on the COTMAN recommendations averaged 1.66 reducing insect control costs by $19.33 /acre. These results indicate that insecticide treatments after NAWF=5 plus 350 heat units are uneconomical in most cases.

References

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Table 1. Yields, number of insecticide applications beyond NAWF=5 plus 350 heat units, and additional control cost comparing termination at 350 heat units to the grower's normal production practices.

State and Year	Yield, 350 HU Term.	Yield,* Full Season Treatment	Number of Reps	SE of estimate	Number Late Season App.	Add-itional Control Costs
AR						
1995						
**	**782.46**	**819.32**	10	10.92	1	9.2
	690.90	688.20	10	13.36	1	9.2
	838.84	831.46	10	8.01	1	9.2
***	834.00	843.20	2	0.00	3	35.4
1996						
	596.00	513.00	2	125.00	1	11.8
	607.50	652.00	2	24.50	1	11.8
1997						
	957.99	951.39	4	24.72	1	32.6
	640.46	599.48	5	88.62	1	10.5
1998						
	774.78	745.06	2	50.69	2	17.9
	481.42	489.22	5	3.94	2	14.6
	785.32	790.60	3	75.95	1	10.8
	929.57	**845.83**	4	17.33	1	7.3
	1019.14	896.17	4	90.49	2	25.4
	728.14	739.86	4	12.81	2	28.5
	494.46	502.56	3	19.38	1	12.8
	867.35	867.68	3	15.61	2	20.1
	432.68	445.87	7	20.16	2	20.1
MS						
1995						
	992.12	961.18	1	0.00	4	56.3
	482.23	473.95	3	22.71	2	10.3
	589.94	555.86	3	19.19	2	10.8
	743.07	792.71	2	26.18	1	17.7
	1053.43	1000.85	3	70.11	1	14.5
	683.20	735.10	3	104.13	1	2.4
	916.07	893.41	3	16.89	2	32.8
1996						
	1134.58	**1310.05**	3	49.78	2	21.9
	915.25	989.29	3	38.34	2	18.6
	726.63	714.67	3	21.39	2	31.6
	1416.90	1430.30	3	124.45	1	17.0
	1254.65	1222.02	5	32.70	NA	NA
	985.60	947.50	3	163.35	5	70.9
TX						
1995						
	911.51	948.64	3	39.98	1	6.8
	1130.90	1163.42	3	57.33	1	6.8
	969.68	1047.28	3	70.92	1	6.8
Mean	829.30	830.52			1.66	19.5

* Observations in bold are significantly different at the 95% confidence level.

**Field had substantial replant; insecticide termination rules changed to recommend 450 heat units in such situations.

***In a separate analysis, revenues were computed based on yield and additional control costs. Termination at 350 heat units resulted in significantly higher revenue compared to full-season control.