A MULTI-STATE EVALUATION OF COTMAN INSECTICIDE TERMINATION RULES

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Abstract

The results of the 1996 multi-state evaluation of the COTMAN insecticide termination rules are presented. Small plot experiments produced no evidnece that yields would be reduced by terminating insecticide treatments when COTMAN suggests. No statistically significant differences in yields, gross revenues nor net revenues were detected in large plot comparisons between the COTMAN rules and full season insect control following growers' normal economic thresholds.

Introduction

The COTMAN expert system is designed to integrate plant monitoring data with other information and make recommendations that assist in practical cotton management decisions. One of the most widely used decision rules within COTMAN is that for terminating insecticide applications based on cutout and heat unit accumulations. Bagwell and Tugwell established that bolls that have reached a level of maturity represented by 350 heat units (HU) after cutout are not as susceptible to bollworm and weevil damage (Bagwell and Tugwell, 1992). Bolls at this stage of development are also not as attractive to these to these pests. Within COTMAN, cutout is defined as the earlier of Nodes Above White Flower (NAWF) equal to 5 or the latest possible cutout determined from the long term weather patterns, the target harvest completion date, and the Gower selected level of risk tolerance. The former is referred to as physiological cutout while the latter is labeled as seasonal cutout. The purpose of this report is to describe results from a multi-state evaluation of a COTMAN insecticide termination study. Previous studies have concluded that significant economic benefits can be generated by following these termination rules (Cochran, et al., 1996; Harris, et al., 1997). Insect control cost savings are frequently observed without yield reductions.

Methods

Evaluations were conducted in two phases. Small plot experiments were designed to test for significant differences in mean yields. Treatments included the termination of insecticide applications at the following thresholds: 1) NAWF = 5; 2) NAWF = 5 plus 200 HU; 3) NAWF = 5 plus 350 HU; 4) NAWF = 5 plus 500 HU; and 5) NAWF = 5 plus 650 HU. These experiments did provide data adequate to examine the trade-offs between insect control cost savings and the value of any yield differences. A second phase evaluated the termination rule in large farm fields with late season infestations. The COTMAN rule was compared in replicated strips of 7 to 10 acres against a full season control using the grower's normal economic thresholds. Data on yields, insect control costs and fiber properties were conducted in these trials.

Results

The results from the small plot experiments in Arkansas, Louisiana and Mississippi are presented in Tables 1-3. In no case was there any evidence that the COTMAN termination rule would result in statistically significant lower yields. In five of the seven trials, however, termination at NAWF = 5 plus 350 HU did produce the largest numerical yield. A similar pattern is observed when yields are converted to gross revenues using a base price of $.70/lb and the Ethridge estimated premiums and discounts for fiber properties (Ethridge, 1996).

In the large plot experiments from Arkansas and Mississippi, the full season insect control normally followed by growers resulted in 1 to 5 additional applications. These results are presented in Tables 4-7. No significant differences in mean yields were detected. In four of eight trials that yields from the COTMAN rule were higher than the yields observed in the full season control plots. In three of five trials for which fiber property information was available, the COTMAN rule resulted in a higher gross revenue. Net revenues above late season insect control costs were calculated for seven trials. In no single case were significant differences observed. In four of seven cases, the COTMAN rule did generate a higher numerical net revenue.

Conclusion

The 1996 results from the multi-state evaluations did not provide any concrete evidence that yields would be reduced by following the COTMAN insecticide termination rules. In many cases, 1 to 5 applications could be avoided. No significant differences in yields, fiber properties nor net revenues were detected.

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Table 1. Actual Heat Units from Cutout to Insecticide Termination for Treatments, Small Plot Experiments, 1996

	Heat Unit Treatments				
	0 HU	200 HU	350 HU	500 HU	650 HU
Experiment	Actual Heat Units from Cutout to Termination				
Marianna (AR)*	0	200	350	500	650
MRTRM961 (LA)	0	194	334	459	622
MRTRM963 (LA)	32	291	396	528	655
SJTRM961 (LA)	25	240	386	508	652
MRTRM962 (LA)*	32	291	396	528	655
BM (MS)	98	200	300	400	500
PH (MS)		230	318	450	

*These small plots involved late-maturing growth patterns and cutout was defined by the Latest Possible Cutout Date

Table 2. Yield for Heat Unit Treatments for Insecticide Termination, Small Plot Experiments, 1996

	Heat Unit Treatments					
	0 HU	200 HU	350 HU	500 HU	650 HU	
Experiment	Lint Yield (lb./acre)					LSD
Marianna (AR)*	931	1025	1153	1017	1091	141
MRTRM961 (LA)	750	763	801	783	777	65
MRTRM963 (LA)	1143	1150	1228	1420	1343	202
SJTRM961 (LA)	1357	1361	1309	1288	1338	138
MRTRM962 (LA)*	351	393	397	395	349	95
BM (MS)	1271	1377	1442	1427	1327	206
PH (MS)		1106	1256	1202		158

*These small plots involved late-maturing growth patterns and cutout was defined by the Latest Possible Cutout Date

Table 3. Gross Revenue for Heat Unit Treatments for Insecticide Termination, Small Plot Experiments, 1996*

	Heat Unit Treatments					
	0 HU	200 HU	350 HU	500 HU	650 HU	
Experiment	Gross Revenue ($/acre)					LSD
Marianna (AR)**	652	717	807	712	764	99
MRTRM961 (LA)	525	534	560	548	544	45
MRTRM963 (LA)	800	805	860	994	940	142
SJTRM961 (LA)	950	952	916	902	936	96
MRTRM962 (LA)**	246	275	278	276	244	67
BM (MS)	889	963	1009	998	928	144
PH (MS)		774	878	841		110

*Discounts/premiums were based on information in Don Ethridge, "Valuing HVI Quality Differences in U.S. Cotton", Proceedings of the 1996 Beltwide Cotton Conferences, pp. 78 83. A base price of $.70 was used.

**These small plots involved late-maturing growth patterns and cutout was defined by the Latest Possible Cutout Date.

Table 4. Number of Insecticide Treatments after 350 Heat Units from Cutout, Large Plot Studies, 1996

	Insecticide Treatment	
	Early Termination (350 Heat Units)	Full Season (Producer Termination)
Farm	Number of Applications	
Parten (AR)	0	1
Young (AR)	0	1
BM (MS)	0	2
HN (MS)	0	2
JO (MS)	0	2
KP (MS)	0	1
LJM (MS)	0	not available
RO (MS)	0	5

Table 5.Yield of Large Plot Studies, 1996

	Insecticide Treatment		
	Early Termination (350 Heat Units)	Full Season (Producer Termination)	
Farm	Lint Yield (lb./acre)		LSD
Parten (AR)	596	513	1588
Young (AR)	608	652	311
BM (MS)	1135	1310	214
HN (MS)	915	989	165
JO (MS)	727	715	92
KP (MS)	1417	1430	535
LJM (MS)	1255	1222	91
RO (MS)	986	948	1895

Table 6.Gross Revenue Adjusted by Quality Premiums/Discounts, Large Plot Studies, 1996*

	Insecticide Treatment		
	Early Termination (350 Heat Units)	Full Season (Producer Termination)	
Farm	Gross Revenue ($/acre)		LSD
Parten (AR)	not available		
Young (AR)	not available		
BM (MS)	not available		
HN (MS)	640	692	116
JO (MS)	508	500	65
KP (MS)	991	1001	374
LJM (MS)	878	855	64
RO (MS)	690	663	1322

*Discounts/premiums were based on information in Don Ethridge, “Valuing HVI Quality Differences in U.S. Cotton”, Proceedings of the 1996 Beltwide Cotton Conferences, pp. 78-83. A base price of $.70 was used.

Table 7. Net Revenue with Additional Insecticide Cost and Price, Adjusted by Quality Premiums/Discounts, Large Plot Studies, 1996*

	Insecticide Treatment		
	Early Termination (350 Heat Units)	Full Season (Producer Termination)	
Farm	Net Revenue ($/acre)		LSD
Parten (AR)**	417	347	1112
Young (AR)**	425	445	218
BM (MS)	794	895	150
HN (MS)	640	674	116
JO (MS)	508	468	65
KP (MS)	991	984	374
LJM (MS)	not available		
RO (MS)	690	592	1322

*Discounts/premiums were based on information in Don Ethridge, “Valuing HVI Quality Differences in U.S. Cotton”, Proceedings of the 1996 Beltwide Cotton Conferences, pp. 78-83. A base price of $.70 was used.

**HVI property tests were not available to calculate quality premium/discount. The base price of $.70 was used without adjustment.