BENEFITS OF COTMAN—CONSULTANT'S PERSPECTIVE

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INTRODUCTION

Low commodity prices, market uncertainty, and high production costs have demanded producers and consultants to better manage cultural inputs in cotton production. Identifying where inputs can be reduced, or eliminated, without significantly lowering yield has become one of the main goals for cotton producers and consultants, particularly during the past two or three years. COTMAN, the University of Arkansas cotton management program, has helped consultants in Northeast Arkansas achieve this goal of reducing inputs. Consultants in this area have been successful in utilizing COTMAN to reduce costs associated with late-season insecticide applications. COTMAN users have also begun reducing nitrogen rates, incorporating plant growth regulator use, and refining early-season irrigation timing and insect control based on crop response to stress and damage.

INTEGRATION OF COTMAN INTO CONSULTING PROGRAMS

Buffalo Island Crop Services (BICS) and Crop Monitoring Services (CMS) have implemented the use of COTMAN into their Northeast Arkansas consulting programs for the past 4 and 5 years, respectively. Both consulting programs collect COTMAN data once per week from the week of first square until the crop reaches cutout. Employees are hired specifically for collecting COTMAN data, entering data into a computer, and printing reports. In both monitoring services, one person is responsible for collecting COTMAN data on approximately 3,500 acres. Reports generated from COTMAN data include information on crop nodal development and fruit retention, and are used in these consulting services as a check on insect scouting. Reviewing variations in crop growth curves, fruit load, and fruit retention have allowed these consultants to identify potential sources of error in their traditional cultural practices. COTMAN reports also allow consultants to "see" the effect of specific cultural inputs or omissions, and provides the basis for communicating those effects to the grower.

SAVINGS RESULTING FROM USE OF COTMAN

COTMAN studies in Arkansas have demonstrated significant economic benefits associated with late-season insecticide termination (Cochran *et al.*, 1994; Benson *et*

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al., 1999). Whole-farm case studies of the impact of the insecticide termination component of COTMAN suggested that more than $17,000 would have been saved on a 700-acre farm in Lincoln county if insecticide applications had been terminated based on COTMAN rules (Sites *et al.*, 2000). Consultants and producers in Arkansas, especially Northeast Arkansas, have gained confidence in the late-season insecticide termination component of COTMAN, and have implemented its use in their insect scouting programs. Consultants with BICS and CMS estimate additional savings, of nearly 15% on their labor expenses, by eliminating the need for cotton scouts after COTMAN recommends termination of insecticide use. In addition, these consulting programs often adjust their early-season insect control programs as a result of information obtained from COTMAN reports. For example, fields below extension thresholds for plant bugs may be treated with an insecticide if COTMAN reports significant increases in fruit loss. On the other hand, fields at extension recommended thresholds may not be treated if COTMAN reports indicate good fruit retention and no crop stress.

In addition to savings from eliminating unnecessary late-season insecticide applications, producers and consultants are starting to implement adjustments to cultural practices when COTMAN output identifies possible crop stress. Crop stress is often reflected as deviations or abrupt changes in growth curves generated by COTMAN, and can result from several factors (including temperature extremes, moisture stress, fertility deficiencies, weed competition, diseases, insect pressure) and their interactions. A good example is in the case of aphid control. Often the initiation of insecticide applications for control of aphids is based on preventing the onset of crop stress. Consultants with BICS and CMS suggest that COTMAN data can help identify crop stress associated with aphid build-up, and alert them to which fields may justify treatment. COTMAN is also being used in conjunction with other management programs such as the University of Arkansas Cooperative Extension Service's irrigation scheduler, and is giving consultants and producers another tool to help time irrigation, reduce crop stress, and produce an earlier crop. BICS and CMS consultants review COTMAN reports for fruit retention, fruit load, and crop growth rates. If fruit load is good, retention is high, and development is on track (compared to the target development curve), irrigation is likely initiated earlier than would be called for by traditional irrigation scheduling programs.

By identifying delayed maturity and excessive crop growth, COTMAN has prompted the consultants with BICS and CMS to reduce soil-applied nitrogen levels. Weekly COTMAN growth curves facilitate timely monitoring of crop development and has given these consultants confidence in the levels to which nitrogen can be reduced without having a negative impact on crop growth or yield. Although COTMAN makes no predictions as to the cause of crop developmental changes, experienced users may gather key insight to possible cultural solutions. COTMAN has given producers and consultants a tool to evaluate the effects of cultural inputs, and has helped identify which inputs can be reduced or eliminated without significantly effecting crop development.

Surveyed independently, consultants with BICS and CMS estimate savings ranging from $35.12 to $36.98 per acre, respectively, when cultural inputs were adjusted based

on monitoring with COTMAN (Table 1 and 2). In both consulting programs, estimates were similar for all cultural inputs. Estimates of insecticide (pyrethroid) savings are based on terminating insecticide use when COTMAN analysis indicates fields are safe from damage due to fruit-feeding insects (NAWF = 5 + 350 heat units). According to consultants with both CMS and BICS, this level of insect safeness usually occurs between August 17 and August 22. Historical University extension recommendations, however, have been to scout and treat fields for economic thresholds of bollworm *Helicoverap zea* (Boddie), tobacco budworm *Heliothis virescens* (F.), and bollweevil *Anthonomus grandis* (Boheman) until September 15 (Martin, personal communication). From the time insecticide applications are terminated in COTMAN monitored fields until September 15 (historical extension guideline for terminating insecticide use), the likelihood of levels of fruit-feeding pests reaching numbers that would trigger recommendations to apply insecticide is high. Therefore, consultants with CMS and BICS believe that terminating insecticide use based on COTMAN rules has probably eliminated three late-season applications.

In fields where COTMAN growth curves indicated delayed maturity, i.e., greater than 80 days from planting to cutout (NAWF=5), nitrogen rates were reduced by 20 to 25% in both consulting programs. Reductions in nitrogen eliminated the need for traditional levels of plant growth regulators (e.g., PIX) and helped insure crop cutout occurred by 80 days from planting. Consultants from both CMS and BICS attribute substantial savings on defoliation costs to earlier crop maturity (defoliation applied in more suitable weather) and reduced nitrogen rates (crops naturally cutting out and less rank growth).

ADDITIONAL BENEFITS

Additionally, COTMAN may supply an objective base for cultural decisions. Consultants with BICS and CMS feel that COTMAN reports provide a means to evaluate the effects of their recommendations, and allow a more informed method of communication between colleagues and clients. They also believe that COTMAN facilitates short-season cotton production by helping them recommend more timely cultural inputs.

REFERENCES

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Table 1. Estimated reductions in production expenses resulting from COTMAN, Buffalo Island Crop Services, Inc.[z]

	Before COTMAN		Using COTMAN		
Cultural input	Rate	Cost ($)	Rate	Cost ($)	Savings ($)
	----------	----------	per acre	----------	----------
Fertilizer (N)	125 lb	26.25[y]	100 lb	21.00	5.25
PGR (PIX)	24 oz	19.20[x]	16 oz	12.80	6.40
Pyrethroid[w]	3 app.[v]	27.75[u]	1 app.	9.25	18.50
Defoliation	2 app.[t]	30.28[s]	2 app.	23.96	6.32
COTMAN (cost to run)	0	0.00	1	1.35	-1.35
Total savings per acre					35.12

[z] Cotton consulting program responsible for 14,000 acres in Leachville, Arkansas.
[y] Nitrogen costs based on $0.21 per unit of N.
[x] PIX costs based on $0.80 per ounce.
[w] Pyrethroid applications made from mid August to September 15.
[v] Average number of pyrethroid applications made per season.
[u] Cost of pyrethroid ($6.25/acre) plus $3.00/acre application cost.
[t] Average number of defoliation applications made per field.
[s] Cost of defoliation material plus application.

Table 2. Estimated reductions in production expenses resulting from COTMAN, Crop Monitoring Services, Inc.[z]

	Before COTMAN		Using COTMAN		
Cultural input	Rate	Cost ($)	Rate	Cost ($)	Savings ($)
	----------	----------	per acre	----------	----------
Fertilizer (N)	120 lb	25.20[y]	90 lb	18.90	6.30
PGR (PIX)	18 oz	14.40[x]	8 oz	6.40	8.00
Pyrethroid[w]	3 app.[v]	27.75[u]	1 app.	9.25	18.50
Defoliation	2 app.[t]	21.63[s]	1 app.	15.70	5.93
COTMAN (cost to run)	0	0.00	1	1.35	-1.35
Total savings per acre					36.98

[z] Cotton consulting program responsible for 4,000 acres in Manila, Arkansas.
[y] Nitrogen costs based on $0.21 per unit of N.
[x] PIX costs based on $0.80 per ounce.
[w] Pyrethroid applications made from mid August to September 15.
[v] Average number of pyrethroid applications made per season.
[u] Cost of pyrethroid ($6.25/acre) plus $3.00/acre application cost.
[t] Average number of defoliation applications made per field.
[s] Cost of defoliation material plus application.