

COTMAN IRRIGATION TERMINATION STUDIES

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Abstract

Approximately 85% of the cotton acreage in Desha county and the surrounding area of Southeast Arkansas is irrigated. Recent work in the area of irrigation initiation has been helpful (Vories et. al., 1998). However, research is limited with regards to irrigation termination near the end of the growing season.

Introduction

The costs associated with irrigation are substantial. However, since irrigation tubing is still in the field late in the growing season, an additional irrigation is not a large cost in labor, fuel, and machinery. A system is needed to assist growers with the decision of timing irrigation termination while maximizing yields and avoiding unnecessary costs.

The COTMAN crop management tool is becoming more popular with growers in the area. While it initially was utilized as a insecticide termination tool, other areas of use have been identified. All four of the fields represented in the study utilized COTMAN and were mapped using both the Squareman and Bollman components. The data includes heat units accumulated past Node Above White Flower 5 (NAWF5). Our objective is to utilize COTMAN as a tool in determining irrigation termination based upon crop status and present soil moisture.

Materials and Methods

Research was conducted on the C. B. Stevens farm near Tillar, AR. COTMAN data was collected season long and NAWF 5 was determined on each field. As the crop matured in 1999, four fields were selected to investigate the timing of irrigation termination. All fields were irrigated using standard timing (seven day schedule) until August 13 when irrigation was terminated on four eight row plots per field. For comparison, irrigation continued on each field with four additional eight row plots. Table 1 illustrates items indicative of each field in the study.

Results

Four middle rows from each plot were mechanically harvested. All plots were measured for acreage, and lint yield per acre was calculated. Plant populations were estimated by counting number of plants per ten row feet and converting to a per acre basis. Three of the four fields in the study showed a resulting lint yield increase from the additional irrigation. (Table 2).

The costs associated with each additional irrigation is estimated at \$ 5.00 per irrigation. (Tacker, 1999) With depressed prices the question arises as to the economic benefit even when yield is gained. Table 3 illustrates the dollar value attributed to additional irrigations, whether positive or negative.

Conclusion

Other factors such as soil type, field history, drainage, canopy density, anticipated rainfall, and potential boll rot may also have a bearing on the decision of irrigation termination.. In this year's study, following August 13 when irrigation was suspended, virtually no rainfall occurred which limited boll rot to near zero. In some cases, additional irrigations beyond "normal" may have an adverse effect if substantial rainfall occurs during boll opening.

More data in future years will be needed before arriving at a firm recommendation. Plans are to continue the study in future years over a wide variety of management schemes and weather patterns.

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References

- Tacker, Phil. University of Arkansas Cooperative Extension Service, Little Rock, AR. Telephone conversation. 1999.
- Vories, E. D., N. P. Tugwell, J. S. McConnell, and R. W. Turner. 1998. Irrigation Management of Cotton. Proceedings of the 1998 Cotton Research Meeting. Arkansas Agricultural Experiment Station. 125-127.

Table 1. Items indicative of fields involved in the study.

Field / Variety/ Planting Date	Cotman Data at Irrigation Term.	Number of Additional Irrigations	Date of Additional Irrigation	Date of Harvest
1 / SG501 / 5-3-99	NAWF5 + 493 HU	1	8/18/99	10/1/99
2 / SG501 / 5-3-99	NAWF5 + 493 HU	1	8/18/99	10/1/99
3 / 33B / 5-9-99	NAWF5 + 467 HU	1	8/18/99	10/22/99
4 / 33B / 5-9-99	NAWF5 + 244 HU	2	8/18/99 8/25/99	10/22/99

Table 2. Lint yield and difference in yield between irrigation terminated plots and irrigation continued plots.

Field	Treatment	Plants Per Acre	Lint Yield	Yield Difference
1	NAWF5+493T erminated	33014	1034	+ 40 #
	Continued 1X	42643	1074	
2	Terminated NAWF5+493	38516	1025	+ 21 #
	Continued 1X	36797	1046	
3	Terminated NAWF5+467	41955	1009	- 14 #
	Continued 1X	40924	995	
4	Terminated NAWF5+244	42987	878	+ 105 #
	Continued 2X	44363	983	

Table 3. Influence of additional irrigation on lint yield

Field	Lint Increase or Decrease in Pounds	Economic Value of Add. Irrigation(s)
1	40	+ \$ 21
2	21	+ \$ 8.65
3	- 14	- \$ 14.10
4	105	+ \$58.25