Effects of Irrigation Termination Date On a Medium Maturity Type Upland Cotton

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ABSTRACT

A single field experiment was conducted in 1989 on a grower cooperator field to evaluate the response of a medium maturity type Upland cotton (DPL-50) to three dates of irrigation termination. The crop was planted 20 April and managed uniformly in all respects until 2 August when the earliest irrigation termination treatment was imposed. The dates of the second and final irrigation terminations were 17 August and 1 September, respectively. With each subsequent irrigation, the respective plots received an additional six acre inches of water (approximately). Harvest results revealed no significant ($P \leq 0.05$) differences in lint yield due to irrigation termination treatments. Overall mean lint yield for the experiment was 1,228 lbs. cotton lint/acre, the experimental coefficient of variation (CV) was 11% and the observed significance level (OSL) was 0.34.

INTRODUCTION

Increasing water costs and lower availability of water in many irrigation districts are compounding the difficulties associated with maintaining cotton production systems across Arizona. One of the possible options to consider is that of producing a cotton crop in a shorter time span than is totally available in the desert environment, and doing so with fewer total inputs required, particularly water. In an effort to accomplish a reduction in the length of growing season used, earlier maturity types of Upland cotton (Gossypium hirsutum L.) may be planted, which accomplish a complete fruit set much quicker than full-season, more indeterminate alternates. One difficulty associated with a short or medium maturity type of variety, versus a full-season type, is the sacrifice in total yield potential. The purpose, however, is to achieve acceptable returns to the system with reduced levels of inputs. Many growers have done this in other parts of the state to complete a cotton season sooner, and return the land to a subsequent vegetable crop. Essentially, this is a quest to attain the most economically efficient production system under existing constraints.

METHODS

With consideration of optimizing a production season with a medium maturity variety of Upland cotton, a single field experiment was conducted in Central Arizona near Coolidge, on a Mohall sandy loam soil in 1989. A field of DPL-50 was planted on 25 March and managed uniformly throughout the season in all respects. Plots consisting of eight, 38-inch rows were identified for each of three irrigation termination treatments, and arranged in a randomized complete block design with four replications. The final (terminal) irrigation was applied to respective treatment areas as shown in Table 1. Each successive treatment (1-3) received an additional four acre inches of irrigation water. Thus, treatments No. 2 and No. 3 received 4 and 8 acre-inches of water more than treatment No. 1, respectively, and prolonged the season and boll maturation period in each accordingly. The first termination treatment was imposed after the crop had reached a distinct cut-out (late July), and sufficient water was applied in an attempt to accomplish maturation of those bolls that had been set up to cut-out. Yield

estimates were made by harvesting the entire center four rows of each eight-row plot (full lengths of the field) with a mechanical picker on 12 October.

RESULTS

Yield results for the experiment are shown in Table 2. No significant differences ($P \leq 0.05$) in yield due to any of the irrigation termination treatments were detected.

The 1989 growing season was very conducive to early crop development and boll set; which allowed for a very good early boll set in this crop of DPL-50, and a very distinct cut-out period. Increasing night temperatures in August due to increased humidities did not provide good conditions for subsequent boll set during that period in this crop. This was also accentuated by the variety and its moderately determinate nature.

More work is needed in this type of project to develop consistencies adequate for the structure of guidelines and recommendations. However, in light of this experiment, other similar research projects, and production practices utilized in other areas; the use of a more compact growing season, by use of a more determinate variety and good early season management, may provide a means by which acceptable production efficiency and returns can be attained with reduced inputs. The limitation of water and other full-season production problems, such as late-season insect populations, provide the necessary incentives to evaluate this type of production strategy to maintain production efficiency in all areas of Arizona.

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Table 1. Dates of final (terminal) irrigation employed in the DPL-50, Pinal Co. experiment, 1989*

Treatment No.	Date of Final Irrigation
1	2 August
2	17 August
3	1 September

*Crop of DPL-50 planted 20 April.

Table 2. Lint yield means from irrigation termination experiment, Prechel Farm, DPL-50, Coolidge, AZ, 1989.

Treatment No.	Yield - lbs. lint/acre -
1	1280
2	1138
3	1266
$LSD_{0.05}$	NS
OSL*	0.34
CV (%)	11

*OSL = observed significance level.