

COTTON IRRIGATION TERMINATION

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This is a progress report on the third year of a study begun in 1966. Previous results have been reported in the preceding issues of "Cotton."

The objective of these experiments was to determine when to terminate irrigation in order to leave just enough water in the soil to mature the main crop, that which sets before cut-out, and then stress the plants for moisture to hasten boll opening. Obviously, this would not be the same date for all environmental conditions, especially with soils having different water-holding capacities.

Theory

The theory involved in this experiment is illustrated by the following example: At Yuma, flowering cut-out is usually between August 1 and 15. The time lapse from fresh flower to mature boll ready to open is approximately 30 days. Average water use by cotton in August is approximately .35 inches per day. Glendale silty clay loam with a field capacity of 26% and a permanent wilting point of 11.8% would hold 2.31 inches of available water per foot of depth, or 9.24 inches in four feet of top soil. Time from irrigation to stress would then be $9.24/.35$ or 26 days plus the four or five days required for the saturated soil to drain down to field capacity, approximately 30 days. Therefore, the last irrigation should be applied at flowering cut-out. If cut-out were August 7 the last bolls set should be mature by September 7 and open by the end of September.

Procedure

Acala 4-42 and Deltapine Smooth Leaf were planted in moist soil on March 18, 1968. The experimental design was a split plot randomized block with eight replications. Whole plots were irrigation treatments and sub-plots were varieties. A sub-plot was four rows 35 feet long with the two center rows picked for yield. Ammonium nitrate at the rate of 100 pounds N per acre and 100 pounds P_2O_5 (44 lb. P) per acre were broadcast before listing. All treatments were uniformly irrigated until the following irrigation termination dates: (1) July 10, (2) July 27, (3) August 14, (4) September 5, and (5) September 25. Insecticide applications by aircraft included 5% malathion dust on April 23, and 0.5 pounds per acre of Guthion on May 15 for beet armyworms and spider mites in addition to the pink bollworm control program which started June 16 and continued until September 22. Guthion and Sevin were alternated on a six-day interval. As the end of the season approached, Dilan and methyl parathion were included for control of leaf perforators.

Results

Flowering, fruiting, cut-out, etc., dates for both varieties were approximately:

First Flowers	June 3
First Open Bolls	July 18

Start of Cut-Out	August 1
Flowering Substantially Reduced	August 10
Resumption of Growth	August 30
Treatments 1 and 2 Bolls 90-98% Open	September 30
Treatments 3, 4 and 5 Bolls 90-98% Open	October 15
Defoliant (DEF) Applied	October 8
Machine Harvest of All Plots	November 13

Plants in Treatment 1, which received its last irrigation July 10 did not resume growth after cut-out and bolls set near cut-out did not develop normally. Irrigation Treatment 2 made slight regrowth, and Treatments 3, 4 and 5 made new growth and set a top crop which was too late and too light to be of any practical importance. This was due largely to an infestation of leaf perforators which built up toward the end of the season and was poorly controlled by the Parathion and Sevin applied August 26 and Dilan and Guthion applied September 10.

A summary of principal results is presented in the following table.

Effects of Irrigation Cut-Off Date on Yield of Cotton, Plant Height, Lodging, Defoliation, and Efficiency of Water Use. Yuma Valley Experiment Station. 1968¹

Treatment No.	Final Irrigation	Yield of Seed Cotton Lb./A	Plant Height Inches	Lodging Index ²	Estimated Percent Defoliation ³	Irrigations		Pounds of Seed Cotton Per Inch of Water
						Number	Inches of Water Applied ⁴	
Acala 4-42								
1	July 10	4609 *	60	1.4	76	4	22.5	205
2	July 27	4422	63	1.8	81	5	25.7	172
3	Aug. 14	4627	65	1.9	82	6	28.6	162
4	Sept. 5	4329	64	2.1	80	7	31.0	140
5	Sept. 25	4534	65	2.0	74	8	32.7	139
	Ave.	4497 **						
Deltapine Smooth Leaf								
1	July 10	5952	45	2.5	66	4	22.5	265
2	July 27	6512 *	47	2.4	70	5	25.7	253
3	Aug. 14	6549	47	2.8	74	6	28.6	229
4	Sept. 5	6363	48	3.4	63	7	31.0	205
5	Sept. 25	6419	50	3.4	65	8	32.7	196
	Ave.	6344 **						

¹ Data are averages of eight replications.

² Numerical Scale: 0 = all plants erect, 10 = all plants prostrate.

³ "DEF" was applied by aircraft at the rate of 1.5 lb. per acre, October 8, 1968.

⁴ Includes 8-inch pre-irrigation.

* Entries opposite the same line are not significantly different at the .05 level.

** The difference in yield between varieties is highly significant.