Effect of Nitrogen and Soil Moisture Level on the Yield of Acala 44-10 and Deltapine Smooth Leaf Cotton Varieties

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With the large shift of cotton acreage in Arizona a few years ago from the Acala varieties to Deltapine smooth leaf, many questions arose as to the relative requirements of N and water for the two varieties. In 1961 an experiment was initiated at the Cotton Research Center of the University of Arizona to provide information more specifically on the relative nitrogen needs of the two varieties at different levels of soil moisture.

1961

This experiment was located on field D-2, on an Adelanto clay loam soil. Two levels of soil moisture were used, dry and wet. The dry treatment received four irrigations from June 14 to August 28 and the wet treatment received seven irrigations from May 29 to August 28, inclusive. Six N rates were applied as urea on May 24 on each moisture treatment.

The data indicate that the response to N at the low level of soil moisture was to the 50 pound rate. With more available soil moisture from the seven irrigations a response to at least 100 pounds of N resulted. Relatively little difference was shown between the yield of the two varieties or in the response of the varieties to moisture or N.

1962

In the second year of this experiment three levels of soil moisture were used. The dry treatment received four irrigations from June 25 to August 18, the medium treatment received six irrigations from May 25 to August 29, and the wet treatment received 10 irrigations from May 5 to September 6. In 1962 the experiment was conducted on field D-3 on a deeper soil showing less influence of land leveling.

The response of the Deltapine smooth leaf variety to N under the three soil moisture levels followed a pattern somewhat different from the Acala variety. Relatively more N was needed by Deltapine smooth leaf under low moisture than under high moisture.

Acala 44-10 responded to higher rates of N with increasing moisture. The irrigation treatments did not influence the yield of Deltapine; however, the dry treatment did reduce the yield of Acala.

1963

The experimental plots used in 1962 were used again in 1963. The dry treatment received three irrigations from June 28 to August 29 the medium treatment received six irrigations from May 22 to September 11, and the wet treatment received a total of nine irrigations from May 16 to September 11.

The yield of both varieties was lower from the dry irrigation treatment and no response to N occurred with either variety at this moisture level. The lowest rate of applied nitrogen, 50 pounds per acre, appeared to be adequate for the Deltapine smooth leaf variety with medium or wet moisture treatments.

For Acala 44-10 the requirement for N appeared to increase with moisture to about 50 and 150 pounds per acre with the medium and wet treatments, respectively.

SUMMARY

In two of the three years the seed cotton yields of Deltapine smooth leaf were greater than Acala 44-10. The lint yield was slightly greater for Deltapine in the other case. Both varieties responded to the moisture treatments with the one exception of Deltapine in 1962. In no case were the yields greater for the wet than medium treatment. The nitrogen requirements of the two varieties appeared to be about equal with moisture causing more influence than variety. Seasonal variations indicated were probably due to differences in summer rains and temperature fluctuations. Soil differences can account for some differences in results between 1961 and the other two years.

Summary of Seed Cotton Yields as Affected by Nitrogen and Moisture. Yields are Given as Pounds per Plot.

	Deltapine Smooth Leaf			Acala 44-10		
			1961			
Nitrogen	Dry	Medium	Wet	Dry	Medium	Wet
1 lbs./A	----------pounds of seed cotton per plot----------					
0	12.2a		14.0a	12.9a		14.7a
50	18.8b		16.3b	17.5bc		19.0b
100	18.2b		20.8c	15.9b		20.5bc
150	18.6b		20.7c	17.6bc		21.9bc
200	18.6b		22.9d	18.4c		21.2bc
400	17.8b		21.1cd	16.7bc		22.4c
Control--Bales/A	1.60		1.82	1.43		1.64
			1962			
0	22.9a	19.3a	19.2a	20.8a	20.0a	19.8a
50	24.9b	24.2b	25.2b	21.1ab	23.8b	21.5ab
100	24.8b	25.5bc	26.3b	21.7ab	26.2c	23.2b
150	26.7c	26.0c	26.4b	22.2ab	26.0c	27.0c
200	26.5bc	27.1c	26.8b	22.7ab	27.1c	26.3c
400	26.4bc	26.7c	26.8b	21.2ab	27.1c	26.9c
Control--Bales/A	2.68	2.26	2.25	2.45	2.35	2.34
			1963			
0	17.4a	18.2a	15.8a	14.2a	15.8a	15.5a
50	18.0a	22.3bc	20.8cd	14.0a	18.7c	18.3b
100	16.8a	20.4b	18.6b	14.5a	16.7ab	17.3ab
150	18.4a	22.2bc	21.3d	15.1a	18.3bc	20.9c
200	18.9a	23.4c	19.1bc	15.2a	19.1c	18.7b
400	18.1a	21.0b	20.0bcd	15.5a	17.1abc	17.9b
Control--Bales/A	2.04	2.14	1.86	1.67	1.86	1.82