Nitrogen and Water Effects in Drip Irrigated Cotton

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Summary

Cotton was planted at the Maricopa Agricultural Center in plots with three rates of nitrogen (N) and three water levels. The water was applied through drip irrigation laterals buried under each row. Cotton yields were not affected by N because sufficient N was available in the soil for maximum yield. The drip irrigation levels were 0.6, 0.95 and 1.2 of the estimated consumptive use (ET). Yields were significantly lower with low water, 0.6 ET. Yields from furrow irrigated cotton planted adjacent to the drip study were similar to yields with drip irrigation at medium water, 0.95 ET.

Cotton (cultivar DPL-62) was replanted April 23 on beds with drip tubing placed 8" below the surface. Water was applied equally to all plots for germination and early seedling growth after which water variables were imposed to approximate 0.6, 0.95 and 1.2 of the estimated evapotranspiration (ET) or consumptive use. The total water applied including rainfall was 27, 37, and 48 inches, respectively.

Nitrogen treatments were according to the schedule in Table 1. All N was applied through the drip system as N-phuric (28-0-0-9.0). The initial soil NO_3^--N level was approximately 20 ppm in the surface foot. Nitrogen was approximately 4 ppm NO_3^--N in the irrigation water.

Seed cotton yields (Table 1) were not significantly affected by N treatment. The initial soil NO_3^--N level was adequate for the maximum yields possible under existing conditions. Although the seed cotton yields for the high water level (1.2 ET) appear larger than for the medium level, the apparent differences were not significant statistically. Differences between the low (0.6 ET) and higher water levels were highly significant.

Flowering and boll data were collected from each plot. Flowering data show differences in water and N treatments at the high water level. However, boll retention was reduced by N treatments resulting in approximately the same total boll load and yield. Petiole NO_3^--N values varied considerably with different N treatments and appear to show agreement between flowering data and N treatments.

Table 1. Nitrogen Treatments and Yields of Machine-picked Seed Cotton.

Plant Growth Stage	Treatment (amount N applied, lbs/A) 1	2	3	4	5	6
Late vegetative to first flower (May 28 - June 18)	25	25	50	50	100	0
First flower to heavy flowering (June 18 - July 9)	25	50	50	100	100	0
Peak flower to late flower (July 9 - July 30)	25	25	50	50	100	0
Late flower - large bolls (July 30 - August 20)	25	0	50	0	100	0
TOTAL N APPLIED PER ACRE	100	100	200	200	400	0
DRIP IRRIGATION YIELDS seed cotton, lbs/Ac						
0.6 ET	3483	3174	2946	3483	3345	3037
0.95 ET	4619	4644	4751	4862	4943	4467
1.2 ET	5369	5263	5182	5035	4949	5085
FURROW IRRIGATED	4550					