

VARIETAL RESPONSES OF COTTON TO NITROGEN FERTILIZATION¹

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RESEARCH PROBLEM

Varietal response of cotton (*Gossypium hirsutum* L.) to N fertilization is an ongoing concern of cotton producers in Arkansas (Maples and Frizzell, 1985). New varieties are continually introduced into mid-South production systems with enhanced pest resistance, superior lint quality, faster maturity, and other new characteristics. Research that provides information on production parameters for the most recently released varieties is scant. The objective of this study is to gather information about new cotton varieties and to determine the responses of new varieties to N fertilization.

BACKGROUND INFORMATION

Innovations in cotton cultivars have increased the diversity of cotton grown in the Mid-South. Varieties now available for use in the mid-South may now contain genetically engineered traits for pest resistance, superior yield and maturity, and fiber properties that are attractive to textile mills. The genetic variability of the available varieties indicates that crop growing practices might differ to achieve optimum yields. Optimizing N fertilization for individual cotton varieties is a possible way of tailoring production practices for individual cultivars.

RESEARCH DESCRIPTION

Testing of the responses of cotton varieties to N fertilization was originally begun at the Southeast Branch Experiment Station in 1989 (McConnell *et al.*, 1993). Varieties have been changed as new varieties were introduced into Mid-South production systems. Two years of data, 1997 and 1998, are available from the current test. Varieties currently under evaluation are Deltapine 20, Deltapine 5415, Stoneville 474, and Nucot 32B. Fertilizer treatments ranged from 0 to 150 lb urea-N/acre in 50-lb N/acre increments. The N fertilizer was split applied with 50 lb urea-N/acre after emergence, around the two true leaf stage and the balance applied at first square. The entire

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test was irrigated when tensiometers set 12 inches deep reached threshold values of -55 cbars of pressure. The measurements taken included seedcotton yield, lint fraction, plant height, and plant population. All data were analyzed using the Statistical Analysis System. The experimental design was a randomized complete block. *F*-tests and least significant differences were calculated at the $\alpha=0.05$ level of probability.

RESULTS

The N fertilization rate that seemed optimum for all four varieties was the 100 lb/acre treatment (Table 1). The results of the first 2 years of the study correlated well for Deltapine 20 and Stoneville 474. The N fertilization rate necessary to produce maximum yield was 100 lb/acre for Deltapine 20 and Stoneville 474. Although a trend of higher yield was observed with greater N rates, the differences were not significant from the 100-lb/acre treatment. In 1998 Stoneville 474, yields declined when N was increased from 100 to 150 lb/acre. Yield trends with Deltapine 5415 and Nucot 32B differed slightly from the two earlier maturing varieties. In 1997, both Deltapine 5415 and Nucot 32B achieved maximum yields with only 50 lb N/acre. A trend of increasing yield with more N was observed for Deltapine 5415 and Nucot 32B, but the differences were not significant compared to the 100-lb N/acre treatment.

PRACTICAL APPLICATION

The results from this test are preliminary, and final conclusions should not be drawn from these data. The yield response of all cultivars seemed to maximize near 100 lb N/acre. Generally, yields were not found to significantly increase with N rates above 100 lb/acre. Yield responses of Deltapine 5415 and Nucot 32B tended not to be as great as those of Deltapine 20 and Stoneville 474. This indicates that the slower maturing varieties may require a little less N fertilizer than the faster maturing ones.

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LITERATURE CITED

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Table 1. Lint yields of four cotton varieties [Deltapine 20 (DP20), Stoneville 474 (ST474), Deltapine 5415 (DP5415), and Nucot 32B (NU32B)] grown with 0, 50, 100, and 150 lb urea-N/acre at the Southeast Branch Experiment Station near Rohwer during 1997 and 1998.

N rate	Varieties			
	DP20	ST474	DP5415	NU32B
lb N/acre	----- lb lint/acre -----			
1997				
150	1309	1416	1179	1226
100	1082	1350	1084	1172
50	937	1181	1003	1020
0	619	620	448	545
LSD _(0.05) = 165				
1998				
150	1218	1247	1159	1217
100	1097	1321	1241	1216
50	992	1130	1049	1084
0	687	691	548	615
LSD _(0.05) = 104				