NITROGEN SOURCE AND RATE EFFECTS ON LEAF CHLOROPHYLL AND COTTON YIELDS

J.E. Matocha and S.G. Vacek
Texas A&M University Agricultural Research & Extension Center
Corpus Christi, TX

Abstract

Nitrogen is generally the most limiting nutrient in the production of cotton. Field studies in Texas indicate that only about 50% of N fertilizer applied to soils is actually used by the targeted plants. Several mechanisms can contribute to losses of N and poor recoveries among some are biological dentrification, temporary immobilization by micro-organisms, clay fixation of ammonium and organic matter fixation. The purpose of this experiment was to compare two granular ammonium forms of N $(NH_4)_2$ $S0_4$ with fluid urea ammonium nitrate at various rates on leaf chlorophyll, petiole nitrate and lint yields of cotton grown on a typical calcareous South Texas soil. The selected soil was an Orelia sandy clay loam (Hyperthermic, typic Ochraqualf) Soil pH (1:2 soil/water 8.3; SOM-2.14%; $N0_3$-29 mg/kg (water extractable); $HC0_3^-$ extractable P, 12 mg/kg; exchangeable K, 340 mg/kg. Nine N source and rate treatments plus a N control were arranged in a randomized complete block design with four replications. Nitrogen sources used were ammonium sulfate (AS) standard, untreated fine granules; larger granules; AS treated (microbiocide); and UAN-urea ammonium nitrate solution. Nitrogen rates of , 30, 60, 90 lb N/Ac were band applied (4x4) before planting. Soil tests indicated adequate levels of available P, K, Zn and Fe. DP&L seed variety 50 planted 4/25/97 and 3/27/98. Pix at 4 oz was applied on June 26, 1997. Cotton was harvested twice in 1997 with first pick on 8/4/97 and second pick on 8/20/97. In 1998 only one and final harvest was made on 8/10/98.

The tests were conducted under two contrasting different production years in terms of precipitation. In the first year, cotton showed no growth (height) response to N rates but indicated some N source effect. Treated AS (AST) produced taller plants than standard AS (ASU). Earliness of fruiting was slightly hastened by AST compared to ASU and N control only at the highest N rate. Leaf chlorophyll estimates showed no significant change as N source was varied. However, a trend toward higher chlorophyll from AST compared to ASU became apparent at higher rates. These data coincide with the trends reported earlier toward taller plants and hastened maturity resulting from use of AST.

First-year yields exceeded 650 lb lint/Ac and reflected excellent soil moisture availability through midseason but limiting water availability during the critical stage of boll maturation. Second-year yields were approximately 65% of those for the first year and ranged from 396 to 493 lbs lint/Ac. Less than 0.50" of rainfall was recorded from planting to harvest in Year 2 (1998). Generally, treatment effects were negligible in this drought stressed season.

Because plants were less stressed for soil water in Year 1, certain treatment differences can be noted which failed to appear in the drought plagued second year. The slight influence on chlorophyll, fruiting and plant height from the AST source appeared to translate into slightly higher in lint yields at first harvest. Although yields did not significantly vary with N source within N rates, AST produced higher yields at 60 lb N/Ac compared to N control and 30 lb N/Ac as ASU. However, final yields (2 harvest total) showed nonsignificant differences due to N sources and N rates.

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 2:1319-1319 (1999)
National Cotton Council, Memphis TN