

IN-SEASON NITROGEN MANAGEMENT FOR LEPA- AND SUBSURFACE-IRRIGATED COTTON

**T. T. Chua, K. F. Bronson, R. J. Lascano, J. W. Keeling,
A. R. Mosier, J. P. Bordovsky, C. J. Green and J. D. Booker**
Texas A & M Univ., Lubbock, TX
Texas Tech Univ., Lubbock, TX
USDA-ARS, Fort Collins, CO

Abstract

Nitrogen is only second to water as a limitation in cotton production in the Southern High Plains of Texas. However, N response information for low energy precision application (LEPA)- and subsurface drip (SDI)-irrigated cotton is lacking. Additionally, new N management strategies to improve N use efficiency are needed. The objectives of this study were to: 1) characterize cotton response to N fertilizer with LEPA, surface drip, and subsurface drip irrigation systems; and 2) to test reflectance and chlorophyll meter measurements as in-season N decision aids for irrigated cotton. The study was conducted at two sites, Lubbock and Ropesville, TX. Cotton variety Paymaster ® Round-up Ready 2326, was planted into terminated wheat in 40-in rows. There were two water regimes, surface and subsurface drip at Lubbock at 75 % ET replacement, and LEPA at 80 and 105 % ET at Ropesville, in the main plot. Five N management treatments, zero-N, soil-test-based, chlorophyll meter-based, reflectance-based, well-fertilized, were in the subplot. Chlorophyll meter (Minolta® SPAD 502) readings were taken on 20 leaves/plot, and spectral reflectance measurements were made using CropScan® MSR16R at 0.5 m above canopy. In-season N of 30 lb N/ac) was applied to reflectance and chlorophyll meter plots when the sufficiency index (relative to well-fertilized treatment) < 0.95 at early squaring, first bloom, and peak bloom.

Lint yield was similar between surface and subsurface drip irrigation at Lubbock. Likewise, lint yield with LEPA at 80% and 105% ET replacement at Ropesville were not different. Lint yield responded to N fertilizer at Lubbock, up to 30 to 60 lb N/ac, however, no N response was observed at Ropesville. Chlorophyll meter and reflectance measurements were positively related with N rate at both sites. Reflectance at early squaring was positively correlated with biomass at both sites, and lint yield was positively related to reflectance at Lubbock only. The most salient finding of the study was that N applied with in-season monitoring at both sites (30 to 90 lb N/ac) was less than with soil test-based application (120 lb N/ac). However, even the in-season applications were probably excessive, except the reflectance treatment with SDI at Lubbock (30 lb N/ac).