

**INTERRELATIONSHIPS OF YIELDS WITH CANOPY NDVI, PLANT HEIGHT, AND LEAF
NITROGEN**

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Abstract

Innovative nitrogen (N) management systems and practices that can manage N more efficiently are needed to increase grower profitability due to substantially increased N prices and tighter environmental regulations during the last several years. The objectives of this study were to 1) determine the optimal N fertilizer application rates and timings for high-yielding cotton production systems in Tennessee; and 2) investigate the interrelationships among lint yield, canopy normalized differential vegetation index (NDVI), plant height, and leaf N concentration at key growing stages. A field trial was conducted at Jackson and Milan, TN from 2008 to 2009. Six N application rates of 0, 40, 80, 120, 160, and 200 lb N/acre and two N application timings (at plant, and between first square and first bloom) were evaluated in field plots (12.7 ft × 30 ft) in a randomized complete block design with four replicates. The following measurements were taken on an individual plot basis: Soil nitrate before cotton planting and after harvest; canopy NDVI readings, plant height, and leaf N concentrations at early square, early bloom, mid bloom, and late bloom; and lint yield at harvest. Relationships among lint yield, canopy NDVI, plant height, and crop N nutrition were determined using different regression models. The results showed that there were significant quadratic relationships of lint yields, canopy NDVI, plant height, and leaf N concentrations with N application rates. The exponential relationship of lint yields with canopy NDVI was not significant at early square or early bloom, but became significant at mid and late bloom stages. The exponential relationship of lint yields with plant height was insignificant at early square, but was significant at early, mid, and late bloom stages. The exponential relationship of lint yields with leaf N was significant at all four growing stages. Correlations of lint yields with NDVI, plant height, and leaf N generally became stronger as the growing season moved forward from early square until mid bloom. The exponential relationship of leaf N with NDVI or plant height was not significant at early square or early bloom, but was significant at mid and late bloom stages. Correlations of leaf N with NDVI and plant height became stronger from early square to mid bloom. The relationship of lint yields or leaf N with plant height was generally stronger than that of lint yields or leaf N with NDVI.