

**DETERMINATION OF COTTON NITROGEN STATUS FROM DIGITAL IMAGE ANALYSIS**

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**Abstract**

Timely in-season N determination in cotton (*Gossypium hirsutum* L.) is a useful tool to producers; however, current methods can be expensive. The objective of this research was to examine the effectiveness of a dark green color index (DGCI) derived from standard digital photographs and image-analysis software to determine cotton N status. A field trial was conducted in 2011 at the University of Arkansas experiment station in Marianna, AR. Treatments of N were applied to create a wide range of plant N status. Sampling was conducted at the third week of flowering. Field nadir (FN) and field off-nadir (FON) pictures were taken of the canopy with an inexpensive digital camera against a neutral color board that included yellow and green disks which served as interval color standards. Chlorophyll meter (SPAD) readings and nadir pictures of two most recently matured, fully expanded leaves 4-6 nodes from the terminal, were taken under fluorescent lighting against a standardized color board. Leaf N concentration was determined from sampled leaves of each N treatment. Image-analysis software used internal color standards to normalize photographs prior to calculation of DGCI. Response of leaf N concentration to fertilizer N applied was moderate ( $r^2=0.55$ ). Strong to moderate coefficients of determination was noted between SPAD readings and laboratory DGCI, FON DGCI, and FN DGCI (0.91, 0.82, and 0.68, respectively). Laboratory DGCI, FON DGCI, and FN DGCI were moderately sensitive to changes in leaf N ( $r^2=0.60$ , 0.48, and 0.44, respectively). Initial results define digital image analysis as a practical and relatively inexpensive method sensitive to cotton N status, which could possibly replace chlorophyll meters.