

REFLECTANCE SENSORS TO PREDICT MID-SEASON NITROGEN NEED OF COTTON

Luciane Farias de Oliveira

Dr. Peter Scharf, Thesis Supervisor

ABSTRACT

Nitrogen (N) is an essential nutrient for cotton production; consequently there is a tendency to over-apply nitrogen. High N causes excessive vegetative growth and delayed crop maturity, which result in increased cost in pesticides, growth regulator, and defoliant. Currently, the most common methods for obtaining information about the nitrogen needs of cotton are labor-intensive and time-consuming limiting their use. Reflectance sensors offer the potential to diagnose N needs immediately in a spatially intensive manner. The objective of this study was to develop on-the-go sidedress N rate recommendations based on sensor readings and quantify variability during the day for both passive and active sensors mounted above cotton plants.

Reflectance was measured with three sensors (Crop Circle, GreenSeeker, and Cropscan) at three growth stages (early square, mid square and early bloom) and at three heights above the cotton canopy (25, 50, and 100 cm) in 2006 and 2007. Results indicated that all three sensors have potential for accurate prediction of optimal N rate. Prediction accuracy was low at the first square stage but acceptable at mid square or early flower. These results suggest that variable-rate N applications to cotton based on real-time reflectance sensor readings are feasible for the mid-square to first flower growth stages. Variability in reflectance values during the day was relatively large for all three sensors. Mid-day was the time with the least error introduced into N rates by drift in sensor readings.