MANAGING SPATIAL VARIABILITY IN NITROGEN AVAILABILITY IN COTTON USING SENSOR BASED NITROGEN FERTILIZTION

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Abstract

Embedding nutrient management goals into N fertilization practices requires attention to satisfying crop demand for N in spatially variable fields to maximize N use efficiency and productivity, while reducing the potential for environmental contamination. Utilizing timely canopy reflectance as an indicator of crop N needs is a viable management strategy. The objective of this research was to compare a sensor based side dress liquid fertilizer N application to grower's routine practices and N response plots. A tractor mounter spectrometer was used to detect canopy reflectance for the calculation of the Simplified Canopy Chlorophyll Content Index (SCCCI) during the first to second week of flower bud formation in cotton. The indice was calibrated to a historical N response model which considers optimizing leaf tissue N and lint yield. Replicated 12 row strip plots were utilized and additional treatments for comparison purposes included the cooperators N fertilization practice and four N rates varying from 34 to 157 kg N/ha. Four sites were utilized across 3 years and soils varied in texture from silt loams to loams to silty clay loams. In 2012, kg lint/kg N applied was 9.3 with grower's practice and 12.6 with sensor based variable rate fertilization. In 2013, grower's practice resulted in 13.2 kg lint/kg N applied, while sensor based produced 16.9 at one location and at a second location 14.2 and 13.8 kg lint/kg N, respectively. Canopy based N fertilization has the potential to direct spatial fertilizer N application in cotton with resulting improvement in N-use efficiency.