REMOTE SENSING OF IN-SEASON NITROGEN REQUIREMENTS FOR IRRIGATED COTTON IN THE SOUTHERN HIGH PLAINS

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Abstract

Response to N fertilizer in cotton is often unpredictable in the Southern High Plains, where water and heat units are the main constraints. The determination of in-season N needs could help avoid over fertilization. Remotely sensed reflectance indices have potential as tools for predicting in-season N needs. We tested this approach in an on-station, replicated N rate study (0 to 120 lb N/ac) in Lubbock and in an on-farm situation where the farmer applied a blanket application of 40 lb N/ac. The on-farm study consisted of half of an 120 ac center pivot field and soil samples were taken on 0.5 ac grid and analyzed for NO_3, P, and Zn. At both locations we took aerial infared photographs, hand-held spectral radiometer measurements and chlorophyll meter measurements at first square and at early bloom (Lubbock only). Both studies were hand-harvested and the on-farm study was additionally stripper harvested and yield monitored.

The indices calculated from NIR and red appear to be the most promising. In Lubbock NDVI related weakly with lint yield at first square but had a strong positive correlation at mid bloom. On-farm in Ropesville, NDVI at first square was weakly related to lint yield. In all cases NDVI-green was positively related to chlorophyll meter readings, which indicates that the spectral reflectance readings are sensitive to N concentration in the plants. Plant height, biomass and plant population also strongly impact NDVI and other indices. At this early point of this research, correlations of spectral indices are weak at first square when we need to decide on N applications, and correlations are strong at mid to full bloom when it is often too late to apply N. Future direction of this research will include: removing bare ground from aerial images, taking spectral reflectance readings directly over and close to the plant rows, and the use of newer spectral radiometers which have a larger number of narrower wavelengths.

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