REMOTE SENSING FOR NITROGEN MANAGEMENT

Tyson B. Raper
University of Arkansas
Fayetteville, AR
Jac. J. Varco
Mississippi State University
Mississippi State, MS
Derrick M. Oosterhuis
University of Arkansas
Fayetteville, AR

Abstract

Nitrogen (N) is considered to be the most limiting nutrient in cotton production and is frequently applied at uniform rates across fields to prevent deficiencies. In the humid regions of the United States, uniform applications can result in within-field deficient and excessive rates due to temporal and spatial variability of soil available N and crop demand. Quantification of crop N demand in real-time through the use of ground-based canopy reflectance could provide valuable insight for successful variable rate N fertilization management, thereby maximizing applied fertilizer N efficiency. The objective of this paper is to outline the current status of remote sensing for cotton N fertilization management. Many studies have examined the spectral N response of cotton at both leaf and canopy scales. At the leaf scale, maximum sensitivity to N stress is typically noted in the green and red-edge regions. These trends hold at the canopy scale, although slight shifts in optimal wavelength sensitivities have occurred from study to study. Even so, currently available sensors which do not monitor the aforementioned wavelengths have shown increases in N use efficiency when used to drive variable rate fertilizer N applications so long as a within-field, sufficient N control was referenced. More recent research examining combination indices utilizing optimal wavelengths have shown greater relationships to cotton N status than traditional indices. Although more research must be conducted to maximize the relationships between reflectance indices and N status, these studies have further established remote sensing as a solution to match variable cotton N demand.