

Inter-relationships of cotton plant height, canopy width, ground cover and plant nitrogen status indicators

ABSTRACT

Petiole-NO₃, leaf N and chlorophyll (SPAD) meter readings are good in-season indicators of the N status of the uppermost part of cotton (*Gossypium hirsutum* L.) plants. Petiole-NO₃, particularly is widely used in the USA as an in-season plant N test that guides N fertilizer recommendations in cotton. However, these N status indicators do not take account of plant biomass, canopy width or percent cover. The objectives of this study were to assess the effect of N fertilizer rates on the commonly used indicators of plant N status; leaf N, petiole sap NO₃ and chlorophyll meter (SPAD) readings and the plant growth measurements; plant height, canopy width, and percent ground cover, and determine to inter-correlations among the them. Irrigated field studies were conducted at Lubbock, TX USA in 2010 and 2011, New Deal, TX in 2010, and at Halfway, TX in 2011. Zero-N and a full N fertilizer rate of 134, 101, and 112 kg N ha⁻¹ were used at Lubbock, New Deal, and Halfway, respectively. The 2010 cotton growing season in West Texas was much wetter than average, and the 2011 season was much drier than normal. As a result, plant height, canopy width, and ground cover were greater in the 2010 sites than in 2011. The effects of N fertilizer were greatest for the two cultivars in subsurface drip irrigation (SDI) at New Deal in 2010 for all three N status indicators, and for the three plant growth measures compared to the other site-years. Correlation analysis indicated that among the three plant N indicators, leaf N was the most sensitive to plant parameters. These effects were positive in 2010 and negative in the 2011 dry year. Petiole NO₃ was the plant N indicator that was the most insensitive to plant growth, but the marked seasonal decline pattern reduces its usefulness for late-season N management.

Keyword: Proximal sensing