EVALUATION OF COTTON YIELD RESPONSE TO NITROGEN FERTILIZER APPLICATION ACROSS THE US COTTON BELT

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Abstract

Nitrogen (N) is an important and one of the costly inputs of cotton production. Therefore, it is important to find out if current nitrogen fertilizer guidelines for cotton production are still valid across soil type, environmental conditions, cropping systems, and management practices. A multi-state project was started in 2020 to improve our understanding of soil biophysical properties in predicting cotton yield and quality response to N application rate. Nitrogen rate response trials were established in LA, MO, MS, NC, OK, SC, TN, TX, and VT in Randomized Complete Block Design with five N rates and four replications. Rates and sites were selected by based on the local conditions and history of previous positive cotton yield response to N applications. At 9 sites out of 20, lint yield responded non-significantly to N applications. These sites had a large variation in lint yield with mean site yield varied from 315 to 1452 lbs./ac. At the other 11 sites, curvilinear response of lint yield to N applications was observed and profit-maximizing N rate at these 11 sites varied from 37 to 150 lbs. N/ac. Economic analysis showed that 7 out of 11 sites needed 20 to 123 lbs. less N compared to recommended N application. The results from this study warrants that we

should include information from soil biophysical properties in making N recommendations so do determine where to apply N and how much to apply. The revised N guidelines will help us to increase farm profits and environmental sustainability of cotton production.