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COTTON FERTILIZATION ON THE BLACKLAND PRAIRIE

Determining the right fertilizer rate for cotton production as part of 4R Nutrient Stewardship depends on several factors. Plant nutrient demand, soil nutrient supply, and fertilizer use efficiency are some examples of things that need to be considered when making a fertilizer rate decision. Following a 4R Nutrient Stewardship plan also requires that growers consider the interaction of rate with nutrient source, time of application, and placement. Thus, identifying the optimum fertilizer rate in a given season can be one of the most challenging aspects of cotton management.

One of the major cotton production areas in the South is the Blackland Prairie region in central Alabama and Mississippi. This region was once the heart of North American cotton production; however, growers in recent years have experienced fertility problems that have been difficult to explain. Growers are reporting K deficiencies in cotton in spite of the fact that these soils often test "high" or "very high" in K. One problem may be poor calibration of the soil test-based recommendations for these soils.

Auburn University researchers, Charles Mitchell and Gobena Huluka concur that "Soil test calibration for cotton on these soils is weak." To address this concern, a fertilizer response study was conducted for six years on a Blackland clay soil in Central AL. The experimental site tested "low" in P and "very high" in K, and the treatment structure included multiple rates of N, P, and K. Lint yields were compared to that of a control treatment that received 90-100-100 lb N-P_2O_5-K_2O/A each year.

Despite the fact that this soil initially tested "very high" in K, there were significant increases in yield with rates up to 100 lb K_2O/A in five of the six years. These results provide credibility to growers' claims that additional K seems to increase yields even though the soils are rated "high" or "very high" for K and none is recommended from the Auburn University Soil Testing Lab. There may be justification to change soil test K ratings for these soils and increase K recommendations for cotton.

Just as surprising a result was the lack of a significant yield response to added P. The "no P" treatment typically produced relative yields between 96 and 120% of the control treatment, which received 100 lb P_2O_5/A/yr. This result calls into question the current "low" rating for this soil test value for cotton. The definition of a "low" soil test rating indicates that the soil will produce less than 75% of its potential without fertilization of that nutrient and that clearly does not appear to be the case for the Blackland Prairie soils.

Soil testing remains our best tool for determining soil contributions to plant nutrient requirements. Fertility trial work shows current soil test recommendations to be accurate in determining required rates of P and K for cotton in other areas of Alabama and surrounding states. However, the results from this study demonstrate that periodic validation of the calibration accuracy is necessary and that re-calibration work is sometimes needed.

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Abbreviations: N = nitrogen; P = phosphorus; K = potassium.