NITROGEN AND POTASSIUM MANAGEMENT FOR 32-IN AND 40-IN COTTON IN THE MISSISSIPPI DELTA

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Abstract

Producers in the Mississippi Delta and across the Cotton Belt recognize the need for an adequate soil nutrient supply. Much of the emphasis over the last few years has centered on potassium (K) and nitrogen (N) requirements for fast-fruiting and early-maturing cotton cultivars. These studies (1996 to 1998) were designed to evaluate the interaction of applied N and K on a sandy loam soil in the Mississippi Delta at both 32-in and 40-in row spacings. The soil type was a Bosket fine sandy loam (Mollic Hapludalfs) located on the Delta Research and Extension Center at Stoneville, MS. Each study consisted of a 3x5 factorial arrangement of N rates (90, 120, and 150 lb N/A) and K rates (0, 40, 80, 120, and 160 lb K/A). The fifteen (15) treatments were randomized in a complete block design with five (40-in row study) or six (32-in row study) replications. The N was "knife" applied as urea-ammonium nitrate solution (UAN, 32% N) to both sides of the planted row utilizing a modified John Blue® applicator. The fertilizer K was also applied as a clear solution (0-0-16) with the same applicator but applied as a sidedress during early square formation. All other cultural practices such as chemical weed and insect control and cultivation were maintained uniformly across all treatments. The center two rows of each plot was spindle-picked with a commercial spindle picker modified for plot harvest. At the time of each harvest, a subsample was taken and ginned through a 10-saw microgin in order to calculate the lint percent and lint yield. For the 32-in row study (S1) treatments and harvests were made from 1996 through 1998. Lint yields ranged from 1050 to 1270 lb/A (220 lb/A difference, 21%)in 1996, 855 to 1192 lb/A (337 lb/A, 39%) in 1997, and 600 to 910 lb/A (310 lb/A, 51%) in 1998. The data suggested that as lint yields decreased, the range between lowest and highest yields increased which further suggested that more stressful conditions such as the drought during the growing season of 1998 results in a greater need for K in the root system. There was no significant interaction between main effect treatments (N rates and K rates) in any of the three years for S1. Main effect lint yields, with respect to N rates (averaged across years and K rates), showed a significant decrease in lint yield when the N rate was increased from 90 to either 120 or 150 lb N/A. Lint yields were 1053, 985, and 978 lb/A for the 90, 120, and 150 lb N/A rates, respectively. With respect to K rates (averaged over N rates and years), lint yields were increased with 80 lb K/A but no additional increase was observed when K rates exceeded 80 lb K/A. In the 40-in study (S2), lint yields in 1996 ranged from 787 to 927 lb/A (140 lb/A difference, 18%), while 1997 yields ranged from 1072 to 1201lb/A (129 lb/A, 12%), and 1998 yields ranged from 799 to 980 lb/A (181 lb/A, 23%). There were no significant treatment effects in 1997 or 1998 while some treatment differences had been detected in 1996. In 1996, lint yield decrease with increasing K rates and were significantly lower with K rates above 40 lb/A. This was different than what had been observed in S1. When averaged across years, there was no significant difference between main effect means. Thus there was no response to increasing N rates or increasing K rates. Results from the 32-in study indicated that significant K response could be obtained with sidedress applications of a K solution. The data has not shown an increase in lint yield from additional N when additional K has been supplied. Part of the difference in response to K additions may have been related to the manner in which the studies were conducted. The 32-in row study has remained in the same location with treatments applied to the same plots each year giving some nutrient buildup with time. In the 40-in study, the plots were rotated in the field and did not receive additional K each year. With this in mind, it appears that annual applications of smaller amounts may be better than a single larger application. Reductions could have been related to chlorine or salt problems which were not measured.

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