

**PHOSPHORUS AND POTASSIUM  
FERTILIZATION OF COTTON**

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**Abstract**

Information on phosphorus ( $P_2O_5$ ) and potassium ( $K_2O$ ) nutrition for no-till (NT) cotton (*Gossypium hirsutum* L.) production is limited. Research was initiated in 1994 and continued through 1999 on a Loring silt loam at the Milan Experiment Station evaluating  $P_2O_5$  and  $K_2O$  fertilization rates for conventional- (CT) and NT production systems. Initially, Mehlich I extractable P was low and extractable K was medium. The experimental design was a split plot, main plots were tillage and  $P_2O_5$ - $K_2O$  sub-plots. The applied  $P_2O_5$  rates were 0, 40, 80, and 120 lb/acre while the applied  $K_2O$  rates were 0, 30, and 60 lb/acre. Treatments were replicated four times. The ANOVA showed a tillage-by-P-K rate-by-year interaction effect on yields. Yearly CT and NT yields were increased by  $P_2O_5$  fertilization. CT yields were increased by broadcasting 40 lb  $P_2O_5$ /acre four of the six years with 80 lb required the other two years. NT yields were increased by 40 lb  $P_2O_5$ /acre three of the six years with 80 and 120 needed the other three years.

Additional research was initiated in 1995 and continued through 1999 on a Lexington silt loam and a Memphis silt loam evaluating the effect of surface K applications for NT cotton production. The research was also conducted 1995 through 1997 on a Loring silt loam. Initial Mehlich I extractable K was high on the Lexington, high on the Loring and low on the Memphis soil. The experimental design for the K tests was a RCB with treatments replicated five times.  $K_2O$  rates of 0, 30, 60, 90, 120, 150, and 180 lb/acre were surface applied. Nitrogen was broadcast at 80 lb N/acre after planting. D&PL 50 was planted 1995 and 1996 with D&PL 5409 planted in 1997 through 1999. On the high EK Loring silt loam, yields from broadcasted K rates differed each year. The 1995 yields were increased with K rates up to 150 lb  $K_2O$ /acre while the 1996 yields were unaffected by K fertilization and 1997 yields were increased with K rates up to 90 lb  $K_2O$ /acre. Three-year average yields were increased by broadcasted K rates up to 90 lb  $K_2O$ /acre. In 1995, yields produced on the high EK Lexington silt loam were not affected by K fertilization. In 1996, broadcasting 120 lb  $K_2O$ /acre increased yields while 90  $K_2O$ /acre increased yields in 1997 and 1998. In 1999, yields were increased by broadcasting only 30 lb  $K_2O$ /acre. Five-year average yields were increased by broadcasting 90 lb  $K_2O$ /acre. For the low EK Memphis silt loam, the 1995, 1997, and 1999 NT yields

were increased by broadcasted K rates up to 90 lb  $K_2O$ /acre while 1996 and 1998 yields were increased by broadcasting 120 and 150 lb  $K_2O$ /acre, respectively. Five year-average yields were increased with broadcast K rates up to 150 lb  $K_2O$ /acre. The 90 lb  $K_2O$ /acre fertilization rate response for the two high EK soils (Lexington and Loring) was higher than the K previously recommended for cotton production in Tennessee. Based on this research, recommended rates of potassium fertilization were increases for NT cotton production.