

**EFFECT OF POTASSIUM RATE ON COTTON UNDER IRRIGATED AND DRYLAND CONDITIONS****S.S. Davis****D.M. Dodds****C.A. Samples****A.B. Denton****M.T. Plumblee****L.X. Franca****B.R. Wilson****Mississippi State University****Mississippi State, MS****Abstract**

Potassium is an essential element for cotton (*Gossypium hirsutum*, L.) production. Adequate potassium levels allow the cotton plant to establish and develop bolls, produce longer fibers with higher quality, and combat disease pressures that may be present. Cotton has been found to be more sensitive to potassium deficiencies when compared to other crops grown in the Mid-South. It has been hypothesized that cotton varieties developed to be higher-yielding and earlier-maturing will uptake potassium earlier and in greater amounts. There is a relationship between soil moisture content and potassium availability to the plant. Further questions regarding the relationship between potassium uptake and irrigation schemes on cotton growth and yield have arisen. Therefore, an experiment was conducted to evaluate the effect of potassium application rate on cotton under both irrigated and dryland conditions. This experiment was located in Starkville, MS at the R.R. Foil Plant Science Research Center in 2016. Two fields were selected due to the low potassium levels present in each field. Field 1 averaged 155 kg K/ha and field 2 averaged 117 K kg/ha. Muriate of potash (MOP) was applied pre-plant using hand spreaders at rates of 0, 45, 90, 134, 179, and 224 kg/ha. Two foliar application programs were used as comparison to other treatments. Nucleus™ 0-0-15 was applied at 1.7 kg ai/ha at each timing. The foliar application programs consisted of applications at pinhead square (8-10 nodes) and bloom (12-14 nodes) or applications at pinhead square, bloom, bloom plus two weeks, and bloom plus four weeks. All fertility treatments were conducted under irrigated and dryland conditions in each field. Data were analyzed in SAS 9.4 using the PROC GLIMMIX procedure. Means were separated using Fisher's Protected LSD at  $\alpha=0.05$ .

Irrigation had a significant impact on cotton growth and development. Irrigated cotton was significantly taller than dryland cotton. Dryland plots reached maturity earlier than irrigated plots. Muriate of potash application rates greater than 134 kg/ha also resulted in significantly greater plant height. Plots treated with potassium application rates of 179 kg/ha and greater yielded significantly higher than plots treated with foliar applications and plots treated with 45 kg/ha and 90 kg/ha. No significant differences in yield were seen due to irrigation or foliar application programs. Based on these data, irrigation and potassium application rates had a significant impact on cotton growth and development. Irrigation did not significantly impact cotton yield. However, as potassium application rate increased, cotton yield increased significantly as well.