

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

Cotton (*Gossypium hirsutum*, L.) varieties have been found to respond to environmental factors in numerous ways. Many times, selecting a variety based on the environment will lead to a more productive crop. Environmental factors that should be considered include soil texture, average season length, and whether the field is irrigated or not. It has also been hypothesized that cotton varieties developed to be higher-yielding and earlier-maturing will uptake potassium in greater amounts and in a quicker manner. There has been a relationship established between soil moisture content and potassium availability to the plant. Questions have arisen regarding cotton varietal response to these relationships. Therefore, an experiment was conducted in order to evaluate cotton varietal response to irrigation schemes and potassium application rates. 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 the soil. 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, 56, 112, and 168 kg/ha. Varieties used in this study were DP 1646 B2XF and DP 1518 B2XF; a mid and early-mid maturity, respectively. 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 $\alpha=0.05$.

Variety selection and irrigation had a significant impact on cotton growth. DP 1646 B2XF was significantly taller than DP 1518 B2XF at both bloom and defoliation. Irrigated plots were significantly taller than non-irrigated plots at defoliation. Plots treated with MOP at 168 kg/ha yielded significantly higher than untreated plots and plots treated with MOP at 56 kg/ha. Both untreated plots and plots treated with MOP at 56 kg/ha showed a negative return on investment. Whereas plots treated with MOP at 112 kg/ha and at 168 kg/ha had a return on investment of \$132 and \$308, respectively. Gin turnout percentage of DP 1646 B2XF was significantly higher than that of DP 1518 B2XF. Based on these data, potassium applications of 112 kg/ha and above will provide a positive return on investment. Potassium applications of 168 kg/ha will produce significantly greater yields. Varietal selection has a significant impact on how a plant responds to irrigation and gin turnout.