

**COTTON VARIETAL RESPONSE TO POTASSIUM APPLICATIONS UNDER IRRIGATED AND DRYLAND CONDITIONS****Savana S. Davis****Darrin M. Dodds****Bradley R. Wilson****Mississippi State University****Mississippi State, MS****Abstract**

Cotton (*Gossypium hirsutum*, L.) varietal selection is of utmost importance in a production system. Placing a cultivar in the optimal environment aids in maximizing productivity of the crop. Variety selection should be based on factors including average season length, soil texture, and irrigation program. Previous research has found that cultivars designed to be higher yielding and faster maturing will uptake potassium in greater amounts and in a quicker manner. Potassium is an essential element for cotton production. Adequate potassium levels have shown to reduce disease presence, aid in boll set and development, and improve fiber quality. Potassium availability to the crop is impacted by soil temperature, soil aeration, and soil moisture levels. 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 conducted in Starkville, MS at the R.R. Foil Plant Science Research Center in 2016 and 2017. Two fields were selected for this study due to low potassium levels present in the soil. In 2017, plots were placed in the same locations within the field and randomization did not change. Muriate of potash (MOP) was applied pre-plant using hand spreaders at application rates of 0, 56, 112, and 168 kg ha<sup>-1</sup>. Cultivars seeded in this study were DP 1646 B2XF and DP 1518 B2XF; a mid and early-mid maturity, respectively. All fertility treatments for each cultivar were conducted under irrigated and dryland conditions in each field. Data were collected throughout the season and analyzed in SAS v9.4 using the PROC GLIMMIX procedure. Analysis was separated by location due to vast differences in the environment. Data were subjected to analysis of variance (ANOVA) and means were separated using Fisher's Protected LSD and a 95% significance level.

Variety selection, irrigation, and potassium application rate significantly impacted cotton growth and development. DP 1646 B2XF was significantly taller than DP 1518 B2XF at the end of the growing season. Irrigation produced taller plants that exhibited delayed maturity in comparison to dryland conditions. Cotton treated with 168 kg ha<sup>-1</sup> MOP were less mature in terms of node above white flower (NAWF) counts than cotton treated with 56 kg ha<sup>-1</sup> MOP. Cotton yield was significantly impacted by variety selection based on environment and by an interaction between irrigation and potassium application rate. In Field 2, DP 1646 B2XF produced significantly greater yields than DP 1518 B2XF. Under irrigation, 168 kg ha<sup>-1</sup> MOP produced significantly greater yields than other irrigation and potassium application rate combinations. Under dryland conditions, cotton yield increased as potassium application rate increased but decreased significantly when 168 kg ha<sup>-1</sup> MOP was applied.