

IMPACT OF VARIOUS POTASSIUM APPLICATION RATES ON COTTON VARIETY**PERFORMANCE****William J. Rutland****Brian K. Pieralisi****John J. Williams****Steven D. Hall****Jacob P. McNeal****Bradley J. Norris****Mississippi State University****Starkville, MS****Abstract**

Cotton (*Gossypium hirsutum*, L.) varietal selection for specific environments is key to maximizing yield 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 soil type, growing season 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 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 potassium application rates. This experiment was located in Starkville, MS at the R.R. Foil Plant Science Research Center. Two fields were selected for this study in 2019, and one field in 2020 due to low potassium levels present in the soil. From 2017 through 2020, 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⁻¹. Cultivars seeded in this study included NG 5711 B3XF and NG 3994 B3XF; a mid-full and early-mid maturity, respectively. Data were collected throughout the season and analyzed in SAS v9.4 using the PROC GLIMMIX procedure. Data were analyzed 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 at an α level of 0.05.

Although both varieties were planted at the same seeding rate, NG 3994 B3XF had greater emergence than NG 5711 B3XF in 2019. Variety selection, potassium fertilizer application rate, and location significantly impacted cotton growth and development in 2019. At the end of the growing season, potassium fertilizer application rates of 112 and 168 kg K ha⁻¹ resulted in more main stem nodes per plant than cotton that received 0 kg K ha⁻¹. Cotton receiving potassium fertilizer application rates of 112 and 168 kg K ha⁻¹ produced greater nodes above cracked boll prior to harvest than cotton that received no potassium fertilizer. Seed cotton yield was affected by location and variety in. In field one, NG 3994 B3XF produced greater seed cotton yield than NG 5711 B3XF. In field two, there were no differences in yield due to variety. In 2020, variety was the only factor that effected seed cotton yield.