ANALYSIS OF GENETIC X ENVIRONMENTAL INTERACTIONS IN COTTON AS INFLUENCED BY PLANT GROWTH REGULATOR APPLICATIONS Frances Browne Trey Cutts Auburn University Auburn, AL

Abstract

Cotton response to plant growth regulators depends largely on environmental factors such as temperature and rainfall and there is likely an interaction between the genotype of the cultivar, the environment, and application of plant growth regulators. Field experiments were conducted in 2017 in Henry, Limestone, and Macon counties in Alabama to demonstrate the influence of plant growth regulators on genotypic and environmental interactions. Ten cotton varieties (DP 1518 B2XF, DP 1538 B2XF, DP 1646 B2XF, DG 3445 B2XF, NG 4601 B2XF, PHY 330 W3FE, PHY 444 WRF, ST 6182 GLT) with varying maturities were planted in conventional seed beds. Mepiquat chloride was applied at 24.52 g ai ha⁻¹, 36.78 g ai ha⁻¹, or 49.03 g ai ha⁻¹ at pinhead square, first bloom, and/or 3 weeks after bloom (WAB) to simulate mild, moderate, and aggressive plant growth regulator application strategies. Fertility and management strategies were standardized across all locations. Growth parameters at maturity and lint yield were assessed. Height reductions of at least 10% were observed for all mepiquat chloride applications in Limestone and Macon counties. A treatment by location interaction was observed and cotton height was not reduced by any treatment in Henry County. Applications at 3 WAB resulted in height reductions of only 7-10% compared to treatments applied at multiple timings during the growing season with height reductions ranging from 8-20%. These data indicate applications of mepiquat chloride at 3 WAB alone may be too late to achieve appropriate plant response. A treatment by location interaction was also observed for total nodes at maturity where cotton treated with mepiquat chloride in Limestone and Macon counties had fewer nodes than the non-treated control. Although height reductions and reduced nodes were observed at two locations, applications of mepiquat chloride did not result in greater fruit retention at any location. Yield was reduced 8-9% for three treatments in Macon County, potentially due to environmental stress. No yield advantages were observed from applications of mepiquat chloride. No treatment by variety interactions were observed for any growth or yield parameters. While applications of mepiquat chloride can reduce plant size, it is likely that applications have an indirect effect on cotton yield through manipulation of the canopy and not by directly increasing fruit retention. The results of this study suggest that plant growth regulator performance is based on the environment in which the cotton is grown and not the variety.