THE EFFECT OF IRRIGATION DURING COTTON SQUARING ON LINT YIELD AND PLANT GROWTH CHARACTERISITICS

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Abstract

Climate conditions such as episodic droughts and unpredictable rainfall patterns, as well as increased attention to and regulation of agricultural water usage, have bought increasing irrigation efficiency to the forefront of agronomic research. In Georgia, where the majority of cotton is grown on sandy soils with low water holding capacity, understanding of drought sensitivity of specific growth stages is critical to developing an irrigation schedule that maximizes both efficiency and yield (Whitaker et al., 2008; Gwathmey et al., 2011). While water supply during the flowering stage has been studied extensively, the effect of water supply during the squaring stage has been researched to a lesser extent (Snowden et al., 2014). In this experiment, the effect of irrigation during squaring on lint yield and plant growth characteristics for both early (FM 1944 B2F) and late (PHY 499 WRF) maturing cultivars was investigated during 2012 through 2014 at Stripling Irrigation Research Park, near Camilla GA, to determine if irrigation should be increased or withheld during squaring for cultivars that are likely to either reach a rapid cutout (early cultivar) or avoid cutout (late cultivar). Treatments included both cultivars subjected to the recommended irrigation rates from the UGA checkbook of 2.5 cm per week (squaring 2.5), twice the recommended amount (squaring 5) followed by 100% UGA checkbook rates during bloom, no irrigation during squaring (squaring 0) followed by 100% UGA checkbook rates during bloom, and a dryland (Dryland) control. In 2012, rainfall provided nearly the targeted 2.5 cm per week during the first (2 cm) and third (2.1cm) week of squaring, however no rainfall occurred during the second week of squaring. Lint yield was reduced when no irrigation was applied during squaring followed by normal irrigation beginning at first bloom, compared to the UGA Checkbook (2.5 cm per week during squaring) but was no different than the dryland control, suggesting that normal irrigation during bloom may not compensate for drought stress that occurred during squaring. This effect was observed in both the later and earlier maturing cultivars. Irrigating at twice the recommended rates (5 cm per week during squaring) resulted in no yield advantage when compared to the normal UGA Checkbook (2.5 cm per week during squaring). In 2013, there was one week during squaring in which no rainfall occurred, however growth remained slow due to cooler temperatures and excessive rainfall during the previous and following weeks. These conditions resulted in a four week squaring period compared to three weeks in 2012. There was no effect on lint yield among treatments, likely due to the 14.3 cm rainfall that occurred during the final week of squaring, and excessive rainfall at other times in 2013. The squaring period lasted four weeks again in 2014, with rainfall occurring in three out of the four weeks. No rainfall occurred during the fourth week of squaring, however, no visible signs of drought stress (i.e. wilting) were observed during this period. Withholding irrigation during squaring and returning to 100% UGA checkbook levels at bloom (Squaring 0) did not reduce yield in either cultivar while the dryland treatment had significantly lower yields than the three irrigated treatments. It was observed again in 2014 that increasing irrigation rates during

squaring above the recommended rates (Squaring 5) did not affect yield for either cultivar. It can be concluded from this experiment that yield reductions may occur if irrigation is withheld during squaring when dry conditions prevail during this period, despite resuming normal irrigation at first bloom. Irrigating at rates higher than recommended by the UGA checkbook during squaring had no effect on yield. The authors would like to thank the Georgia Cotton Commission for their support of this and all agronomic research.

References

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