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CONVENTIONAL COTTON RESPONSE TO LOW RATES OF GLYPHOSATE

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Abstract

In 2000, 54% of the 15.3 million acres of upland cotton planted in the United States were Roundup Ready varieties. Because non-Roundup Ready cotton is often planted adjacent to Roundup Ready cotton, the potential for herbicide drift or misapplication exists. The objective of these studies was to determine the effects of low rates of Roundup UltraMax (similar to drift) on non-Roundup Ready cotton. Experiments were established at three locations, including: Lubbock, TX, Munday, TX, and Altus, OK, which represent upland cotton producing regions of the Texas Southern High Plains and Rolling Plains and Southwest Oklahoma. At the Lubbock location, Paymaster HS26 was planted and at Munday and Altus, DPL 237B was planted. Roundup UltraMax was applied at 0.38 lb ae/A (12.8 oz/A), 0.19 lb ae/A (6.4 oz/A), 0.094 lb ae/A (3.2 oz/A), 0.047 lb ae/A (1.6 oz/A), and 0.023 lb ae/A (0.8 oz/A) postemergence-topical (POST) to cotton at the cotyledon to 2-leaf (COT to 2-lf), 4- to 5-leaf, pinhead square (PHSQ), and first bloom (FBLM) growth stages. Cotton injury ratings and plant heights were taken at 14 days after treatment (DAT) and at the end of the season. Cotton lint yields and quality were also determined.

At Lubbock, cotton injury 14 DAT ranged from 0 to 50% at the four growth stages. The 0.19 lb ae/A rate did not injure cotton when applied at the FBLM stage, while the 0.094 lb ae/A rate did not injure cotton at any stage. Cotton injury declined as the season progressed, and only the highest rate applied at the COT to 2-lf and PHSQ showed injury at season's end. No differences in end of season plant height were observed for any rate at any growth stage. Only Roundup UltraMax at 0.38 lb ae/A applied at the PHSQ and FBLM cotton growth stages decreased yield compared to the untreated. All rates applied to cotton at the PHSQ growth stage and 0.047 and 0.19 lb ae/A applied at the 4 to 5-lf stage significantly increased micronaire compared to the untreated.

At the Munday location 14 DAT, all rates at all growth stages injured cotton 10 to 90%, with increasing injury from increasing rate. At the COT to 2-lf and 4 to 5-lf stages, injury ranged from 18 to 87%, while injury ranged from 10 to 35% at the PHSQ and FBLM stages. At 8 weeks after treatment (WAT), injury ranged from 1 to 82% injury. All but the lowest rate of Roundup UltraMax applied at the COT to 2-lf stage showed injury 8 WAT and all rates applied at the 4 to 5-lf stage injured cotton. Rates of Roundup UltraMax greater than 0.094 lb ae/A applied to cotton at the PHSQ stage showed injury 8 WAT; however, no injury was noted at that time from applications made at FBLM. No differences in end of season plant height were noted for any rate at any growth stage. Cotton lint yield was reduced from Roundup UltraMax applications at 0.38 lb ae/A applied to COT to 2-lf cotton, all rates applied to 4 to 5-lf cotton, greater than 0.094 lb ae/A applied to cotton at PHSQ, and greater than 0.19 lb ae/A applied to cotton during FBLM.

At the Altus location 14 DAT, injury ranged from 0 to 85%. At the 0.38 lb ae/A rate, injury occurred at the COT to 2-lf, 4 to 5-lf, and PHSQ. At 0.19 and 0.094 lb ae/A, injury was observed at the COT to 2-lf and 4 to 5-lf stages. No injury was observed from any treatment at the FBLM growth stage. At season's end, the only injury observed was from 0.38 lb ae/A applied at the PHSQ stage (6%). Roundup UltraMax applied at higher rates and especially at the FBLM stage increased plant height at the end of the season. Roundup UltraMax at 0.38 lb ae/A decreased lint yield when applied at the COT to 2-lf and PHSQ growth stages. Rates greater than 0.19 lb ae/A applied to cotton in FBLM decreased yields at the Altus location. Micronaire was reduced by Roundup UltraMax applications greater than 0.094 lb ae/A applied to COT to 2-lf cotton, greater than 0.19 lb ae/A applied to 4 to 5-lf cotton, and 0.38 lb ae/A applied to cotton at the PHSQ or FBLM stages.

Cotton injury was affected by Roundup UltraMax application timing and rate, but varied between locations. Visual injury did not always result in a yield reduction, especially at the COT to 2-lf growth stage. These studies suggest that non-Roundup Ready cotton can tolerate some Roundup UltraMax injury, especially early in the season with little effect on yield.