

EFFECTS OF ROUNDUP DRIFT ON NON-ROUNDUP READY COTTON
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Abstract

The Texas Southern High Plains produced 3.61 million and 3.55 million acres of cotton in 2002 and 2003, respectively. Of those acres, 50 to 60% of the varieties planted were Roundup Ready. The remaining acres included conventional, non-transgenic varieties, as well as other non-Roundup Ready transgenic varieties. Because Roundup Ready cultivars are often planted adjacent or in close proximity to non-Roundup Ready varieties, herbicide drift or misapplication can occur. Experiments were conducted at the Texas Agricultural Experiment Station near Lubbock in 2002 and 2003 to determine the effects of low rates of Roundup UltraMax (similar to drift) on non-Roundup Ready cotton. Paymaster HS26 was planted for both trials in both years. Roundup UltraMax was applied at 0.75 lb ae/A (1X), 0.38 lb ae/A (1/2X), 0.19 lb ae/A (1/4X), 0.094 lb ae/A (1/8X), 0.047 lb ae/A (1/16X), and 0.023 lb ae/A (1/32X) postemergence-topical (POST) to cotton at the cotyledon to 2-leaf (COT-2 lf), 4- to 5-leaf (4-5 lf), pinhead square (PHSQ), and first bloom (FBLM) growth stages. Cotton visual injury ratings were taken at 14 days after treatment (DAT), 21 DAT, 28 DAT, and at the end of the season. Plants were mapped at the end of the season and cotton lint yields and quality were also determined.

At 14 DAT in 2002, Roundup UltraMax applications made at the COT-2 lf growth stage injured cotton 35% (1/16X) to 90% (1X). Injury from 8 to 95% (1/16X to 1X) was observed from applications made to 4-5 lf cotton. Roundup UltraMax applications at 1/16X and greater made at PHSQ injured cotton 9 to 90%. Injury from FBLM applications was only observed from 1/8X and greater, with injury ranging from 60 to 95%. By the end of the season in 2002, injury from applications made on COT-2 lf cotton had decreased. The only significant injury was observed from 1/4X and greater (62 to 80%). Roundup UltraMax applications applied to 4-5 lf cotton had also decreased with injury ranging from 10 to 82% (1/4X to 1X). At the end of the season in 2002, Roundup UltraMax applications made on later cotton (PHSQ and FBLM) were more injurious than those made on earlier cotton (COT-2 lf and 4-5 lf). Applications made at PHSQ caused injury from 5 to 100% (1/8X to 1X). All but the 1/32X rate of Roundup UltraMax applied at FBLM showed injury at the end of the season, and injury was as high as 100% from the 1X and 1/2X applications. Cotton lint yields were decreased 50 to 61% from 1/4X and greater applied to cotton at the COT-2 lf growth stage. All rates but the 1/32X decreased lint yields when applied at the 4-5 lf and FBLM growth stages. All Roundup UltraMax rates applied at PHSQ decreased yields. No yield was obtained from 1X applications made at PHSQ and FBLM or 1/2X applications made at FBLM.

In 2003 at 14 DAT, Roundup UltraMax applications made at the COT-2 lf growth stage showed injury with rates of 1/8X and greater, with injury ranging from 40 to 85%. At 14 DAT, all rates except the 1/32X applied at 4-5 lf injured cotton from 20 to 92%. Similar to the 4-5 lf application, rates of 1/16X and greater applied at PHSQ injured cotton 25 to 92%. In contrast to the results seen from FBLM application made in 2002, injury observed in 2003 ranged from 25% from 1/8X to 60% from the 1X rate, probably because of higher than average temperatures and lower than average rainfall received in-season in 2003. However, injury observed at the end of the season in 2003 was similar to those observed in 2002. Injury from 45 to 85% was observed from Roundup UltraMax applications at 1/4X and greater applied at COT-2 lf. Only the 1/2X and 1X rates applied at the 4-5 lf growth stage showed injury at the end of the season. Roundup UltraMax applications at 1/4X and greater injured cotton 78 to 90%. All rates but the 1/32X rate applied at FBLM showed injury at the end of the season, from 25 to 95%. Cotton lint yields were decreased with Roundup UltraMax applications of 1/4X and greater applied at COT-2 lf, 4-5 lf and PHSQ 20 to 50%. Applications of 1/8X and greater applied at FBLM decreased cotton lint yields 50 to 83%.

In both years, application timing and Roundup UltraMax rate affected cotton injury levels. Roundup UltraMax at 1/4X and greater decreased yields, regardless of growth stage or year. Initial visual injury did not always result in a yield reduction and injury tended to overestimate yield loss, especially from early season (COT-2 lf and 4-5 lf) applications. Later applications (PHSQ and FBLM) reduced yield more than earlier applications. Cotton injury and subsequent lint yields from Roundup UltraMax drift are dependent on the growing season and crop conditions at the time of the application.