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GLYPHOSATE-RESISTANT COTTON RESPONSE TO REDUCED RATES OF GLUFOSINATE

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Abstract

Research was conducted in 2003 at the Northeast Research Station in St. Joseph, La, to evaluate glyphosate-resistant cotton response to reduced rates of Liberty (glufosinate) that may be encountered in drift or sprayer contamination events. Liberty rates of 0.063, 0.084, 0.10, 0.125, 0.146, 0.167, 0.188, 0.21, 0.23, or 0.25 lb ai/A, representing 15, 20, 25, 30, 35, 40, 45, 50, 55, or 60% of a 0.418 lb ai/A (32 oz/A) use rate, were applied to DP 458 BR cotton at the 3 or 6 leaf growth stage. A nontreated control was included for comparison. Applications were made using a CO_2 backpack sprayer at 15 GPA to each 2 row 6.67' x 35' plot. Parameters measured included plant height 30 days after application (DAT) and prior to harvest, plant population 30 DAT, percent first harvest, and seedcotton yield. The nontreated control was used to calculate percent reduction values for all parameters measured except percent first harvest, but was not included in the statistical analysis.

Averaged across growth stage at time of application, height reduction 30 DAT ranged from 19 to 50% and was maximized at the 0.125 lb ai/A rate (38%). Averaged across Liberty rates, greater height reduction was noted with the earlier application timing (53 vs. 22%). Height prior to harvest was reduced no more than 2% for all Liberty rates, while mature height reductions did not differ by growth stage at time of application. At the 3 leaf application, plant population was reduced at least 50% beginning with the 0.10 lb ai/A rate (56%), with higher rates resulting in a population reduction ranging from 78 to 99%. Population reduction for the 3-leaf application was maximized at the 0.167 lb ai/A rate (91%). Reduction at the 6-leaf application timing ranged from 5 to 26%, with little differences noted among Liberty rates. Within each Liberty rate, population reduction was greater at the earlier timing. Percent first harvest ranged from 78 to 92% and 88 to 92% for the 3 and 6 leaf timing, respectively, with only slight differences noted among Liberty rates. At the 3-leaf application, yield reduction ranged from 21 to 82% and was maximized at the 0.146 lb ai/A rate (47%). Yield reduction for the 6-leaf timing ranged from 10 to 29% with no differences noted among Liberty rates. At rates of 0.146 lb ai/A or higher, yield reduction was greater for Liberty application at the earlier timing (47 to 82% vs. 10 to 29%).

In conclusion, Liberty rates as low as 0.063 lb ai/A (4.8 oz/A), or 15% of a 0.418 lb ai/A (32 oz/A) use rate, can result in significant plant population and yield reduction. In general, negative effects from Liberty applied to glyphosate-resistant cotton were more pronounced at the 3-leaf application. As acceptance of both transgenic technologies and likelihood of adjacent production fields increases, all precautions must be taken to avoid Liberty misapplication to glyphosate resistant cotton through spray drift or sprayer contamination to avoid negative consequences.