EFFECT OF SIMULATED DRIFT RATES OF ROUNDUP ULTRA (GLYPHOSATE), BUCTRIL (BROMOXYNIL), AND LIBERTY (GLUFOSINATE) ON GROWTH AND YIELD OF CONVENTIONAL COTTON

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Abstract

A field study was conducted in 1999 at the Macon Ridge Research Station in Winnsboro LA to determine the effect of Roundup Ultra (glyphosate), Liberty (glufosinate), and Buctril (bromoxynil) simulated drift rates on conventional cotton. The experimental design was a randomized complete block with a 3 (herbicide) x 7 (rates) x 3 (timing) factorial arrangement of treatments replicated four times. Plot size was 6.67' x 35'. Simulated drift rates of 0, 1/4, 1/8, 1/16, 1/32, 1/64, and 1/128x of the labeled rate of Roundup Ultra (1.0 lb ai/A), Liberty (0.365 lb ai/A), and Buctril (0.5 lb ai/A) were applied to STV 474 cotton at the 2, 5, and 9 node growth stage. Applications were broadcast with a handboom at 15 GPA. Drift to adjacent plots was eliminated by use of physical barriers between plots. Supplemental furrow irrigation as needed and standard weed, insect and fertility practices were utilized. Parameters measured included visual injury 14 days after each application timing (DAT), plant height 30 DAT (10 random plants/plot), whole plant dry weight 30 DAT (1m section of row/plot), nodes above white flower (NAWF) (10 random plants/plot) mid-season, green and open boll (1 m section of row/plot) late season, final plant population prior to harvest, and seedcotton yield. Dry weight and height data are presented as a percent reduction from the nontreated control (0 rate). For ease of analysis, data were analyzed by herbicide and subjected to ANOVA and means separated by Tukey-Kramer at the 5% probability level.

Roundup Ultra

No significant differences in NAWF, open boll, plant population, and seedcotton yield were noted compared to the nontreated control. A significant rate by timing interaction was noted for injury, height, and dry weight. A stepwise reduction in injury was observed for the 1/4x rate at the 2 (52%), 5 (45%), and 9 (21%) node timings with all greater than the nontreated check. Injury with 1/8 (33%) and 1/16 (14%) x rates at the 2 node timing was greater than at the 5 or 9 (< 4%) node timing and the nontreated check. Rates of 1/32x or less resulted in no significant injury (<7%). Only the 1/4x rate at the 2 (43%) and 5 (22%) node timing resulted in significant height reduction compared with the nontreated check. Similarly, 1/4x rate applied to 2 (69%) and 5 (39%) node cotton resulted in significant dry weight reduction compared with the nontreated check. A significant rate effect was observed for green boll counts. Averaged across timings, green boll number was significantly greater than the nontreated check only for the 1/4x rate.

Liberty

Liberty application resulted in no significant differences in NAWF, green boll, open boll, plant population, or seedcotton yield compared to the nontreated check. A significant rate by timing interaction was noted for injury only. A stepwise reduction in injury for the 1/4x rate was observed at the 2 (67%), 5 (41%), and 9 (27%) node timing with all greater than nontreated check. All applications at the 1/8 and 1/16 x rates, although not different from each other, and the 2 node application of the 1/32 x rate, resulted in injury ranging from 10 to 25% which was greater than the nontreated check. All other applications resulted in no significant injury. A significant rate effect was noted for height and dry weight. Averaged across timings, significant height reductions of 14 and 18% were observed for only the 1/4 and 1/8x rates, respectively. Dry wt was reduced 38, 20, 20, and 20% by the 1/4, 1/8, 1/16, and 1/64x rates, respectively.

Buctril

No significant differences in NAWF or open boll were noted. Due to mixing error, 1/8x rate was excluded from the analysis. A significant rate by timing interaction was noted for injury, dry weight, plant population, and seedcotton yield. A stepwise reduction in injury was noted for the 1/4x rate at the 2 (92%), 5 (77%), and 9 (64%) node timing with all greater than the nontreated check. Injury with the 1/16x rate was equivalent among timings ranging from 49 to 56%, with all greater than the nontreated check. At the 1/32x rate, significant injury ranging from 35 to 47% was observed. The 1/64 and 1/128x rate at the 2 (33 and 17%, respectively) and 5 (36 and 25%, respectively) node timing resulted in greater injury than their respective 9 node timings and the nontreated check. No significant injury was noted only for the 1/128x rate at the 9 node timing. For the 1/4x rate, height reduction at the 2 (54%) and 5 (45%) node timings were greater than at 9 node (15%), with all greater than the nontreated check. For the 1/16 x rate, height was significantly reduced at the 2 (20%) and 5 (23%) node stages only. With the exception of 1/32x rate applied at the 5 node stage (14%), all other applications did not result in significant height reductions. For the 1/4x rate, dry weight reduction was greater for the 2 (91%) and 5 (72%) node timing than at 9 (34%) node. These respective treatments, in addition to the 1/16x rate at the 2 node timing, which resulted in a 51% reduction, were different from the nontreated check. All other treatments resulted in no greater than a 14% reduction. Plant population and seedcotton yield were significantly reduced with only the 1/4x rate applied at 2 node timing. A significant rate effect was noted for green boll. Averaged across timings, the 1/4x rate significantly increased green boll number compared to the nontreated check.

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