TOLERANCE OF WIDESTRIKE™ COTTON TO GLUFOSINATE

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Abstract

Cotton tolerant to glyphosate is planted on greater than 95% of the acreage in the Mid-South. However, as glyphosate-resistant weed species have emerged and spread throughout the Mid-South and Southeastern United States, growers are continually looking for ways to control these species. In particular, glyphosate-resistant Palmer amaranth has proven to be very problematic due to its competitiveness, rapid growth, prolific seed production, and ability to withstand difficult environmental conditions. One option for control of this, and other weed species, is glufosinate. Glufosinate tolerant cotton varieties are available; however, they are only planted on a small percentage of the acreage in the Mid-South and Southeast. Increasingly, growers in many areas are utilizing cotton varieties containing Widestrike™ technology as these varieties utilize the *pat* gene as a selectable marker for Widestrike™. The *pat* gene also confers some level of tolerance to glufosinate herbicide. Previous research indicates that glufosinate may cause visual injury to Widestrike™ cotton; however, yields were unaffected. This research was undertaken to determine the level of tolerance present in Widestrike™ cotton in comparison to Liberty Link® cotton.

Studies were conducted at two locations in Starkville, MS; Jackson, TN, Chic, TN; Marianna, AR; and Plains, GA. FiberMax 'FM 1773LLB2' and Phytogen 'PHY 375 WRF' were planted at seeding rates determined by local standards. Plots consisted of two rows either 9 or 12 m in length. Glufosinate applications were made at 0.59, 1.19, 1.78, and 2.38 kg ai ha^{-1} either once or twice using a tractor-mounted compressed air sprayer or a CO_2 powered backpack sprayer. Applications were made to one- to three-leaf cotton and/or six- to eight-leaf cotton. Visual injury, growth and development, yield, and fiber quality data were collected. No application rates by number of application interactions were present; therefore, data were pooled over number of applications.

Visual injury seven days after the one- to three-leaf application increased significantly as application rate increased. Application of 0.59 kg ai ha^{-1} resulted in ~15% visual injury whereas application of 2.38 kg ai ha^{-1} resulted in ~47% visual injury to 'PHY 375 WRF'. Less than 10% injury was observed at all application rates on 'FM 1773 LLB2'. Plant height was unaffected by glufosinate application for either variety; however, application rates beyond 1.19 kg ai ha^{-1} caused significant reductions in the number of plant nodes 14 days after the one- to three-leaf application. Cotton injury on 'PHY 375 WRF' seven days after the six- to eight-leaf application also increased as application rate increased. Approximately 6% injury was observed following the 0.59 kg ai ha^{-1} application compared to 30% visual injury following the 2.38 kg ai ha^{-1} application. Less than 3% injury was observed on 'FM 1773 LLB2' at all application rates. Plant height of 'FM 1773 LLB2' 14 days after the six- to eight-leaf application was unaffected by application rate. Plant height of 'PHY 375 WRF' was reduced at application rates beyond 1.19 kg ai ha^{-1}. Total plant nodes of either variety were unaffected by application rate of glufosinate. End of season plant height and nodes were also unaffected by glufosinate application rate. Application of glufosinate at rates beyond 1.19 kg ai ha^{-1} did increase nodes above cracked boll of 'PHY 375 WRF' indicating a delay in maturity. Application rate had no effect on maturity of 'FM 1773 LLB2'. Lint yield of 'FM 1773 LLB2' was unaffected by glufosinate application rate. Application rates beyond 1.19 kg ai ha^{-1} resulted in reduced lint yield of 'PHY 375 WRF'.