OPTIMIZING WEED MANAGEMENT IN GLYPHOSATE-RESISTANT CORN (*Zea mays*). Chad L. Smith and Reid J. Smeda, Graduate Research Assistant and Associate Professor, Department of Agronomy, University of Missouri, Columbia, MO 65211

Traditional weed control strategies for corn indicated the use a of PRE and/or POST herbicides. The advent of glyphosate-resistant corn creates options such as strict dependence upon POST herbicides. Ideally, producers prefer a single timing for herbicide application. However, the unpredictability of weather and corn sensitivity to weed competition can necessitate multiple applications. The objective of this study was to determine the efficacy of PRE, PRE + POST, and POST only herbicide programs in glyphosate-resistant corn. Field studies were conducted in 2003 and 2004 in central and northeast Missouri. Treatments included six, one-pass programs and nine, two-pass programs. Glyphosate-resistant corn was planted in 76 cm rows under a conventional tillage system. Weed control was visually evaluated for giant foxtail, common waterhemp, common ragweed, Pennsylvania smartweed, and velvetleaf 5 weeks after the final herbicide application was made. Management programs consisting of sequential applications of glyphosate at 0.84 kg ae/ha or *s*-metolachlor followed by an application of glyphosate at 0.84 kg/ha were the only two-pass treatments which resulted in >90% weed control across all four-site years. A tank mix containing 0.07 kg ai/ha of mesotrione, 1.68 kg ai/ha atrazine, and 0.84 kg/ha of glyphosate applied on 10 cm weeds was the only one-pass system that provided >90% giant foxtail control across all four site-years. In site-years where other species such as common ragweed and Pennsylvania smartweed were present, weed control from all one-pass programs were comparable to control in the two-pass programs. The spectrum of weeds controlled was broadened in treatments that contained atrazine. For 3 of the 4 site-years, grain yield in plots that received a single application of glyphosate were at least 12% lower compared to plots that received sequential glyphosate applications. Grain yield for PRE only, PRE followed by POST, and sequential POST glyphosate applications was comparable in 2 of the 4 site years. Grass weed control was poor following an early post-emergence application of dimethenamid-p + atrazine, and as a result grain yield was up to 32% lower compared to plots receiving sequential glyphosate applications. For 3 of the 4 site-years, plots that received a single application of glyphosate when weeds were 10 - 15 cm in height resulted in grain yields that were decreased by as much 19% when compared to treatments that received sequential applications of glyphosate. Glyphosate only weed management programs in corn can result in comparable weed management and grain yield comparable to traditional weed management programs, but early season weed competition can result in significant reductions in grain yield.

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