

IMPLICATIONS OF SOIL RESIDUAL HERBICIDES ON THE CONSISTENCY OF GLYPHOSATE EFFICACY IN GLYPHOSATE-RESISTANT CORN. Daniel D. Schnitker, Bryan G. Young, William G. Johnson, and Mark M. Loux, Graduate Research Assistant and Professor, Department of Plant, Soil, and Agricultural Systems, Southern Illinois University, Carbondale, IL 62901, Associate Professor, Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47907, Professor, Department of Horticulture and Crop Science, The Ohio State University, Columbus, OH 43210.

The implementation of glyphosate-resistant corn has led to an increased reliance on postemergence glyphosate applications with less dependence on preplant soil residual herbicides. Less emphasis on early-season weed management may potentially compromise the consistency of glyphosate efficacy applied postemergence. Two field studies were each conducted in Illinois, Indiana, and Ohio in 2006 and 2007. The objective of the first study was to evaluate residual herbicide rate and timing effects on weed densities and heights preceding a planned postemergence glyphosate application. Applications at both 14 days before planting and preemergence were performed for the following herbicide treatments: atrazine, atrazine plus simazine, atrazine plus isoxaflutole, atrazine plus acetochlor, and acetochlor plus flumetsulam plus clopyralid. The objective of the second study was to determine the effects of residual herbicide rate and postemergence glyphosate timing on weed densities and heights prior to the postemergence glyphosate application. Herbicide treatments were applied preemergence and included atrazine, atrazine plus simazine, atrazine plus isoxaflutole, atrazine plus acetochlor, and atrazine plus *s*-metolachlor plus mesotrione. Two postemergence glyphosate timings were implemented based on weed sizes prior to application (early post and late post).

Applying residual herbicides early preplant resulted in increased densities of fall panicum, common waterhemp, giant ragweed, and velvetleaf plants exceeding the glyphosate label limitations at the postemergence timing compared with the residual herbicides applied preemergence. This difference was not consistently resolved by applying increased rates of the residual herbicides at the early preplant timing. Differences in weed heights across herbicide treatments and timings were not observed for redroot pigweed or common lambsquarters. All herbicide treatments across timings reduced the heights of giant foxtail, redroot pigweed, and common lambsquarters to within glyphosate label limitations.

Delaying the postemergence application of glyphosate resulted in weed heights over the labeled limitations for glyphosate products for fall panicum, common waterhemp, giant ragweed, velvetleaf, and morningglory species. Treatments including acetochlor or *s*-metolachlor plus mesotrione provided the lowest densities of giant foxtail, fall panicum, redroot pigweed, and common waterhemp. Velvetleaf densities were lowest when an HPPD-inhibiting herbicide was included, such as isoxaflutole or mesotrione. Increasing herbicide rates tended to reduce weed densities of some species. This research suggests that a preemergence application of a broad-spectrum residual herbicide will reduce the weed densities and heights of most species to provide increased flexibility and consistency regarding the postemergence application of glyphosate.