WEED COMMUNITY COMPOSITION AFTER SIX YEARS IN GLYPHOSATE-RESISTANT CORN AND SOYBEAN. Mark R. Jeschke and David E. Stoltenberg, Graduate Research Assistant and Professor, University of Wisconsin, Madison, WI 53706.

Research was conducted at the University of Wisconsin Arlington Agricultural Research Station from 1998 through 2003 to determine the effects of crop rotation, primary tillage system, and glyphosate use intensity on weed community composition. Six weed management treatments were compared in continuous corn and a corn-soybean annual rotation, and in three different primary tillage systems: moldboard plow, chisel plow, and no-tillage. Weed management treatments were based on six levels of glyphosate use intensity: glyphosate applied post-emergence, glyphosate applied post-emergence and late post-emergence, glyphosate applied post-emergence followed by inter-row cultivation (in corn only), glyphosate applied post-emergence rotated annually with a non-glyphosate herbicide program, a soil-residual herbicide applied pre-emergence followed by glyphosate applied post-emergence, and a non-glyphosate program. Plots were maintained in the same location for the duration of the experiment. Weed species richness (number of species) and plant density of each species were measured several times each growing season.

Weed species richness and diversity at the time of post-emergence herbicide application varied among crop rotation, tillage, and weed management treatments. Crop rotation was a significant source of variation of weed species diversity in 1998 only, and was not a significant source of variation for weed species richness. Tillage system was a significant source of variation of species richness in 1998, 2001, and 2003, and a significant source of variation of species diversity in 1998, 1999, and 2001. Weed management treatment was a significant source of variation for both parameters in each year. Weed community composition in glyphosate-based treatments changed little over time, whereas weed community composition changed rapidly, in as few as 3 yr, in non-glyphosate treatments. Species richness and the number of abundant weed species were typically greater in treatments that included glyphosate as the sole herbicide chemistry compared to non-glyphosate treatments, which were typically dominated by one or two weed species. Common lambsquarters, velvetleaf, pigweed species, eastern black nightshade, and giant foxtail were the most abundant weed species over time in glyphosate-based treatments. In contrast, giant ragweed and shattercane became the dominant weed species over time in non-glyphosate treatments. These two species were associated with substantial crop yield losses, particularly in crop rotation and tillage treatments where weed density was high. Glyphosate-based weed management treatments were typically associated with greater weed species richness, diversity, and community stability over time compared to non-glyphosate treatments, suggesting that the risk of rapid change in weed community composition was similar to or less than that of non-glyphosate treatments.

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