

CROP ROTATION, TILLAGE, AND WEED MANAGEMENT EFFECTS ON WEED COMMUNITIES AFTER 12 YEARS

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Abstract

Research was conducted from 1998 through 2009 to determine the effects of crop sequence, tillage system, and glyphosate use frequency on weed community composition and management risks in glyphosate-resistant corn and soybean. Weed communities tended to be dominated by a few highly abundant weed species. Common lambsquarters, giant foxtail, and redroot pigweed were abundant across cropping sequence and tillage treatments over time. In contrast, giant ragweed was not observed in 1998, but increased over time, particularly in chisel plow and no-tillage systems, to become the most abundant weed species in most treatments by 2009. Giant ragweed abundance was similar between continuous corn and corn-soybean rotation after 12 years, but there were fewer instances over time of high densities of giant ragweed and crop yield loss in corn-soybean rotation than continuous corn. In both continuous corn and corn-soybean rotation, giant ragweed increased over time in treatments that did not provide adequate control, particularly control of later flushes of giant ragweed (e.g., those that emerged after the typical postemergence application timing). Giant ragweed abundance was affected greatly by tillage system. In the moldboard plow system, total weed densities (including giant ragweed) were very low over time across cropping sequence and weed management treatments. In contrast, giant ragweed abundance increased over time in chisel plow and no-tillage systems, particularly in treatments that did not provide adequate control of late flushes as noted above. However, the greatest crop yield losses associated with crop-weed competition occurred in the continuous corn, chisel plow system. Weed management treatments that effectively targeted the range of giant ragweed emergence (from early to late flushes) were associated with the lowest total weed densities and lowest crop yield loss risks across cropping sequence and tillage systems over time.

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