

WEED GROWTH IN CONVENTIONAL AND LOW-INPUT CROP ROTATIONS. Rachel B. Halbach and Robert G. Hartzler, Graduate Research Assistant and Professor, Department of Agronomy, Iowa State University, Ames, IA 50011.

A two year study was conducted in central Iowa to evaluate the effects of cropping systems on the growth of common waterhemp, common lambsquarters, giant ragweed, and velvetleaf. The cropping systems, established in 2002, were a corn-soybean rotation relying on convention inputs and a low-external input system based on a corn-soybean-oat/alfalfa-alfalfa rotation. Experiments were conducted during the soybean phase of the rotations. Since 2005, soybean in the diversified rotation had higher yields than soybean in the corn-soybean rotation. Our main objective was to determine if emergence, growth, and end-of-season biomass of the four weed species differed between a two-year and four-year crop rotation.

The first experiment evaluated emergence of the four species. Plots were field cultivated for seed bed preparation on 19 May 2008 and 12 May 2009. Glyphosate was applied to all plots on 30 June 2008 and 17 June 2009 at a rate of 0.84 kg ae ha⁻¹. Cumulative emergence for giant ragweed and common waterhemp was greater in the two year rotation than the four year rotation, but there were no differences in emergence between rotations for common lambsquarters or velvetleaf. Plots in 2009 in the conventional system had 60 more giant ragweed seedlings m⁻² than those in the diversified system. Emergence of giant ragweed in 2008 was not different between the systems. Common waterhemp emergence in 2008 differed by 26 seedlings m⁻², with more emerging in the corn-soybean rotation. Seedlings emerged did not vary between systems in 2009 for common waterhemp.

A second study evaluated the growth and biomass production of the four weed species in the absence of control tactics. Seeds were planted immediately following soybean planting and when soybean was at the V2 stage. Height measured over the course of the growing season was not different between rotations for common waterhemp or common lambsquarters. Height of velvetleaf in the first cohort in the two year system on 20 Aug 2008 was 38.4 cm shorter than that in the four year system. No height difference was detected previous to that date or within the second cohort plants. Giant ragweed height in the first cohort was not different between systems, but plants in the second cohort growing in the conventional system were 57.1 cm taller than those in the diversified system on 2 Sept 2009. End of season biomass of giant ragweed in the first cohort was influenced by rotation, with the two year system producing only 75% of the four year system in 2008. Also in 2008, giant ragweed in the second cohort in the two year system produced less than 8% of that in the four year. In 2009, however, no difference existed between the systems in either planting. Velvetleaf in the first cohort in the conventional system also produced 38% less biomass than that in the low-input in 2008. Similar to giant ragweed, no difference was detected in velvetleaf biomass between the rotations in 2009. In both giant ragweed and velvetleaf, seeds sowed at the time of soybean planting produced 610.64 g and 70.97 g more biomass, respectively, than those planted at soybean V2 stage. Biomass of common waterhemp and common lambsquarters showed no differences in rotation or planting date.