

HAS WATERHEMP BECOME HARDER TO CONTROL WITH GLYPHOSATE? Dean S. Volenberg, William L. Patzoldt, Aaron G. Hager, and Patrick J. Tranel, Postdoctoral Research Scientist, Graduate Research Assistant, Assistant Professor, and Associate Professor, Department of Crop Sciences, University of Illinois, Urbana, IL 61801.

Since the beginning of this century there have been ongoing reports that waterhemp (*Amaranthus tuberculatus* (Moq) Sauer) is harder to manage with glyphosate than in the past. Therefore we quantified glyphosate responses of 100 waterhemp populations obtained from different times. The populations consisted of ten populations collected prior to 1996, 45 collected in 1998 and 1999, and 45 collected in 2003. A population consisted of seed collected from one waterhemp plant. Populations were randomly collected from soybean (*Glycine max* (L.) Merr.) or corn (*Zea mays* L.) fields throughout Illinois, except for two populations within the prior to 1996 group, which were obtained from Iowa. Two additional populations were included in experiments as positive and negative controls. Four- to five-leaf stage (10 to 12 cm) waterhemp plants grown in the greenhouse were treated with 0 or 270 g ai ha⁻¹ glyphosate. Shoot biomass was harvested 14 days after treatment, dried at 70 C, and quantified. The experimental design was completely randomized for each experiment with six replicates per treatment. The experiment was conducted five times. Data were combined by population collection time and the mean responses calculated. Analysis of variance was performed on all data. Means were separated with Fisher's protected LSD at the 0.05 level of significance. The experiment by treatment interaction was significant and the data from repeated experiments is presented separately. In three of the experiments, there was no difference in the mean responses to glyphosate among populations grouped by collection time (i.e. prior to 1996 = 1998-1999 = 2003). In the other two experiments the mean response of the prior to 1996 group and 1998-1999 group were similar, whereas the 2003 group had a significantly lower mean response compared to the other two groups in one experiment and a significantly greater mean response than the prior to 1996 group in the other experiment. There were several populations within each of the three groups that were very sensitive to glyphosate. In contrast, there were also some glyphosate-tolerant populations within the 1998-1999 and 2003 collection. In follow-up dose-response experiments, four-to five-leaf stage (10 to 12 cm) plants of selected glyphosate-tolerant populations from the 1998-1999 and 2003 collections had GR₅₀ values ranging from 153 to 402 g ai ha⁻¹, whereas the positive and negative control populations had an GR₅₀ values of 249 and 209 g ai ha⁻¹, respectively. Our results indicate that glyphosate sensitivity has not decreased appreciably over time in these populations.