

AN ILLINOIS WATERHEMP BIOTYPE WITH RESISTANCE TO PPO, ALS, AND PSII INHIBITORS. William L. Patzoldt, Aaron G. Hager, and Patrick J. Tranel, Graduate Research Assistant, Assistant Professor, and Assistant Professor, Department of Crop Sciences, University of Illinois, Urbana, IL 61801.

A waterhemp population was identified in Adams County, Illinois, that was not controlled following a postemergence treatment of lactofen, a protoporphyrinogen oxidase (PPO)-inhibiting herbicide. Greenhouse studies were conducted to characterize waterhemp responses to lactofen and various other herbicide mode-of-action chemistries when compared to a sensitive population. The Adams County population was 19-fold resistant to lactofen when compared to the sensitive population. The Adams County population was about 16,000-fold and 9,000-fold resistant to imazamox and thifensulfuron, respectively, two acetolactate synthase (ALS)-inhibiting herbicides. Sequencing of *ALS* from resistant plants identified a tryptophan to leucine substitution at amino acid position 574 of *ALS* conferring resistance. In response to the photosystem II (PSII) inhibitor atrazine, the Adams County population was 25-fold resistant. Chlorophyll fluorescence measurements of intact leaves following a foliar treatment of atrazine suggested that an altered target site was not the mechanism of resistance. Waterhemp plants within the Adams County population survived treatment with a solution containing lactofen at 175 g ai ha<sup>-1</sup>, imazamox at 44 g ae ha<sup>-1</sup>, and atrazine at 1000 g ai ha<sup>-1</sup> plus 1% COC and 2.5% AMS. A treatment solution containing the equivalent rate of any one of these herbicides gave acceptable control of waterhemp from the sensitive population. Contrary to results obtained with previously mentioned herbicides, the Adams County population was not resistant to glyphosate or paraquat.