CHARACTERIZATION OF A WATERHEMP BIOTYPE WITH RESISTANCE TO PROTOPORPHYRINOGEN OXIDASE-INHIBITING HERBICIDES. William L. Patzoldt, Aaron G. Hager, Dean E. Riechers, Jonathan F. Holt, and Patrick J. Tranel, Graduate Research Assistant, Assistant Professor, Assistant Professor, Agricultural Research Specialist, and Associate Professor, Department of Crop Sciences, University of Illinois, Urbana, IL 61801.

Resistance to protoporphyrinogen oxidase (PPO)-inhibiting herbicides was identified in an Adams County, Illinois waterhemp population (ACR) during the summer of 2001. Field research conducted during the summer of 2002 suggested that normal field use rates of POST-applied PPO inhibitors did not control the ACR population; in contrast, PRE-applied PPO inhibitors did provide adequate control. These observations led to the hypothesis that expression of PPO inhibitor resistance might be developmentally regulated (i.e., growth stage dependent). Detailed herbicide dose-response experiments were initiated in the greenhouse with a PPO inhibitor-resistant waterhemp line derived from the ACR population, and compared with a known PPO inhibitor-susceptible waterhemp biotype from Wayne County, Illinois (WCS). Results from PRE-applied PPO inhibitor studies with lactofen or flumioxazin showed that the ACR biotype was less sensitive than the WCS biotype to these herbicides even when soil applied. However, the ACR biotype was adequately controlled when normal field use rates of either herbicide were applied PRE. Furthermore, results of dose-response experiments with POST-applied lactofen across different growth stages indicated that the level of resistance remained constant. Therefore, growth stage does not appear to influence the expression of resistance to PPO inhibitors in the ACR biotype. Results from inheritance experiments with F1 progeny of crosses between the ACR and WCS biotypes suggested that resistance is partially dominant, with F1 progeny intermediate in response to that of either parent. Research is being conducted to determine the mechanism of resistance to PPO inhibitors in the ACR waterhemp biotype.

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