PREPONDERANCE OF THE PROTOPORPHYRINOGEN OXIDASE GLYCINE DELETION IN WATERHEMP RESISTANT TO PPO INHIBITORS. Kate A. Thinglum, Chance W. Riggins, Patrick J. Tranel, Kevin W. Bradley, and Kassim Al-Khatib, Graduate Research Assistant, Post Doctoral Research Assistant, and Professor, University of Illinois, Urbana, IL 61801, Associate Professor, University of Missouri, Columbia, MO 65211, and Professor, Kansas State University, Manhattan, KS 66506.

Research was conducted to determine if all waterhemp populations containing resistance to PPO-inhibiting herbicides have the same mechanism of resistance and to determine if the allele conferring resistance has been independently selected. Four resistant populations (two from Missouri and one each from Illinois and Kansas) and three sensitive populations (one from each of the above three states) were used in the study. Greenhouse dose-response experiments with the PPO-inhibitor lactofen indicated that the different resistant populations contained moderately different levels of resistance. However, results from screening multiple plants from each population at a single rate of lactofen suggested that these differences likely were due to different frequencies of resistant plants among populations, rather than differences in the absolute biotypic levels of resistance. Plants were assayed for the presence or absence of a deletion (ΔG210) in the *PPX2* gene that was previously shown to confer resistance to PPO-inhibiting herbicides in waterhemp. The presence of this deletion was highly associated with resistance in each of the resistant populations. To address the question of independent selection of the resistance allele, a region of the *PPX2* gene was sequenced and resulting sequences were aligned and organized into a phylogenetic tree. Resistance alleles did not cluster together, suggesting the ΔG210 mutation has been independently selected. These results add to a growing body of evidence indicating that the ΔG210 mutation – despite being an unusual resistance mutation – is the primary (and thus far, only) mechanism of resistance to PPO inhibitors in waterhemp.

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