MANAGEMENT OF COMMON WATERHEMP RESISTANT TO PROTOPORPHYRINOGEN OXIDASE (PPO)-INHIBITING HERBICIDES IN SOYBEAN. Hank J. Mager, Bryan G. Young, and Kassim Al-Khatib, Graduate Research Assistant and Assistant Professor, Southern Illinois University, Carbondale, Il 62901 and Associate Professor, Kansas State University, Manhattan, KS 66506.

Common waterhemp is a widespread problem in the Midwest and protoporphyrinogen oxidase-inhibiting herbicides have been frequently utilized for postemergent (POST) control of common waterhemp in conventional soybean. A common waterhemp population suspected to be resistant to PPO-inhibiting herbicides was identified in Madison County Illinois after repeated applications of diphenylether herbicides failed to control the common waterhemp in 2001. The site has a history of continuous soybean production and exclusive use of diphenylether herbicides for common waterhemp control. Common waterhemp seed was collected from this site and screened in the greenhouse for resistance to PPO-inhibiting herbicides. Lactofen at 420g ai/ha and acifluorfen at 840 g ai/ha controlled only 30 and 35%, respectively, of the Madison County common waterhemp population compared to 98% control of a population susceptible to PPO-inhibiting herbicides. Field studies were conducted in 2002 to evaluate the efficacy of several herbicides with different modes of action on the PPO-resistant common waterhemp and to evaluate herbicide strategies for management of PPO-resistant common waterhemp in soybean. Preemergence (PRE) applications of sulfentrazone, chlorimuron & sulfentrazone, s-metolachlor, s-metolachlor & metribuzin, alachlor, and flufenacet controlled greater than 96% of common waterhemp at 28 DAT. However, PRE applications of pendimethalin and flumioxazin controlled only 39 to 48% and 50 to 84% of common waterhemp at 28 days after treatment (DAT), respectively. Common waterhemp control 14 DAT was less than 30% from postemergence applications (5 to 20 cm common waterhemp) of the PPO-inhibiting herbicides lactofen, fomesafen, acifluorfen, flumiclorac, carfentrazone, flumioxazin, and sulfentrazone. No common waterhemp control was observed with imazamox suggesting that this population is also resistant to acetolactate synthase inhibiting herbicides. Glyphosate was the only POST herbicide labeled for use in soybean that provided acceptable control of this common waterhemp population. Treatments that included a soil residual herbicide followed by glyphosate POST controlled at least 97% of common waterhemp at 56 days after the POST application. Preemergence applications of pendimethalin or flumioxazin followed by a PPO herbicide provided less than 64% control 56 DAT. Results suggest the most effective management of PPO-resistant common waterhemp populations would include a non PPO-inhibiting soil residual herbicides followed by a POST application of glyphosate.

2002 North Central Weed Science Society Abstracts 57:70.