

INHERITANCE OF PROTOX RESISTANCE IN COMMON WATERHEMP. Douglas E. Shoup, Kassim Al-Khatib, and Peter Kulakow, Graduate Research Assistant, Professor, and Research Assistant Professor, Department of Agronomy, Kansas State University, Manhattan, KS 66506.

Common waterhemp resistance to protoporphyrinogen oxidase (protox)-inhibiting herbicides was first reported in northeast Kansas in 2001. The objectives of this research were to determine the inheritance of the protox-resistance trait. Resistant (R) and susceptible (S) common waterhemp were inbred using sib-mating for three generations in the greenhouse. After the third generation, R and S plants were crossed in a male and female reciprocal manner creating 57 F1 lines. A proportion of the F1 progeny were screened for resistance and the remaining progeny were used to create F2 and backcross lines. Over 500 F1 progeny were treated with 105 g ha<sup>-1</sup> of lactofen when plants reached the 15 to 18 cm height. Visual injury ratings were determined at 14 days after treatment and based on a scale of 0 = no injury and 100 = mortality. A plant was considered to be R when visible injury was less than 50%. The remaining progeny from the F1 were either crossed to a sibling or back crossed to an S parent. Approximately 400 backcross progeny and 1440 F2 progeny were screened and rated for protox-resistance as described above. Approximately 93 and 92% of F1 progeny from R female × S male and S female × R male crosses, respectively, were scored as being resistant. There was no evidence of reciprocal differences in F1 or segregating generations indicating the resistance is dominant and contained in the nucleus. F2 progenies from individual crosses and pooled data supported a 3:1 genetic ratio using a Chi-squared goodness-of-fit test. In addition, backcross progenies supported a 1:1 ratio. These results indicate resistance to protox-inhibiting herbicides is determined by a single dominant nuclear gene.