

MOLECULAR METHODS TO STUDY GLYPHOSATE-RESISTANT PALMER AMARANTH. Todd A. Gaines, Philip Westra, and Christopher Preston. Graduate Student and Professor, Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO 80523 and Lecturer, School of Agriculture, Food, and Wine, University of Adelaide, Australia.

Recent reports of glyphosate-resistant Palmer amaranth have been investigated using several molecular methods. Seeds were obtained from scientists in Georgia and screened with an in-vivo shikimate accumulation assay. Using a range of glyphosate concentrations from 100 to 2,000 μM , susceptible plant leaf discs accumulated shikimate in 100 μM glyphosate while resistant plant leaf discs accumulated detectable shikimate only in 2,000 μM glyphosate. Candidate glyphosate resistance mechanisms under investigation include mutations in EPSPS and over-expression of EPSPS. Gene sequences have been obtained for 1,056 base pairs of EPSPS from resistant and susceptible plants. These results have been compared using current bioinformatics protocols to determine whether any detected mutations may be significant. Expression profiling using reverse-transcriptase PCR has been used to determine whether EPSPS is over-expressed in resistant plants. These molecular methods are useful to determine why Palmer amaranth is resistant and to identify and develop more rapid resistance diagnostic tools. Molecular biology techniques have been applied in weed science for some time and training for graduate students in molecular methods is increasingly important and valuable.