

RESISTANCE TO PPO INHIBITORS IN COMMON RAGWEED: MOLECULAR INVESTIGATION OF TARGET-SITE GENES. Stephanie L. Rousonelos, Ryan M. Lee, Patrick J. Tranel, and Mark J. VanGessel, Graduate Research Assistant, Postdoctoral Research Assistant, and Associate Professor, Department of Crop Sciences, University of Illinois, Urbana, IL 61820 and Professor, Department of Plant and Soil Sciences, University of Delaware, Georgetown, DE 19947.

Herbicides that inhibit protoporphyrinogen oxidase (PPO), like several other herbicide chemistries, have selected herbicide-resistant weeds. Common waterhemp was the first weed species to evolve resistance to this class of herbicides. It was determined previously that resistance in common waterhemp to PPO inhibitors was due to a single codon deletion in *PPX2L*. This gene is a longer version of *PPX2* and contains a 30 amino acid extension in the 5' end. *PPX2L* encodes for both mitochondria- and plastid-targeted isoforms of PPO. Two other genes were identified that encode PPO: *PPX1* encodes plastid- and *PPX2* encodes mitochondria-targeted isoforms of PPO.

The most recent weed species to develop resistance to PPO-inhibiting herbicides is common ragweed. Clones of *PPX1* and *PPX2* from a common ragweed cDNA library were isolated and sequenced. To test if a long form of *PPX2* is present in common ragweed, RACE amplification is being performed at the 5' end. A resistant common ragweed biotype from Delaware was crossed to a sensitive biotype to create an F₁ population. Sequence data from the cloned cDNAs were used to design primers to obtain *PPX1* and *PPX2* sequences from the F₁ population. Based on the presence of two peaks in the sequence chromatograms, polymorphisms between the parental alleles of *PPX1* and *PPX2* were identified from the F₁ population. Markers were developed, based on these polymorphisms, and are being used for segregation analyses of these target-site genes in backcross progenies to determine whether *PPX1* or *PPX2* co-segregates with the resistant phenotype.