INVESTIGATION OF THE MOLECULAR BASIS OF RESISTANCE TO PPO-INHIBITING HERBICIDES IN COMMON RAGWEED. Stephanie L. Rousonelos, Ryan M. Lee, and Patrick J. Tranel, Graduate Research Assistant, Postdoctoral Research Assistant, and Associate Professor, Department of Crop Sciences, University of Illinois, Urbana, IL 61820.

To date there are three weed species in the world that have evolved resistance to PPO-inhibitors: waterhemp, common ragweed, and wild poinsettia. Resistance to PPO-inhibiting herbicides in waterhemp was shown to result from a unique mechanism: a single codon deletion in *PPX2L*, which encodes both plastid- and mitochondrial-targeted PPO isoforms. It was originally understood that this species contained several *PPX* genes: *PPX1*, *PPX2S*, and *PPX2L*. The resistant biotype contained *PPX2L*, with the 3-bp deletion, but *PPX2S* was absent. Recently, it has been determined, after further testing, that there are likely only two *PPX* genes in waterhemp, *PPX1* and *PPX2L*.

The most recent weed species to develop resistance to PPO-inhibiting herbicides is common ragweed. Research was conducted to determine if the resistance mechanism in this species was similar to that identified in waterhemp. Sequences of *PPX1* and *PPX2* were obtained by screening a cDNA library of sensitive common ragweed. A resistant common ragweed biotype from Delaware was crossed to a sensitive biotype to create an F_1 population. The F_1 population was then selfed to create an F_2 population. A molecular marker was designed based on polymorphisms between the parental alleles of *PPX2* identified from the F_1 population. This marker was used for segregation analysis of *PPX2* in the F_2 population and was determined to co-segregate with resistance. Polymorphisms identified from the F_1 common ragweed sequence are being tested with site-directed mutagenesis of a vector containing *PPX2* from waterhemp. RACE amplification is being performed at the 5' end to obtain full-length clones of these target-site genes and to test if a long form of *PPX2* is present in common ragweed.

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