

MOLECULAR CHARACTERIZATION OF THE HPPD GENE FROM VELVETLEAF. Dean E. Riechers and Michelle M. Stanford, Assistant Professor and Undergraduate Research Assistant, Department of Crop Sciences, University of Illinois, Urbana, IL 61801.

Herbicides that inhibit the enzyme 4-hydroxyphenylpyruvate dioxygenase (HPPD) are relatively new for weed management in crops, and include the commercially available compounds of mesotrione, sulcotrione, and isoxaflutole. These herbicides are effective at controlling many broadleaf and certain grass weed species. In particular, mesotrione and isoxaflutole are very effective for selective control of velvetleaf, lambsquarters, and pigweeds in corn. These herbicides are also effective at controlling ALS- and triazine-resistant weeds, since they target a new and novel site of action in plants. No herbicide resistant weeds have been reported to the HPPD inhibitors, so it was our research objective to provide molecular information about the HPPD gene and its expression patterns in sensitive weed species before resistance development occurs. Our studies to this point have focused on velvetleaf, which is extremely sensitive to mesotrione and isoxaflutole and has a history of developing resistance to other classes of herbicide chemistry.

Primers for PCR (polymerase chain reaction) were designed from conserved sequences in the HPPD gene from other plant species (barley, carrot, *Arabidopsis*, and *Coleus blumei*) that are reported in the GenBank database. A 1.2 kb PCR product was amplified from velvetleaf genomic DNA using these primers. This PCR product was ligated into a plasmid vector and sequenced. The velvetleaf DNA was confirmed to be a partial fragment of the HPPD gene by comparison with the other HPPD sequences in GenBank, and is the first reported HPPD gene sequence from a weed species of agronomic importance. Among plants, the velvetleaf HPPD gene demonstrated the highest homology with the *Arabidopsis* HPPD gene, and the lowest homology with barley HPPD. The velvetleaf HPPD gene has a small intron that interrupts the coding region in the same place as the *Arabidopsis* gene. An expression study was set up to examine HPPD mRNA levels in velvetleaf seedlings: plants were either untreated or treated with mesotrione postemergence, then either kept in the light or placed in the dark for 24 and 48 hours. This study will allow us to determine under what experimental conditions the HPPD gene is expressed, which will be useful for subsequent cDNA cloning and in determining how many HPPD gene(s) are present and expressed in velvetleaf.