ARTIFICAL SELECTION OF GLYPHOSATE RESISTANCE. Ryan M. Lee, Patrick J. Tranel, and Robert E. Pruitt. Postdoctoral Research Assistant, Associate Professor, Department of Crop Sciences, University of Illinois, Urbana, IL 61801, Professor, Department of Botany and Plant Pathology Purdue University, West Lafayette, IN 47907.

Despite heavy selection pressure, glyphosate resistant weeds have been rare events. Over the past few years, glyphosate resistance in weedy species has been found and the list of resistant weeds has been growing steadily. Resistance in these species was originally hypothesized to be due to an amino acid substitution **EPSPS** protein, the target site of glyphosate. Specifically, a proline was changed to a serine or threonine in the **EPSPS** from these resistant species. These sequences have been found in glyphosate resistant biotypes of goosegrass (*Eleusine indica*), rigid ryegrass (*Lolium rigidum*) and horseweed (*Conyza canadensis*). However, multiple mutageneses of wild-type *Arabidopsis* have yielded no glyphosate resistant mutants suggesting that no single gene is sufficient to confer resistance to glyphosate. Based on these data it is hypothesized that **EPSPS** harboring either a serine or threonine in place of the active site proline is necessary but not sufficient to confer glyphosate resistance. To test this hypothesis transgenic *Arabidopsis* plants were generated that harbor one of two forms of the *EPSPS.* These plants were then mutagenized and mutant progeny were screened for second-site enhancers of resistance.

Arabidiopsis contains two *EPSPS* genes located on chromosome 1 and 2. Preliminary results indicate that analogous mutations in these genes do not confer the same level of resistance in transgenic plants. Because the sequences of the proteins encoded by these genes are 90% identical, it is thought that the differences in resistance provided by these transgenes may be due to transcriptional characteristics based on regulatory sequences. Genetic screens of mutagenized populations have isolated mutants exhibiting an enhanced glyphosate-resistance phenotype.