EFFECT OF GLUFOSINATE AND THE GENE GDHA ON THE METABOLIC PROFILE OF TOBACCO. Scott A. Nolte, Luke T. Tolley, Bryan G. Young and David A. Lightfoot, Graduate Research Assistant, Assistant Professor, Associate Professor and Professor, Southern Illinois University, Carbondale, IL 62901.

Glufosinate inhibits the glutamine synthetase enzyme, thereby causing ammonia toxicity in susceptible plants. A secondary pathway for ammonium assimilation is catalyzed by glutamate dehydrogenase (GDH). An isolated *gdh*A gene from *E.coli* which encodes for a more active GDH pathway was used to transform plants which resulted in an increase in tolerance to glufosinate. Therefore, *gdh*A transformed plants exhibit a novel mechanism of tolerance to glufosinate via greater activity of the GDH pathway. To further elucidate the changes caused by gene transformation and herbicide application, metabolic profiling techniques were utilized.

Two tobacco lines including *gdhA* transgenic and a non-transformed control were treated with 340 g ai/ha glufosinate. Two days after treatment leaves and roots from treated as well as non-treated plants were harvested and tissue extractions were performed. Tobacco samples were analyzed using a Q-Tof micro mass spectrometer, in the positive ion mode. Spectra were acquired every second with a mass range of 100 to 1200 daltons. Data was collected for 5 minutes and then summed for the final spectra.

ESI-MS detected over 1,300 ions in both leaves and roots combined. Through manual deconvolution over 300 ions were discovered in roots and over 200 ions in leaves that changed in abundance due to transformation with the *gdhA* gene. Approximately 18 and 15 of the changed metabolites from roots and leaves, respectively, were in the range of 100-200 daltons, which are possibly amino acids or derivatives. There also were over 300 ions in roots and over 300 ions in leaves that changed in abundance due to the application of glufosinate. Use of metabolic profiling is a tool to assess how plant transformations for herbicide tolerance and subsequent application of that herbicide alter plant metabolic processes.

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