CHARACTERIZATION OF GLYPHOSATE RESISTANCE OF *ARABIDOPSIS THALIANA* MEDIATED BY PHYB. Altanbadralt Sharkhuu, Ray A. Bressan, William G. Johnson, Stephen C. Weller, Department of Horticulture and Landscape Architecture, and Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47907.

Glyphosate is the most widely used herbicide in the world. It inhibits 5-enolpyruvylshikimate 3-phosphate synthase (EPSPS), the penultimate enzyme in the shikimate pathway of plants. Resistance to glyphosate has been engineered into all major agronomic crops. Glyphosate resistant (GR) crops are now grown on 120 million ha by 12 million farmers worldwide. The widespread use of glyphosate for weed control in GR crops has resulted in the appearance of 14 resistant weed biotypes. The specific mechanism(s) of resistance to glyphosate in most of these weeds is not known.

We identified several glyphosate responsive mutants in a forward genetic screen of a T-DNA tagged *Arabidopsis thaliana* population. One of the mutants *gre1* (*glyphosate response* 1) has a resistant phenotype to glyphosate treatment compared to wild type. Mutation of *gre1* results in a knock out of the *AtPHYB* gene that encodes an apoprotein of the red and far red light receptor phytochrome B (phyB). Our results show *EPSPS* expression of *gre1* is reduced. No change in sensitivity to glyphosate of EPSPS *in vitro* activity has been found. Glyphosate absorption is greater in mutant plants but translocation of glyphosate is reduced compared to wild type. Shikimate accumulation is two times lower than in wild type after glyphosate treatment. Glyphosate treatment also results in reduced expression of the plastidial membrane phosphate transporter, *PHT2;1*, and lower accumulation of anthocyanin in *gre1* than wild type, which are common responses to stress. These results indicate that light signaling plays an important role in plant response to glyphosate and mutation of *PHYB* causes glyphosate resistance.

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