

CHLOROPHYLL FLUORESCENCE TO ASSESS GLYPHOSATE RESPONSE IN HERBICIDE RESISTANT GIANT RAGWEED (*AMBROSIA TRIFIDA* L.) Renae R. Robertson, Burkhard Schulz, and Stephen C. Weller, Graduate Research Assistant, Assistant Professor, Professor, Department of Horticulture and Landscape Architecture, Purdue University, West Lafayette, IN 47907.

The annual giant ragweed (*Ambrosia trifida* L.) persists in disturbed areas and croplands. Farmers often use glyphosate for weed control of giant ragweed. Glyphosate is the most widely used herbicide worldwide and destroys weeds by inhibiting EPSP synthase, the key enzyme of the shikimate pathway. Repeated use of glyphosate allowed the isolation of glyphosate resistant (R) giant ragweed plants in Indiana. This study investigated quantifiable parameters of responses to glyphosate in resistant (R) and sensitive (S) populations of giant ragweed. Previously, we have observed a noticeable difference in temporal and phenotypical response reactions to glyphosate applications in R versus S populations of giant ragweed. In order to study the basis of these response differences, we used an Imaging-PAM fluorometer (Walz GmbH) to measure photosynthetic activity in leaves of R and S giant ragweed populations after foliar treatment with glyphosate. Our technique involved treating R and S giant ragweed leaves with glyphosate, and then removing the leaf at a given time point to measure photosynthetic inhibition. The Image-PAM fluorometer detected significantly reduced photosynthetic activity measured as an increase in fluorescence within 6 hours of glyphosate treatment in the R leaf. After 24 hours, this reduction in fluorescence was widespread over the entire leaf surface. The treated S plant leaf showed only limited leaf injury (at 6 hours) and much less reduced photosynthetic activity even 24 hours after herbicide treatment. Data suggest a response mechanism in R plants that results in faster injury than would be expected merely by inhibition of EPSP synthase, the target enzyme of glyphosate. The injury response in the R population resembles a hypersensitive-like response commonly seen in plants after pathogen attack. Further studies are investigating the possible mechanisms of the hypersensitive-like response observed in R plants and what role it plays in the ability of R plants to survive a glyphosate concentration that kills S plants.