

RAPID ASSAY OF PLANT RESPONSE TO PROTOPORPHYRINOGEN OXIDASE (PROTOX) - INHIBITING HERBICIDES. Jeanne S. Falk, Kassim Al-Khatib, and Dallas E. Peterson, Graduate Research Assistant, Assistant Professor, and Professor, Department of Agronomy, Kansas State University, Manhattan, Kansas 66506.

Protoporphyrinogen oxidase (protox)-inhibiting herbicides are an integral part of conventional soybean cropping systems. Resistance to protox-inhibiting herbicides was confirmed in a population of common waterhemp near Sabetha in northeast Kansas in 2001. The common approach to confirm protox resistance is to treat plants with selected rates of protox-inhibiting herbicides in the field or greenhouse. This method can be time consuming and costly. In order to quickly confirm resistance, a rapid assay is needed. Two procedures were tested for the rapid assay of soybean response to protox-inhibiting herbicides. Procedure 1 consisted of submerging leaf discs of soybean in solutions containing different concentrations of acifluorfen, fomesafen, or sulfentrazone. Leaf discs were incubated under a light intensity of  $980 \mu\text{mol m}^{-2} \text{s}^{-1}$  for 3 hours. In procedure 2, the entire leaf of the soybean was treated with 0.0625, 0.125, 0.25, and 0.50 times the use rate of acifluorfen (420 g/ha), fomesafen (420 g/ha), and sulfentrazone (111 g/ha). The leaf was cut into discs and placed in a petri-dish on filter paper. Leaves were incubated at a light intensity of  $245 \mu\text{mol m}^{-2} \text{s}^{-1}$  for 6 hours. Then leaf discs were submerged in an aqueous solution and incubated in darkness for 2 hours. In both procedures, herbicide damage was determined by measuring electrolyte leakage from leaf discs. Percent leaf disc leakage was determined by comparing electrolyte leakage to total electrolytes in the leaf discs. Response from procedure 2 for acifluorfen, fomesafen, and sulfentrazone was highly correlated with whole plant response to these herbicides. In procedure 1, the response for acifluorfen and fomesafen also correlated to the whole plant injury. However, the response of sulfentrazone was not well correlated with the response of the whole plant. These responses show that treating the entire leaf and incubating discs from the leaf in petri-dishes are more applicable to screening for resistance to protoporphyrinogen oxidase-inhibiting herbicides due to the direct correlation between electrolyte leakage and whole plant injury.