

COMMON RAGWEED: GLYPHOSATE RESISTANCE WITH AN ATTITUDE. Reid J. Smeda, Justin M. Pollard, University of Missouri, Columbia, MO and Brent A. Sellers, University of Florida, Ona, FL.

Common ragweed is one of 11 species world-wide with recognized resistance to glyphosate, and was the first summer annual broadleaf detected. The infested area is approximately 52 hectares, and largely resulted from continuous use of glyphosate in glyphosate-resistant soybean. Under greenhouse conditions, the I_{50} dose for vegetative growth suppression of glyphosate-resistant (Gly-R) to glyphosate-susceptible (Gly-S) plants was 9.6, which is similar to that reported for Gly-R horseweed. A dose of 0.21 kg ae/ha was consistently lethal to Gly-S plants. Use of up to 10 kg/ha glyphosate has resulted in surviving plants that produced viable seed. Field studies document that glyphosate alone for control of the Gly-R biotype is ineffective. Laboratory studies were conducted to determine the accumulation of shikimate in treated (0.25X, 0.5X, 1X [0.84 kg /ha], and 2X) Gly-R and Gly-S plants. Using a spectrophotometric assay, concentrations of shikimate reached optimal levels within 24 hours of treating Gly-S plants, with significant differences between Gly-S and Gly-R plants at 0.25X, 0.5X and 1X glyphosate rates. Shikimate concentrations returned to background levels in Gly-R plants treated with 0.25X, 0.5X, and 1X doses within 96 hours following treatment, but remained at similar, elevated concentrations to Gly-S plants at 2X glyphosate doses. Field-based trials were established to determine if the spread of Gly-R plants could be mediated via pollen. Replicated groups of Gly-S plants were established east (downwind predominantly) of a blocked group of known Gly-R plants (pollen source) at a distance of 1, 3, 11, 30, 91, 198, and 580 meters. Mature seed from Gly-S plants were sown under greenhouse conditions, and seedlings treated with a 2X glyphosate dose. For known resistant plants, the frequency of the Gly-R phenotype (0 to 30% visual injury) was 17.5%. The frequency of the Gly-R phenotype from the Gly-S population was 1.5, 1.3, 0, 2.4, and 6.4% for the plants at 1, 3, 11, 30, and 91 meter distances from Gly-R source plants. These data indicate that the target enzyme of glyphosate, 5-enolpyruvylshikimate-3-phosphate (EPSP) synthase, is sensitive in Gly-R common ragweed, but plants evacuate the herbicide from the chloroplast. This mechanism of resistance to glyphosate is similar to that reported for horseweed and rigid ryegrass. Resistance is heritable, and can be mediated via pollen to adjacent Gly-S plants.