OPEN-POLLINATED TRANSFER OF GLYPHOSATE RESISTANCE IN HORSEWEED (*CONYZA CANADENSIS*) IN GREENHOUSE ISOLATION. Ryan S. Henry, Vince M. Davis, and William G. Johnson, Undergraduate Student, Graduate Research Assistant, Associate Professor, and Associate Professor. Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47907.

Horseweed (*Conyza canadensis)* has rapidly become a major weed in crop production fields of the United States. In the U.S., glyphosate-resistant (GR) plants have been found as far east as Delaware, as far west as California, and from Michigan to Mississippi. In Indiana, farmers have repeatedly ranked horseweed as one of the top five worst weeds in their fields. A field survey conducted from 2003-2005 found that the frequency of GR horseweed in southeastern Indiana was as high as 38% of total soybean production. Previous studies have determined that an incompletely dominant, single-locus gene confers resistance to glyphosate in GR horseweed biotypes. However, the mechanism or mechanisms and the gene responsible for glyphosate resistance are not presently known. In addition to glyphosate resistance, horseweed has also developed resistance to other popular herbicides, including ALS inhibitors and paraquat. The objective of this experiment was to quantify the potential for GR horseweed to outcross in open pollinated populations with mingling GR and glyphosate–susceptible (GS) biotypes in close proximities. This information will increase our understanding of the potential for horseweed to transfer glyphosate resistance to biotypes that may also be resistant to other herbicides even in the absence of selection pressure. Parental plants were from a known GS population and a known GR population that was purified with half the normal field use rate of glyphosate (0.42 kg ae ha^{-1}) on rosettes less than 5 cm width to guarantee resistant plants would be used in crosses. Plants were maintained in greenhouse conditions until 10% - 25% of the flowers opened. Six plant clusters that contained 8:1 GR:GS ratios were then generated. Three clusters spaced 3-m apart were isolated in two separate greenhouses and were allowed to open-pollinate. Seeds were collected from the six susceptible plants, propagated in the greenhouse, and plants were sprayed with 0.84 kg ae ha^{-1} glyphosate at 3 to 5 cm width to isolate heterozygous, GR F_1 plants. F_1 plants were grown and self-pollinated under wax paper bags and maintained to maturity. The progeny (F_2 generation) was then grown and sprayed with 0.84 kg ae ha^{-1} glyphosate at 3 to 5 cm horseweed rosette width to determine positive resistance transfer by expected Mendelian segregation ratios. Segregation ratios were determined by both visual assessment and digital imaging analysis software. Outcrossing for the 8:1 GR:GS clusters ranged from 1.1% to 3.8% and segregation for F_2 plants fit expected 3:1 R:S ratios according to chi-square goodness-of-fit analyses. Our results confirmed that glyphosate resistance in horseweed can transfer to a closely located, putative GS biotype under open-pollinated conditions at low frequencies in greenhouse conditions.

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