

Public Abstract

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Title:GLYPHOSATE RESISTANCE: POLLEN MOVEMENT WITHIN A COMMON RAGWEED (*Ambrosia artemisiifolia* L.) POPULATION AND HERBICIDE RELEASE FROM COMMON WATERHEMP (*Amaranthus rudis* SAUER) PLANTS

Common ragweed is a native, summer annual weed distributed widely throughout the continental United States. In a mid-Missouri field with continuous soybean rotation, a population of common ragweed was identified as glyphosate-resistant in 2004. Field studies were carried out in 2005 through 2007 to identify the frequency and distance that the trait for glyphosate-resistance could be spread by pollen. A glyphosate-resistant population was established in a 1 x 11 meter area, with groups of glyphosate-susceptible plants placed in semi-circles at distances of 1, 3, 11, 30, 91, 198, and 580 meters east of the resistant population and allowed to pollinate. A total of 7367, 4934, and 4,520 seedlings were evaluated in 2005, 2006, and 2007, respectively. Glyphosate resistance was detected up to 91 meters away from the source resistant population at a frequency of 6, 3.4, and 1.2 percent of the evaluated plants in 2005, 2006, and 2007, respectively. The percentage of all resistant individuals observed between 1 and 91 meters were 1.6, 1.9, and 1.1 percent for 2005, 2006, and 2007 respectively. In 2006, one plant was identified as resistant 198 meters from source R plants. Odds ratio comparisons revealed that a single R plant produced at any distance from the source resistant population is a significant event, and S plants up to 91 meters from source resistant plants are 85.2 times more likely to develop resistant progeny than susceptible plants in the 580 meter group (no resistant progeny detected). The frequency of resistant progeny from susceptible plants was greatest close to resistant source plants, with 48 percent of the 1 meter groups through all years producing resistant progeny. Glyphosate resistance is likely to spread to adjacent areas via pollen, which is an important dispersal mechanism for larger-seeded weeds such as common ragweed.

Common waterhemp is a dominant annual weed in the Midwest, and populations with resistance to glyphosate have been discovered in numerous states. No definitive studies have identified the mechanism underlying resistance in common waterhemp. Greenhouse studies were conducted in 2007 and 2008 to determine whether survival of glyphosate-resistant versus -susceptible waterhemp was based upon exudation of glyphosate from roots. The results from this study revealed no significant differences in coleoptile length between the extracts of Hoagland's solution in the S and R plants. The data for all three studies show the treatments which received a 3x rate of glyphosate were not significantly different than the treatments which did not receive any glyphosate applied to the plant. It does not appear that R and S waterhemp treated with glyphosate exudes significant amounts of glyphosate from roots.