SUSCEPTIBILITY OF COMMON LAMBSQUARTERS TO GLYPHOSATE IS INFLUENCED BY PARENTAL EXPOSURE. Andrew R. Kniss, Stephen D. Miller, Philip H. Westra, and Robert G. Wilson. Assistant Research Scientist and Professor, Department of Plant Sciences, University of Wyoming, Laramie, WY 82071, Professor, Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins, CO 80523-1177, and Professor, Department of Agronomy and Horticulture, University of Nebraska, Scottsbluff, NE 69361.

Agricultural management practices such as tillage, crop rotation, and herbicides tend to favor one or more weed species over others within the community. Provided that the weed community can be managed with available control tactics, a shift in the weed species composition is generally of little consequence. However, adaptations such as herbicide tolerance or resistance, or a shift in the weed spectrum toward more difficult to control species can create management problems. The advent of crops resistant to glyphosate allows for a potential three to four crop rotation while using glyphosate as the sole weed management tactic. Increased selection pressure from continuous use of glyphosate in glyphosate resistant crops will likely cause a shift in the weed spectrum towards more naturally tolerant species. Common lambsquarters has been reported to have the ability to survive in glyphosate-resistant crops to produce seed either by avoidance mechanisms or a natural low-level tolerance to glyphosate. In 1998, long-term irrigated field studies were initiated at three university research stations as part of a regional effort to examine weed community shifts resulting from glyphosate-resistant cropping systems. After 6 yr of study, a trend for increased common lambsquarters density was observed where exclusive use of glyphosate was utilized. Field studies were carried out in Wyoming in 2005 using common lambsquarters collected from long-term research sites to examine common lambsquarters tolerance to glyphosate in response to herbicide use history. Plants collected from the areas receiving 840 g ae glyphosate ha^{-1} exclusively twice each year exhibited lower average mortality than any other historical herbicide treatment. Plants collected from areas receiving 420 g ae glyphosate ha^{-1} exclusively twice each year also showed reduced mortality compared to plants collected from areas that had not received glyphosate over the previous 6 yr. Mortality followed a logical pattern, with the mortality ranging from the lowest value (42%) where historical selection pressure was heaviest up to the highest value (54%) where no glyphosate selection pressure had been applied over the previous 6 years. Due to the strong influence of environmental conditions on glyphosate efficacy, it is likely that many differences in glyphosate susceptibility within a species may not be noticeable under environmental conditions which favor glyphosate efficacy (such as warm, humid environments) but more noticeable under unfavorable conditions.

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