LOSING TOLERANCE FOR CURRENT DEFINTITIONS OF RESISTANCE (MAYBE WE'RE JUST TOO SENSITIVE). Mark M. Loux and Jeff M. Stachler, Professor and Weed Science Extension Program Specialist, Dept. of Horticulture and Crop Science, The Ohio State Univ., Columbus, OH 43210.

Current guidelines for confirmation of herbicide resistance have been developed based on the relatively high levels of resistance that occur for several of the most used herbicide sites of action. Research conducted over the past several years by The Ohio State University and Purdue University indicates that it is possible for lambsquarters and giant ragweed to develop a low level of glyphosate resistance. This type of resistance is more difficult to accurately characterize, compared with higher levels of resistance typical of ALS inhibitors, for example. Results of greenhouse dose response studies can be inconsistent from experiment to experiment, due to the low level of resistance, the genetic variability in response to glyphosate among plants from a composite seed sample, and changes in the greenhouse environment. Consequently, it is necessary to conduct field studies in addition to the greenhouse studies, where multiple biotypes are compared under the same environmental conditions in the field. It is also necessary to conduct field studies using various glyphosate rates and application sequences, with the goal of determining how control is affected in glyphosate-resistant crops. The high level of resistance usually associated with ALS resistance tends to result in a complete lack of control, regardless of rate or number of applications. Plants with a low level of glyphosate resistance may still be controlled by higher rates and multiple applications of glyphosate, but this should not preclude these biotypes from being classified as resistant. When this evidence is considered relative to the steady increase in prevalence of giant ragweed in growers' fields, we are forced to conclude that resistance to glyphosate is present and will become more widespread.

Weed scientists have largely failed to prevent herbicide resistance for any number of reasons. The most we can hope to accomplish is to identify resistant species soon after their discovery in a few fields, and to implement educational programs soon enough to prevent additional growers from experiencing weed control failures and substantial increases of the resistant biotype in the seed bank. The earlier in the development of resistance that we can accomplish this, the more successful we will be at preventing others from having the same problem. The low level of resistance to glyphosate can make it difficult to be absolutely certain that giant ragweed or lambsquarters is truly resistant, per current resistance definitions. However, the increased incidence of ineffective control of these species in the field would dictate that more effective control measures are necessary, regardless of the cause of the problem. Basing our recommendations on the assumption that resistance is occurring would appear to have few disadvantages, especially when evidence tends to support that resistance has developed. Moreover, there is considerable overlap in the recommendations intended to improved control of resistant versus non-resistant biotypes, and there would thus appear to be few disadvantages to initiating education on management of resistant biotypes.

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