BENCHMARK STUDY: IMPACT OF GLYPHOSATE-RESISTANT CROPS ON WEED POPULATION DENSITY. Stephen C. Weller, Micheal D.K. Owen, Bryan G. Young, David R. Shaw, Robert G. Wilson, David L. Jordan, and Philip Dixon, Professor, Purdue University, West Lafayette, IN 47907, Professor, Iowa State University, Ames, IA 50011, Professor, Southern Illinois University, Carbondale, IL 62901, Professor, Mississippi State University, Mississippi State, MS 39762, Professor, University of Nebraska, Scottsbluff, NE 69361, Professor, North Carolina State University, Raleigh, NC 27695 and Professor, Professor, Iowa State University, Ames, IA 50011.

A multi-state, four-year field scale study was initiated in 2006 to assess the impact of weed management tactics on weed populations in glyphosate-resistant (GR) crops. A total of 155 commercial fields in Illinois, Indiana, Iowa, Mississippi, Nebraska and North Carolina were included in the study and seedbank, weed populations and yields were enumerated during the growing season. Fields selected for the project in 2006 had been in a glyphosate-resistant cropping system for the previous 3 yr. Each field was divided into two sections with half managed for weed control as typical for the grower and the other half managed following recommendations by a university weed specialist within the state. Forty sample locations were established throughout each field with GPS coordinates within the two sides of the study site. Cropping systems examined in the study included; continuous GR crop (corn, soybean, and cotton), a rotation of two GR crops and a rotation of a GR crop and a non-GR crop. Weed density was measured in the spring prior to crop planting, after crop emergence, two weeks after the last postemergent herbicide application and at crop harvest in both years. Weed counts by species were taken in a 0.5 M^2 area in the 20 GPS locations in each half of the field. Weed density was compared among the various cropping systems and between the grower and university sides of the field. In 2006, prior to crop planting, fields in continuous cotton had greater weed density than all other cropping systems. The measurements after crop emergence showed that continuous GR corn had greater weed density than continuous cotton. Interestingly, this higher weed density was reduced in fields where GR corn was rotated with a different GR crop or with a non-GR crop. At harvest, weed density was similar in fields cropped continuously with GR corn, cotton or soybeans but in fields practicing rotation, weed density was reduced compared to continuous GR soybean or GR corn. In 2007 the weed density measurements followed a similar pattern as in 2006 with the highest weed densities occurring in fields where a GR crop was grown continuously with no rotation. For example, at crop planting, weed density was higher in continuous GR soybean and cotton than in continuous GR corn but when the GR soybeans were rotated with a different GR crop or with a non GR crop weed density was lower. Weed density after the last postemergent herbicide application was highest in continuous corn compared to continuous soybean or cotton but densities were reduced when rotation with another crop was practiced. This pattern of weed densities continued at harvest in the various cropping systems. In comparisons of weed densities in grower versus university sides of the fields in both 2006 and 2007, there was a trend towards reduced weed density on the university side. Although, only in a few cases were these differences significant. This trend was most likely due to including a soil applied preemergence herbicide with glyphosate on the university side versus growers relying solely on glyphosate. These results suggest that both cropping system and weed control programs play a critical role in the density of weeds in glyphosate resistant crops.

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