GROWTH AND SEED PRODUCTION OF MULTIPLE GLYPHOSATE- AND ACETOLACTATE SYNTHESIS-RESISTANT HORSEWEED (*CONYZA CANADENSIS*) BIOTYPES. Vince M. Davis, Greg R. Kruger, and William G. Johnson, Graduate Research Assistant, Graduate Research Assistant, and Associate Professor, Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47907.

Glyphosate and acetolactate synthesis (ALS) inhibitors are the first and second most commonly used postemergence herbicides in U.S. soybean production, respectively. Glyphosate-resistant horseweed (*Conyza canadensis*) biotypes are documented in over 1/3 of the states in the continental U.S., and frequencies of glyphosate-resistant horseweed have been documented in up to 38% of no-till soybean fields in the southeastern region of Indiana. Horseweed biotypes resistant to ALS herbicides also occur frequently throughout the eastern cornbelt. Horseweed populations with mixtures of glyphosate- and ALS-resistant biotypes as well as biotypes with multiple-resistance to glyphosate+ALS inhibitors have also been documented in the region. These biotypes are particularly problematic because when additional herbicides are added to postemergence glyphosate, ALS inhibiting herbicides are a common tank-mix selection to increase postemergence horseweed control in soybean. The objective of this experiment was to characterize the growth and seed production capability of glyphosate-, ALS-, and multiple glyphosate+ALS-resistant horseweed biotypes in a fallow (common garden) field experiment. A four herbicide by four horseweed population factorial field experiment was conducted in the southeastern region of Indiana in 2007 and repeated in 2008. Four horseweed populations were collected from Indiana or Ohio and confirmed resistant to glyphosate, ALS, both, or neither in greenhouse confirmation screening experiments. The four herbicide treatments were untreated, 0.84 kg ae ha^{-1} glyphosate, 35 g ai ha^{-1} cloransulam, and 0.84 kg ae ha^{-1} glyphosate + 35 g ai ha^{-1} cloransulam. Seeds were germinated in the greenhouse and seedlings were transplanted to a tilled fallow field area in the middle of May each year. Herbicides were applied when horseweed reached 10 cm tall. Three plants per replication were harvested for biomass accumulation at 12 WAT and seed production was determined by weight 100 seeds^{-1} multiplied by total seed weight. Data were analyzed as a mixed model factorial with year and replication as random effects. Biomass accumulation of the glyphosate-resistant, ALS-resistant, and glyphosate+ALS-resistant biotypes was not less when sprayed with glyphosate, cloransulam, and glyphosate+cloransulam, respectively, than their respective untreated biotype cohorts at the P=0.1 level. Most importantly, the glyphosate+ALS-resistant biotype produced as much seed (219,000 seeds plant^{-1}) following the 0.84 kg ae ha^{-1} glyphosate + 35 g ai ha^{-1} cloransulam treatment as it did with no herbicide treatment (208,000 seeds plant^{-1}) in 2007. Based on this experiment, season-long biomass and seed production potentials can remain as high in glyphosate-, ALS-, and glyphosate+ALS-resistant horseweed biotypes when treated with the herbicide or herbicide combination they have evolved to resist. Soybean producers in the eastern cornbelt should judiciously use glyphosate+ALS inhibitor tank-mix combinations to control horseweed postemergence, and consider it to be a second best management approach to controlling horseweed prior to crop planting with preplant herbicides that provide residual horseweed activity.

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