

Introduction

Giant ragweed (*Ambrosia trifida* L.) is one of the most competitive weed species in corn, soybean and cotton in the U.S. Capable of rapid growth, this genetically variable species is well adapted to a variety of environments, causing substantial yield losses (Webster et al. 1994). In the past three decades, giant ragweed has become a growing concern in the mid-South and U.S. Corn Belt due to the continuous increase in herbicide-resistant populations. Currently, giant ragweed has been reported resistant to glyphosate and acetolactate synthase (ALS)-inhibitor herbicides in 13 U.S. states and one Canadian province (Heap 2015).

Objective

Determine the extent and distribution of glyphosate-resistant giant ragweed in Nebraska.



Materials & Methods

- A total of 28 populations were collected from 21 counties during the fall 2014 and 2015.
- Plants were treated at 10-15 cm with the following rates of glyphosate: 0, 217, 434, 868, 1736, 3472, and 6946 g a.e. ha⁻¹ using a single nozzle research track sprayer calibrated to deliver 94 l ha⁻¹ at 414 kPa using the nozzle AI9502EVS.
- The experiment was organized in a completely randomized design with at least four replications. The experiment was conducted in two runs.
- At 28 d after treatment (DAT), visual estimations of injury (0-100 scale) and plant biomass were recorded.
- Data were fitted to a non-linear regression model using the drc package in R (version 3.1.1).
- The effective dose (g a.e. ha⁻¹) to control 90% of the population (ED₉₀) was estimated for each population using a four parameter log logistic equation: $y=c+(d-c)/(1+\exp(b(\log x-\log e)))$ (Kenzevic et al. 2007).



Figure 3. Dose response of the population 'Way15-1' at 0, 217, 434, 868, 1736, 3472, and 6946 g ha⁻¹ (left to right).



Figure 4. Dose response of the population 'Ced-14' at 0, 217, 434, 868, 1736, 3472, and 6946 g ha⁻¹ (left to right).



Figure 5. Dose response of the population 'Way15-1' at 0, 217, 434, 868, 1736, 3472, and 6946 g ha⁻¹ (left to right).

Results

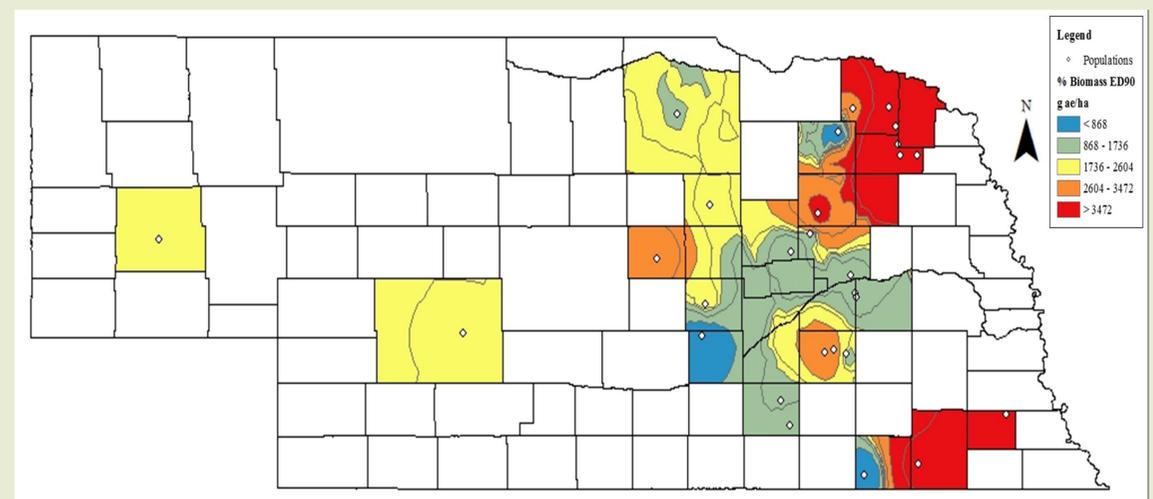


Figure 1. Map of Nebraska depicting giant ragweed populations collected and the respective rate required to achieve 90% biomass reduction.

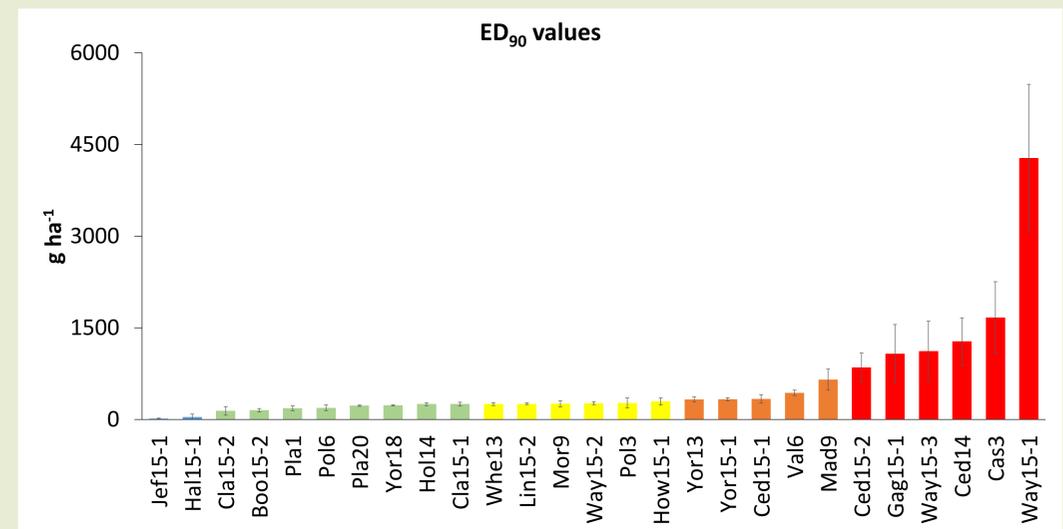


Figure 2. Mean ED₉₀ ± SEM for the populations evaluated. The assigned colors for each population correspond with the location in Figure 1.

Conclusions

- Way15-2 was the most resistant to glyphosate while Cas3, Ced-14, Way15-3, Gag15-1 and Ced15-2 showed resistance.
- The most resistant population required an ED₉₀ of 4280 g ha⁻¹ while the most susceptible required an ED₉₀ of 14 g ha⁻¹, approximately 305 fold-difference.
- The survey showed similar results to reports in that glyphosate resistance in giant ragweed is more common in north east and south east Nebraska than in other regions of the state.

Literature

- Heap, I (2015) The International Survey of Herbicide Resistant Weeds: www.weedscience.org/Summary/home.aspx.
- Knezevic, S.Z., J. C. Streibig, and C. Ritz (2007) Utilizing R Software Package for Dose-Response Studies: The Concept and Data Analysis. *Weed Technology*: 21 (3): 840-848.
- Webster TM, Loux MM, Regnier EE, Harrison SK (1994) Giant ragweed (*Ambrosia trifida*) canopy architecture and interference studies in soybean (*Glycine max*). *Weed Technol* 8:559-564

