

Effect of Late Season Herbicide Application on Seed Production and Fecundity of Glyphosate-Resistant Giant Ragweed

Introduction

- Giant ragweed is an early emerging summer annual weed found mainly in row crop production system of Midwest and eastern corn and soybean belt of United States
- It causes significant yield loss in corn, for example, 1 giant ragweed plant m⁻² resulted in 14 % grain loss in corn
- Late-season herbicide applications provide grower's an additional advantage to control weeds that have escaped weed control during early season
- Herbicide application at or near flowering or seed set reduces weeds seed production that would eventually deplete seedbank in soil
- Multiple herbicide-resistant corn and soybean such as glyphosate and dicamba resistant soybean by Monsanto and 2,4-D plus glyphosate-resistant corn and soybean by the Dow AgroSciences are likely to be commercialized in near future
- It will provide an opportunity of POST or in-crop herbicide application

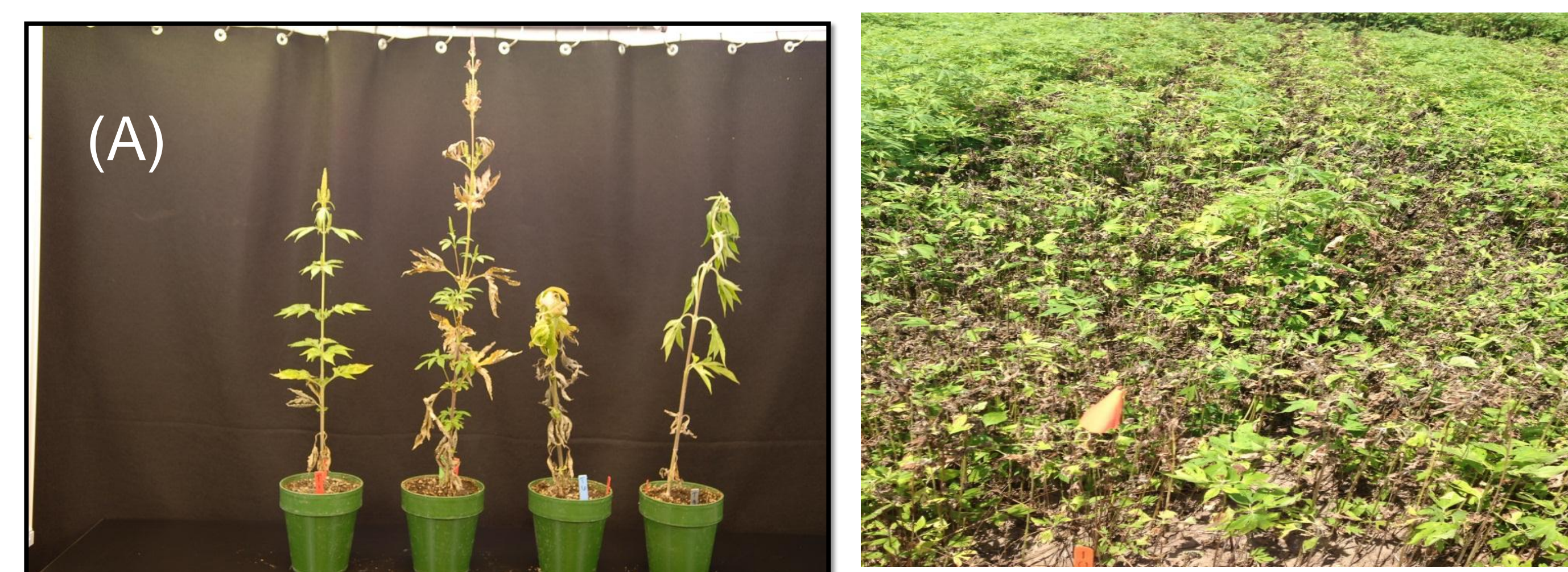
Objective

- To determine the effects of late-season application of several POST herbicides on seed production and fecundity of glyphosate-resistant giant ragweed under field and greenhouse conditions

Materials & Methods

- **Field Experiments:** Bare ground studies were conducted at David City, NE in 2012 and 2013 in a grower's field infested with glyphosate-resistant giant ragweed
- The field experimental design was randomized complete block design consisting of four replications
- A total of nine herbicide treatments including single and sequential applications of glyphosate (1660 g ae ha⁻¹), glufosinate (740 g ai ha⁻¹), 2,4-D (1060 g ae ha⁻¹) and dicamba (280 g ae ha⁻¹) were compared for control of glyphosate-resistant giant ragweed. A nontreated control was also included for comparison
- The application rates of herbicides were selected based on recommended labeled rates. Glyphosate treatment was included to demonstrate the presence of glyphosate-resistance in the giant ragweed population and to serve as a comparison with other herbicide treatments
- Treatments were applied when glyphosate-resistant giant ragweed plants were nearly 50 cm tall and later after 40-45 days
- **Greenhouse Study:** Plants were maintained at temperature 24-28°C and 14 h photoperiod in greenhouse throughout the experiment
- Herbicides were applied using a chamber track sprayer calibrated to deliver 15 gal/acre at 30 psi
- Visual control ratings and effect of herbicides on inflorescence were recorded at the time of harvest
- Seed heads were harvested from the greenhouse manually from each plant and the number of seeds produced was counted
- **Statistical Analysis:** Data were subjected to ANOVA using the PROC GLIMMIX procedure in SAS version 9.3

Effect of various herbicides on glyphosate-resistant giant ragweed under greenhouse and field conditions at 28 DAST



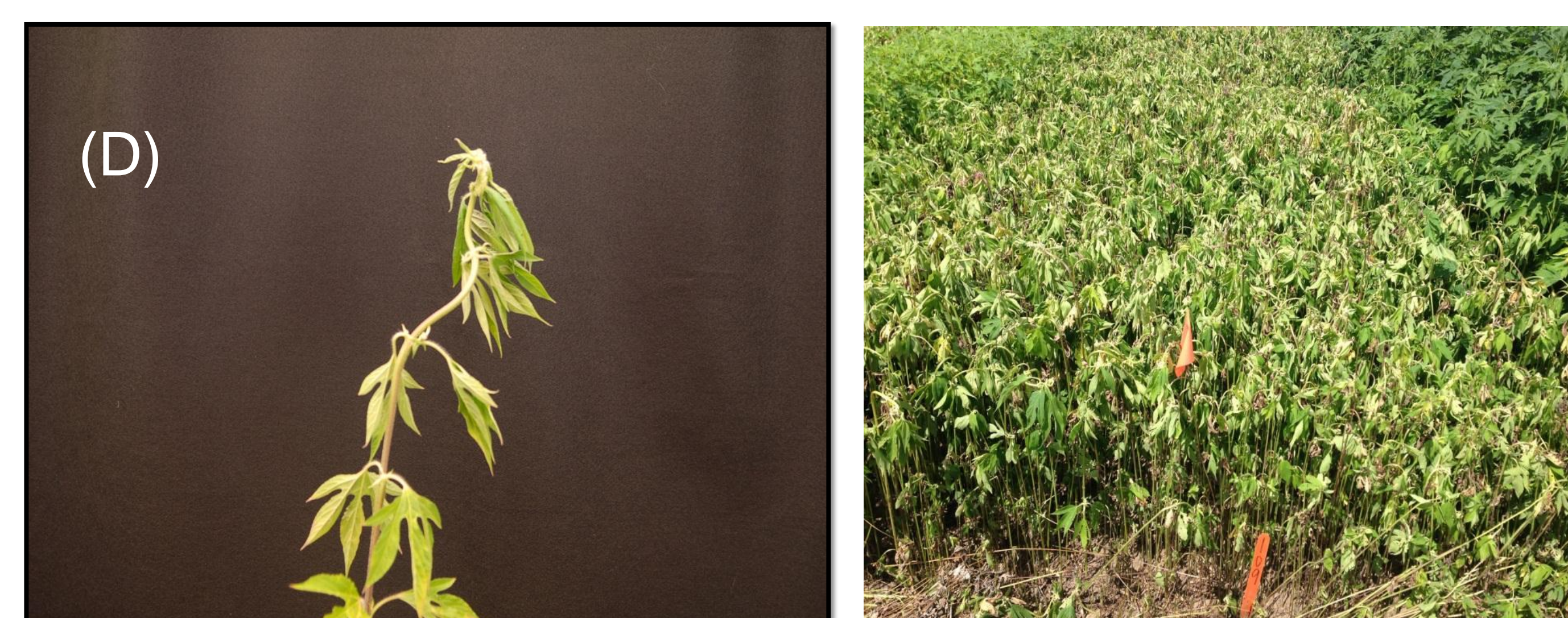
(A) Glyphosate



(B) Glufosinate



(C) 2,4-D



(D) Dicamba

Results & Discussion

- Our results suggested that sequential application of 2,4-D, dicamba and glufosinate provided upto 90% control of glyphosate-resistant giant ragweed compared to single herbicide treatment [Fig. 1 (A)]
- Glufosinate is a contact herbicide and 2,4-D and dicamba does not have residual activity, therefore second application of these herbicides was important to achieve good weed control
- Similar results were observed on the inflorescence where only few seeds were produced in the treatments including dicamba, 2,4-D and glufosinate applied sequentially both in greenhouse and field conditions [Fig. 1 (B)]
- Since, giant ragweed is an early emerging weed, therefore, weed management practices should be started early in the season by using burndown herbicides sequentially followed by PRE and POST herbicide applications to achieve complete control throughout the growing season and to avoid yield loss

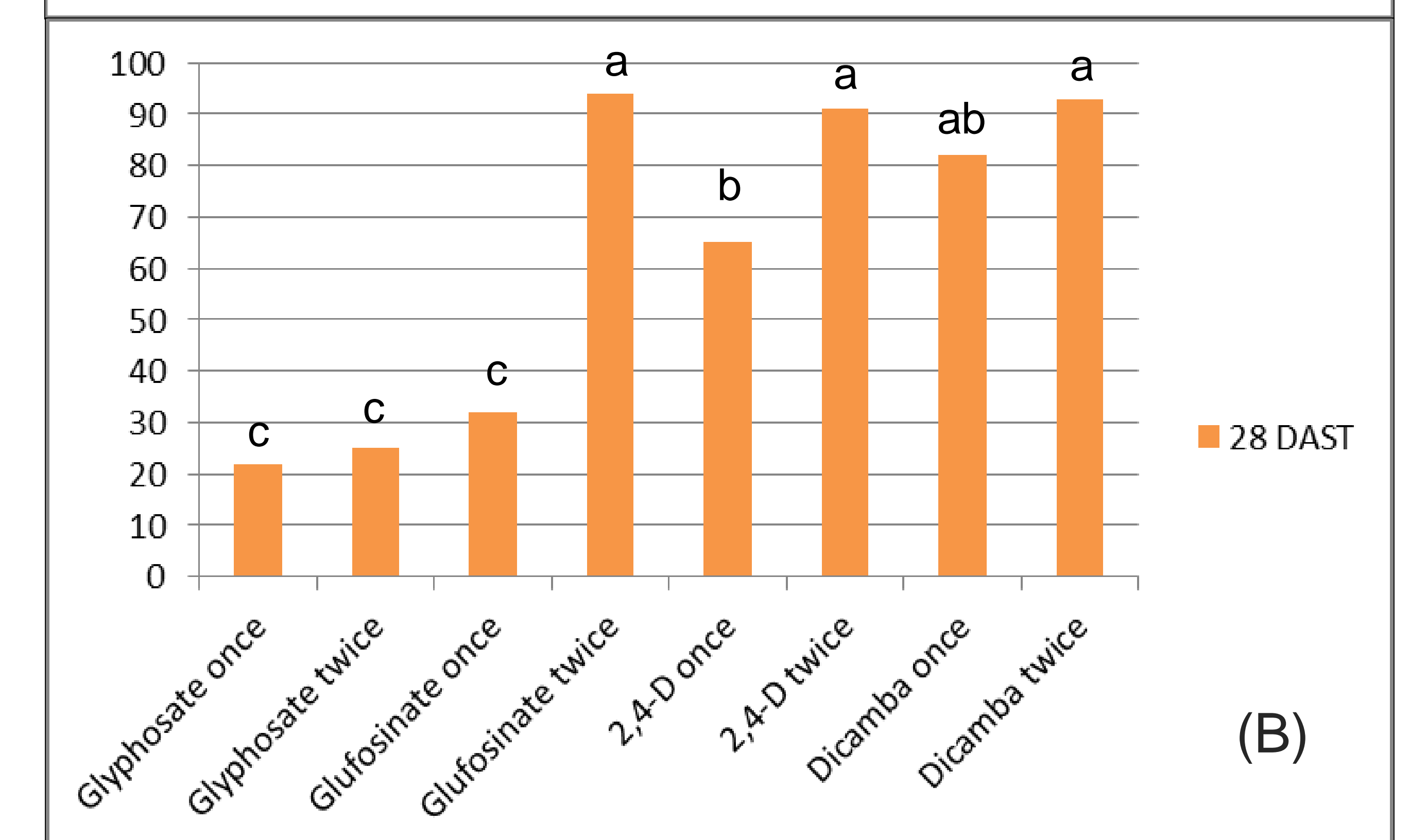
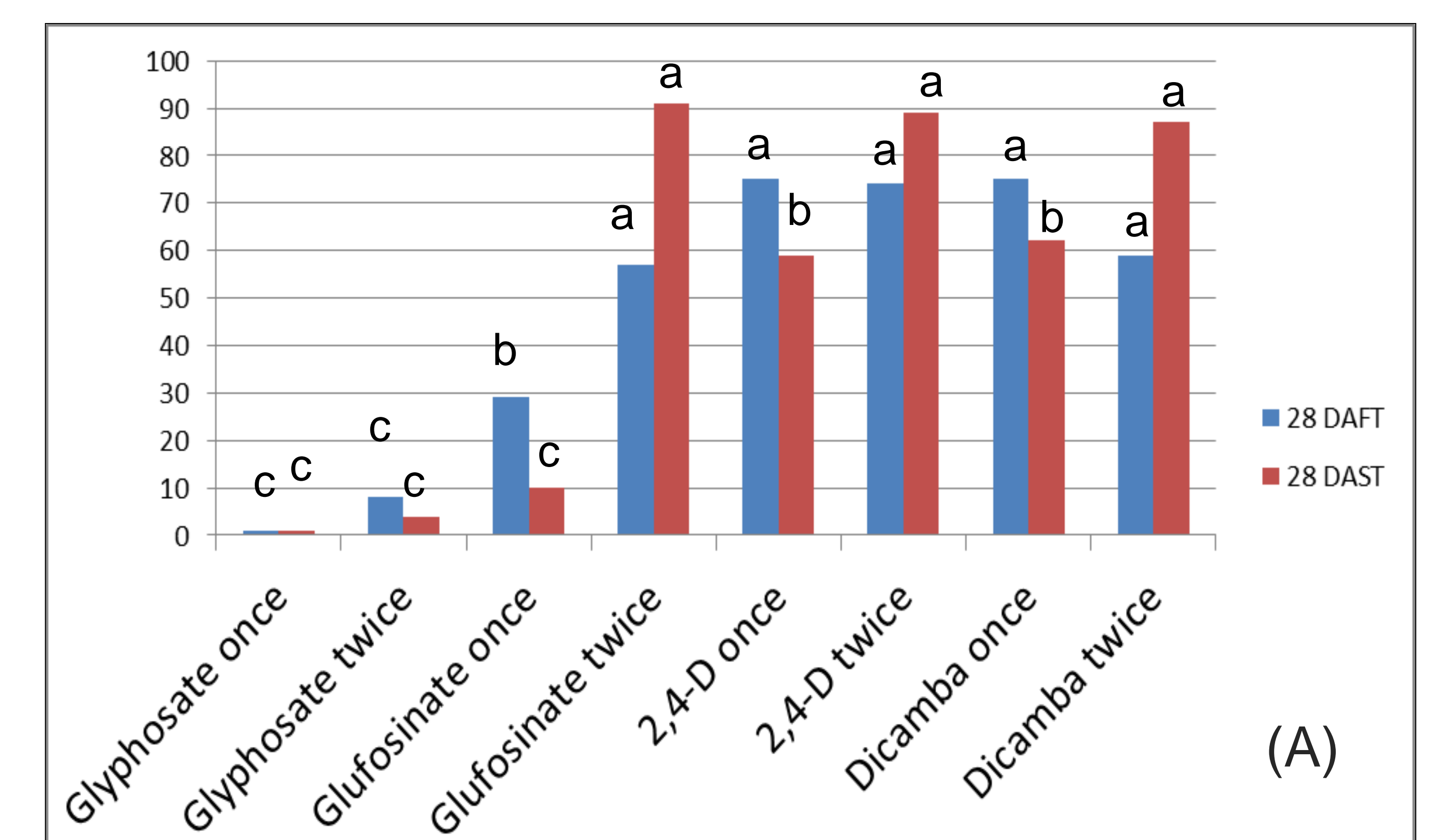


Fig.1. (A) Control of glyphosate-resistant giant ragweed at 28 Days after First and Second application (B) Effect on inflorescence at 28 DAST

*Abbreviation: DAST, Days after second treatment