

Glyphosate Efficacy on Giant Ragweed Infested With European Corn Borer

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PURDUE
Weed Science

Background

► In Illinois, Indiana and Ohio, glyphosate occasionally fails to control giant ragweed.



Introduction

► Closer investigation of some of the escaped plants reveals the presence of stalk boring insects and tunneling.



Introduction

► Previous research indicates that giant ragweed can serve as a host for the European corn borer (ECB) (*Ostrinia nubilalis*) (Dicke 1932).



Introduction

▶ Purdue University entomologists have also noted stalk borers, clover stem borers, and rhubarb billbug larvae in giant ragweed in Indiana (Blackwell, Gerber and Obermeyer (personal observations)).



Introduction

- ▶ Glyphosate efficacy on giant ragweed can be influenced by
 - ▶ Timing
 - ▶ Spray volume
 - ▶ Herbicide application rate (Tharp and Kells, 1999)
- ▶ Glyphosate efficacy can be variable on velvetleaf (Gonzini et al. 1999)

Objective

- ▶ To determine the influence of insect boring on giant ragweed control with glyphosate in both the greenhouse and field.

Materials and Methods

Greenhouse

- ▶ Collected 96 giant ragweed seedlings 3- to 5-cm tall from Purdue Agronomy Center for Research and Education.
- ▶ Study set up as a factorial
 - Two application timings
 - Four glyphosate rates
- ▶ This was done by doing 3 runs with 6 reps.



Infesting giant ragweed with ECB neonates with paint brush

Materials and Methods

- ▶ Placed in plastic pots, fertilized and placed in the greenhouse.

- ▶ Infested 48 giant ragweed that were 6- to 8-cm tall with 2- to 4-ECB neonates.



ECB Neonates on giant ragweed leaf

Materials and Methods

- ▶ Glyphosate treatment timings
 - 13- to 15-cm tall giant ragweed
 - 40- to 44-cm tall giant ragweed
- ▶ Received glyphosate treatments
 - 0 kg ae/ha
 - 0.63 kg ae/ha
 - 0.76 kg ae/ha
 - 1.52 kg ae/ha

Materials and Methods

► Data collected 21 days after treatment

ECB length of tunnels

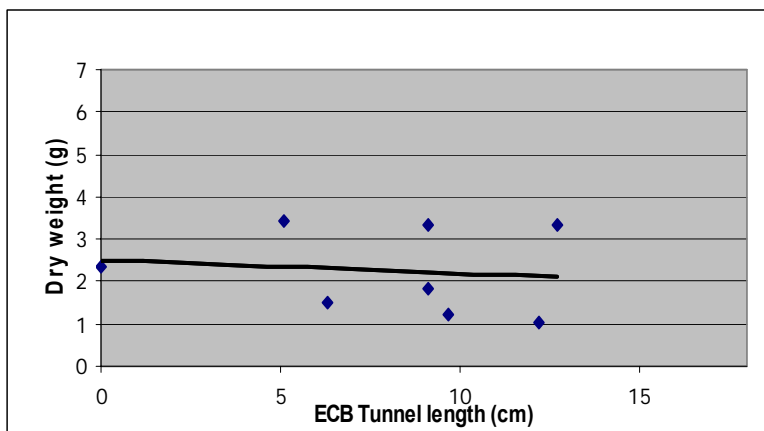
Giant ragweed dry weights



ECB larva in giant ragweed 21 DAT

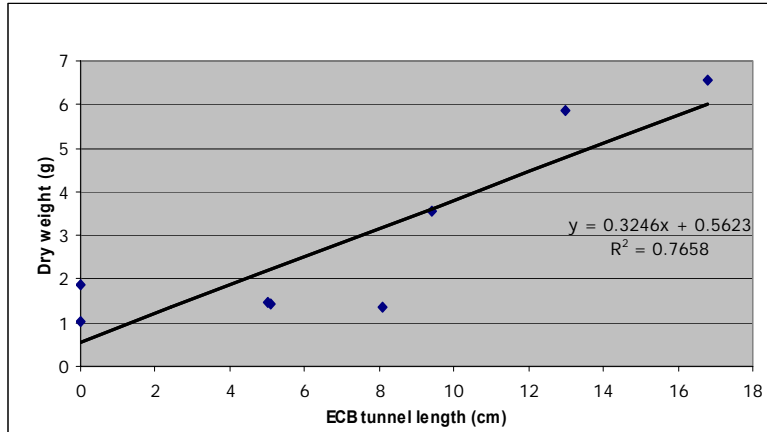
Results and Discussion

Giant ragweed dry weight as a function of tunnel length on 40- to 44-cm plants untreated.



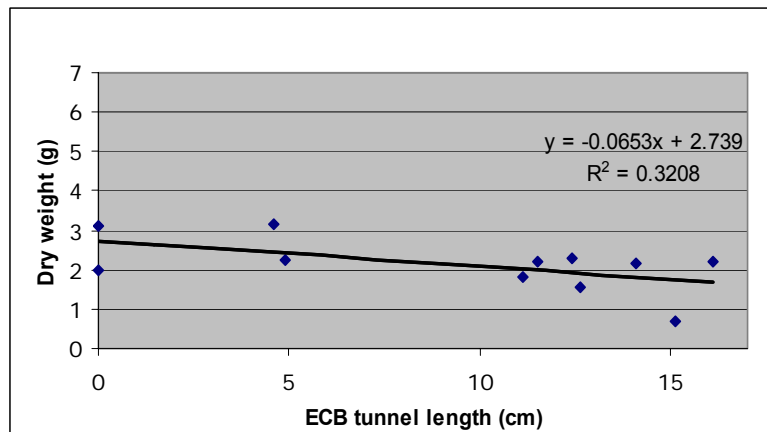
Results and Discussion

Giant ragweed dry weight as a function of ECB tunnel length on 40- to 44-cm plants sprayed with 0.63 kg ae/ha.



Results and Discussion

Giant ragweed dry weight as a function of ECB tunnel length on 40- to 44-cm plants sprayed with 1.52 kg ae/ha.



Results and Discussion

Greenhouse

► The 13- to 15-cm tall giant ragweed treatments all showed a decrease of giant ragweed dry weight with increased ECB tunnel length.

► 40- to 44-cm tall giant ragweed treated with 0.63 kg ae/ha was the only treatment that showed that ECB tunneling reduced glyphosate efficacy.



Giant ragweed 21 DAT treated with 0.63 kg ae/ha

Results and Discussion

► Axillary shoots were produced on many plants in the 0.63 kg ae/ha with 40- to 44-cm tall giant ragweed treatment.



Axillary shoots below ECB tunneling

Materials and Methods

Field

- ▶ 3m x 9m plots were used to observe natural infestations of stalk boring insects.
- ▶ 2 x 2 factorial
 - natural emergence cohorts stimulated by tillage
 - Two treatment timings
 - Two rates of glyphosate
- ▶ 3 runs with 4 reps

Preliminary Results

Field

- ▶ Glyphosate was applied at 0.76 kg ae/ha or 1.52 kg ae/ha at two timings
- ▶ 13- to 15-cm giant ragweed
- ▶ 40- to 44-cm giant ragweed
- ▶ 10 selected plants in each plot were cut open to look for insect tunneling



Preliminary Results

- ▶ Most giant ragweed that had escaped glyphosate treatment had evidence of insect tunneling.
- ▶ Most infestations took place 12.5 cm above the soil surface.
- ▶ The heaviest natural infestation occurred in the earliest tillage timing
 - Tilled June 6, 2003
 - Sprayed June 24, and July 3, 2003

Preliminary Results

	17-Jul-03	31-Jul-03	11-Aug-03
Number of plants with evidence of insect boring	48	30	32

Preliminary Results

	17-Jul-03	31-Jul-03	11-Aug-03
13- to 15-cm tall giant ragweed			
glyphosate (0.76 kg ae/ha)	95.3	97	96.5
40- to 44-cm tall giant ragweed			
glyphosate(1.52 kg ae/ha)	97.3	99.5	97.8
13- to 15 cm tall giant ragweed			
glyphosat(0.76 kg ae/ha)	93.3	92	91.5
40- to 44-cm tall giant ragweed			
glyphosate (1.52 kg ae/ha)	97	96	92.8