

GLYPHOSATE-RESISTANT HORSEWEED CONTROL IN SOYBEAN TOLERANT TO BOTH DICAMBA AND GLYPHOSATE. Lawrence E. Steckel and Robert F. Montgomery, Assistant Professor Department of Plant Sciences, The University of Tennessee, Jackson, TN 38301 and Technology Development Representative, Monsanto Company, Union City, TN 38261.

Introduction

Glyphosate-resistant (GR) horseweed (*Conyza canadensis*) is a serious pest problem in no-till soybean production in Tennessee (Heap 2007). Currently, the typical GR horseweed management program in Tennessee is 0.25 lb ae/A of dicamba tank mixed with 0.75 lbs ae/A of glyphosate applied 30 to 14 days before planting (Steckel et al. 2007). The draw back to the dicamba and glyphosate tankmix is that in dry soil conditions horseweed control has been inconsistent and soybean injury from the dicamba has occurred. In addition, GR horseweed emerges 11 months out of the year in Tennessee (Main et al. 2006) and even fields that are weed free at planting can have subsequent GR horseweed emergence. In 2007 in Tennessee Monsanto field tested soybean varieties that have a glyphosate tolerance trait stacked with a dicamba tolerance trait. Soybean tolerance to dicamba could provide producers a number of possible application timing options to control GR horseweed. Therefore, the objectives of our studies were to (1) determine how effective post emergence applied programs that center around dicamba controlled GR horseweed and (2) evaluate soybean tolerance to the herbicide applications.

Materials and Methods

Two studies were conducted in 2007 in a soybean field near Union City, TN and at Agricenter International located in Germantown, Tennessee. One study primarily looked at a weed management system that contained glyphosate and dicamba while the other study incorporated some soil residual containing Pre applied herbicides. The soybean variety was provided by Monsanto and contained both glyphosate tolerance and dicamba tolerance traits. The dicamba salt used in the study was diglycolamine. Herbicide applications were made with a CO₂ pressurized backpack sprayer equipped with Flat Fan 1100015VS nozzles under a pressure of 40 psi which provided an application volume of 10 gallons/acre. Application timings for the Germantown site are listed on Table 1. The treatments evaluated at Germantown are listed on Table 2. Application timings for the Union City site are listed on Table 3. The treatments evaluated at Union City are listed on Table 4. GR horseweed ratings were taken 21, 30 and 50 days after treatment (DAT).

Table 1.

Location	Application Timing	Date	Horseweed Size
Germantown	PRE	June 8	3"
Germantown	Early Post	July 7	8"
Germantown	Post	July 16	12"
Germantown	Sequential	July 26	20"

Table 2.

All Roundup Weather Max (RWM) applications were made at 1.12 lbs ae/A.

Trt 1. RWM Pre/fb RWM Early Post/ fb RWM Sequential.

Trt 2. RWM + Cloransulam 0.25 oz ai/A/fb RWM + dicamba 0.5 lbs ae/A Early Post / fb RWM + dicamba 0.5 lbs ai/A Sequential.

Trt 3. RWM Pre/ fb RWM + dicamba 0.5 lbs ae/A Early Post/ fb RWM + dicamba 0.5 lbs ae/A Sequential.

Trt 4. RWM + dicamba 0.5 lbs ae/A + flumioxazin Pre/ fb RWM + dicamba 0.25 lbs ae/A Early Post / fb RWM + dicamba 0.5 lbs ae/A Sequential.

Trt 5. RWM Pre/ fb RWM + dicamba 0.25 lbs ae/A Early Post / fb RWM + dicamba 0.5 lbs ae/A Sequential.

Trt 6. RWM + dicamba 0.5 lbs ae/A Pre/ fb RWM Early Post / fb RWM Sequential.

Trt 7. RWM + dicamba 0.5 lbs ae/A Pre/ fb RWM + dicamba 0.5 lbs ae/A Early Post / fb RWM Sequential.

Trt 8. RWM + dicamba 0.5 lbs ae/A Pre/ fb RWM + dicamba 0.5 lbs ae/A Early Post / fb RWM + dicamba

0.5 lbs ae/A Sequential.

Trt 9. RWM + dicamba 0.5 lbs ae/A Pre/ fb RWM Early Post / fb RWM + dicamba 1.5 lbs ae/A Sequential.

Trt 10. RWM + dicamba 0.5 lbs ae/A + sulfentrazone 0.25 lbs ai/A + cloransulam 0.25 oz ai/A Pre/ fb RWM + dicamba 0.5 lbs ae/A Early Post/ fb RWM Sequential.

Table 3.

<u>Location</u>	<u>Application Timing</u>	<u>Date</u>	<u>Horseweed Size</u>
Union City	PRE	June 11	12"
Union City	Early Post	June 29	18"
Union City	Late Post	July 2	24"
Union City	Sequential	July 23	30"

Table 4.

All Roundup Weather Max (RWM) applications were made at 0.75 lbs ae/A.

Trt 1. RWM Pre/fb RWM Late Post / fb RWM Sequential.

Trt 2. RWM Pre/fb RWM + dicamba 0.25 lbs ae/A Late Post / fb RWM + dicamba 0.25 lbs ai/A Sequential.

Trt 3. RWM Pre/ fb RWM + dicamba 0.25 lbs ae/A Late Post/ fb RWM + dicamba 0.25 lbs ae/A Sequential.

Trt 4. RWM Pre/ fb RWM + dicamba 0.125 lbs ae/A Early Post / fb RWM + dicamba 0.25 lbs ae/A Sequential.

Trt 5. RWM Pre/ fb RWM + dicamba 0.125 lbs ae/A Late Post/ fb RWM + dicamba 0.25 lbs ae/A Sequential.

Trt 6. RWM + dicamba 0.25 lbs ae/A Pre/ fb RWM Late Post/ fb Sequential.

Trt 7. RWM + dicamba 0.25 lbs ae/A Pre/ fb RWM + dicamba 0.25 lbs ae/A Late Post/ fb RWM Sequential.

Trt 8. RWM + dicamba 0.5 lbs ae/A Pre/ fb RWM + dicamba 0.5 lbs ae/A Late Post/ fb RWM + dicamba 0.5 lbs ae/A Sequential.

Trt 9. RWM + dicamba 0.5 lbs ae/A Pre/ fb RWM Late Post / fb RWM + dicamba 1.5 lbs ae/A Sequential.

Trt 10. RWM + dicamba 0.5 lbs ae/A + sulfentrazone 0.25 lbs ai/A + cloransulam 0.25 oz ai/A Pre/ fb RWM + dicamba 0.5 lbs ae/A Late Post / fb RWM Sequential.

Results and Discussion

At the Germantown location GR horseweed control was very good with all treatments by the 8/28 ratings.

At that location, GR horseweed populations were low and horseweed size was also small which could factor into the good overall control. At the Union city location treatments 5 and 7 that contained back to back post dicamba applications were the only treatments that provided better than 95% GR horseweed control by the 8/18 rating. The remainder of the treatments provided inadequate control (<77%). At the Union City location GR horseweed size was much larger (Table 3) and GR horseweed populations were much heavier (roughly 20/m²) which contributed to the poorer control. At the Germantown location some soybean leaf burn was observed (<10%) with the sequential dicamba and glyphosate tankmixes. Across all of the treatments at both locations the soybeans showed no leaf cupping or epinasty typical of dicamba injury on soybeans. The data from this study would suggest that GR horseweeds can be successfully controlled in a system where dicamba can be sprayed up to 0.5 lbs ae/A either pre emergence or over the top of soybeans. It also showed that the dicamba tolerance in the trait provides excellent crop safety to dicamba and that stacking glyphosate tolerance and dicamba tolerance traits offers a viable system for control of glyphosate resistant horseweed.

Main, C. L., L. E. Steckel, R. M. Hayes and T. C. Mueller. 2006. Biotic and abiotic factors influence horseweed emergence. *Weed Sci.* 54:1101-1105.

Steckel, L. E., C. C. Craig and R. M. Hayes. 2006. Glyphosate-resistant horseweed (*Conyza canadensis*) control with glufosinate prior to planting no-till cotton. *Weed Technol.* 20:1047-1051.

Heap, I. 2007. International Survey of Herbicide Resistant Weeds. Web page: <http://www.weedscience.com>. Accessed: November 1, 2007.