GLYPHOSATE-RESISTANT HORSEWEED CONTROL IN DICAMBA GLYPHOSATE RESISTANT SOYBEANS. Lawrence E. Steckel and Robert F. Montgomery, Assistant Professor, Department of Plant Sciences, The University of Tennessee, Jackson, TN 38301 and Area Technology Development Manager, 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 2008). 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 both a glyphosate tolerant trait stacked with a dicamba tolerant trait. Soybeans tolerant to dicamba could provide soybean 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**

Studies were conducted in 2007 and 2008 in a soybean field near Union City. The soybean variety was provided by Monsanto and contained both glyphosate tolerant and dicamba tolerant traits. Herbicide applications were made with a $CO^2$ 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 are listed in Table 1. GR horseweed control ratings were taken 21, 30 and 50 days after treatment (DAT). The treatments evaluated are listed on Table 2.

Table 1.

| Location/Year | Application Timing | Date | Horseweed Size |
|---|---|---|---|
| Union City 2008 | PRE | June 6 | 12” |
| Union City 2007 | PRE | June 3 | 3” |
| Union City 2008 | 6” Weeds | July 2 | 24” |
| Union City 2007 | 6” Weeds | July 16 | 8” |
| Union City 2008 | 3 WAT | July 23 | 30” |
| Union City 2007 | 3 WAT | July 26 | 0 |

Table 2.

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

Trt 1. RWM Pre/fb RWM on 6” weeds/ fb RWM 3 WAT.
Trt 2. RWM /fb RWM + dicamba 0.5 lbs ae/A on 3” weeds/ fb RWM + dicamba 0.5 lbs ai/A 3 WAT.
Trt 3. RWM Pre/ fb RWM + dicamba 0.5 lbs ae/A on 6” weeds/ fb RWM + dicamba 0.5 lbs ae/A 3 WAT.
Trt 4. RWM Pre/ fb RWM + dicamba 0.25 lbs ae/A on 3” weeds/ fb RWM + dicamba 0.5 lbs ae/A 3 WAT.
Trt 5. RWM Pre/ fb RWM + dicamba 0.25 lbs ae/A on 6” weeds/ fb RWM + dicamba 0.5 lbs ae/A 3 WAT.
Trt 6. RWM + dicamba 0.5 lbs ae/A Pre/ fb RWM on 6” weeds/ fb RWM 3 WAT.
Trt 7. RWM + dicamba 0.5 lbs ae/A Pre/ fb RWM + dicamba 0.5 lbs ae/A on 6” weeds/ fb RWM 3 WAT.
Trt 8. RWM + dicamba 0.5 lbs ae/A Pre/ fb RWM + dicamba 0.5 lbs ae/A on 6” weeds/ fb RWM + dicamba 0.5 lbs ae/A 3 WAT.
Trt 9. RWM + dicamba 0.5 lbs ae/A Pre/ fb RWM on 6” weeds/ fb RWM + dicamba 1.5 lbs ae/A 3 WAT.

Trt 10. RWM + sulfentrazone 0.25 lbs ai/A + cloransulam 0.25 oz ai/A Pre/ fb RWM + dicamba 0.5 lbs ae/A on 6" weeds/ fb RWM 3 WAT.
Trt 11. RWM + imazaquin 0.125 lbs /A Pre/ fb chlorimuron + thifensulfuron 1 oz/A 6" weeds.
Trt 12. RWM + cloransulam 0.25 oz ai/A Pre/ fb RWM + imazamox 4 oz/A 6" weeds.
Trt 13. RWM + flumioazin 0.25 lbs ai/A Pre/ fb RWM + dicamba 0.5 lbs ae/A on 6" weeds.
Trt 14. RWM + flumioazin 0.25 lbs ai/A + cloransulam 0.25 oz ai/A Pre/ fb RWM + dicamba 0.5 lbs ae/A on 6" weeds.

**Results and Discussion**

The horseweed at the Union City location showed about 50% control with glyphosate and is a typical biotype for Tennessee with respect to glyphosate tolerance. Treatments where glyphosate was applied Pre and then followed with glyphosate + dicamba applications on 6" weeds showed consistently poor horseweed control (60 to 80%). Treatments where glyphosate + dicamba was applied Pre followed by glyphosate or a sequential glyphosate + dicamba application on 6" weeds provided the best horseweed control (>96%). Across all of the treatments in both years of the study the soybeans showed no leaf cupping or epinasty typical of dicamba injury to soybeans. The Pre application of glyphosate + dicamba provided better horseweed control than a common farmer standard of glyphosate + FirstRate. 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. These data also point out that once horseweed is stressed with a glyphosate alone application follow up dicamba applications are not as effective. It also showed that the dicamba tolerance in the trait provides soybeans excellent crop safety to dicamba. All treatments resulted in acceptable weed control by the end of the season. Yield did not differ in this study but some horseweeds persisted until R2 soybean growth stage in treatments where dicamba was not applied in initial applications. Yield reduction would likely result under heavy infestation levels for these treatments.

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