Palmer Amaranth (*Amaranthus palmeri* S. Wats.) Management in GlyTol® + LibertyLink® Cotton

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Introduction

Palmer amaranth (*Amaranthus palmeri*) is the most common and troublesome weed in Texas High Plains (THP) cotton production. Yield reductions from Palmer amaranth across Texas have been estimated at 12% (Byrd, 2003). Glyphosate resistance has not yet been reported in Palmer amaranth in the THP. Soil residual herbicides are widely used in conjunction with glyphosate to control Palmer amaranth. However, continued use of glyphosate has caused shifts to more glyphosate-tolerant weeds such as ivyleaf morningglory (*Ipomoea hederacea* (L.) Jacq.) in some areas.

Bayer Crop Science plans the release of cotton varieties in 2011 with glyphosate and glufosinate tolerance. GlyTol® and GlyTol® + LibertyLink® (GL) cotton may provide producers with opportunities to manage weeds such as ivyleaf morningglory while maintaining effective control of Palmer amaranth. This study evaluated Palmer amaranth control strategies in GL cotton.

Objectives

- Identify synergism and/or antagonism on Palmer amaranth with tank mixes of glyphosate and glufosinate in GL cotton
- Determine the most effective sequential applications of glyphosate and glufosinate to control Palmer amaranth

Materials and Methods

Design: RCBD with 3 replications
Plot Size: 4.1 x 9.1m
Spray volume: 93.54 L/Ha
Application equip: CO2-pressurized backpack sprayer
Planting Date: May 20, 2010
Variety: FiberMax 9250GL
Weed Size: Tank Mix and Proportions – 5-10cm, 13-25cm
Sequential – 5-10cm

Treatments

Tank Mixes

Treatment	kg ae or ai ha^{-1}	Comparative
glyphosate	0.84	1X
glufosinate	0.58	1X
glyphosate + glufosinate	0.84 + 0.58	1X + 1X
glyphosate + glufosinate	0.84 + 0.44	1X + 0.75X
glyphosate + glufosinate	0.84 + 0.29	1X + 0.5X
glyphosate + glufosinate	0.84 + 0.15	1X + 0.25X

Proportions

Treatment	kg ae or ai ha^{-1}	Comparative
glyphosate	0.84	1X
glyphosate + glufosinate	0.63 + 0.15	0.75X + 0.25X
glyphosate + glufosinate	0.42 + 0.29	0.5X + 0.5X
glyphosate + glufosinate	0.21 + 0.44	0.25X + 0.75X
glufosinate	0.58	1X

Sequential*

Treatment	kg ae or ai ha^{-1}
glyphosate fb glyphosate	0.84
glyphosate fb glufosinate	0.63 + 0.15
glufosinate fb glyphosate	0.42 + 0.29
glufosinate + glufosinate	0.21 + 0.44

*all plots received pendimethalin 2.3 L ha^{-1} PPI

Results

Tank Mixes

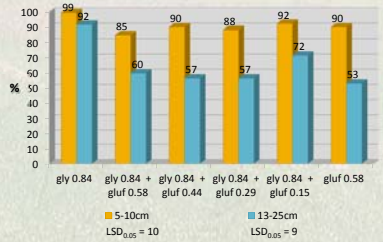

Table 1. Palmer amaranth control 14 days after treatment (DAT) with glyphosate + glufosinate tank-mixes.

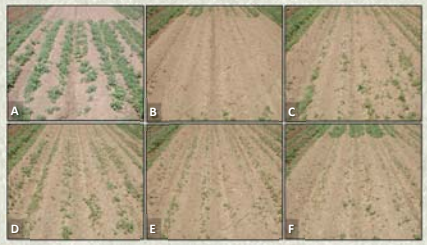

Figure 1. Tank-mix treatments 14 DAT: Untreated (A); glyphosate (B); gly 0.84 + gluf 0.58 (C); gly 0.84 + gluf 0.44 (D); gly 0.84 + gluf 0.29 (E); gly 0.84 + gluf 0.15 (F).

Proportions

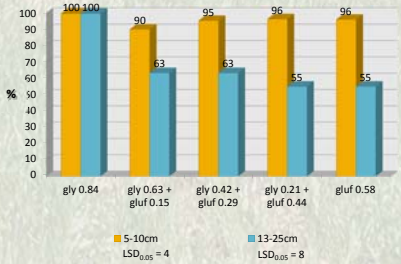

Table 2. Palmer amaranth control 14 DAT with proportional glyphosate + glufosinate tank-mixes.

Figure 1. Proportionial tank-mix treatments 14 DAT: Untreated (A); glyphosate (B); gly 0.63 + gluf 0.15 (C); gly 0.42 + gluf 0.29 (D); gly 0.21 + gluf 0.44 (E).

Sequential

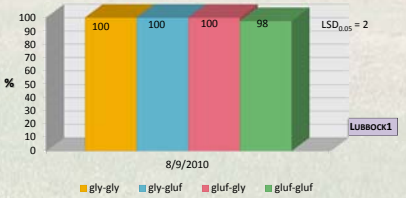

Table 3. End of season Palmer amaranth control at Lubbock1 location with sequential applications of glyphosate and/or glufosinate.

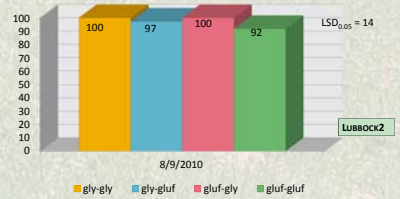

Table 4. End of season Palmer amaranth control at Lubbock2 location with sequential applications of glyphosate and/or glufosinate.

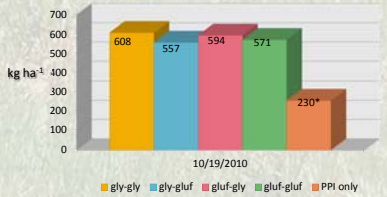

Table 5. Cotton lint yields following sequential applications of glyphosate and/or glufosinate. *denotes significant differences between treatments

Summary and Conclusions

- Tank-mixes and 1X proportional tank mixes of glyphosate and glufosinate reduced control of Palmer amaranth compared to glyphosate alone.
- Sequential applications of glyphosate and glufosinate effectively controlled Palmer amaranth regardless of the sequence.
- Cotton lint yields were similar for all sequential treatments.
- Sequential applications of glyphosate and glufosinate are a better option than tank-mixes for managing Palmer amaranth in GL cotton. These results are in agreement with previous research regarding glufosinate antagonism (Burke et al., 2005).

Future Research

- These studies will be repeated in 2011
- Greenhouse studies will be conducted to quantify observed antagonism of glyphosate/glufosinate tank mixes

References

Byrd, J.D. 2003. Report of the 2002 cotton weed loss committee. Proc. Beltwide Cotton Conf. Memphis, TN. CD-ROM.

Burke, I.C., S.D. Askew, J.L. Corbett, and J.W. Wilcut. 2005. Glufosinate antagonizes clethodim control of goosegrass (*Eleusine indica*). Weed Technol. 19:664-668.