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Enhancing Palmer Amaranth (*Amaranthus palmeri*) Control in Soybean: Effective Strategies for Glufosinate and 2,4-D Applications

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Introduction

- Palmer amaranth is a troublesome weed in soybean production due to rapid growth rate, and competitive nature, and propensity for herbicide resistance[1]
- Combinations of glufosinate and 2,4-D are recommended for post-emergence control of Palmer amaranth in Enlist soybeans; but multiple applications may be needed to achieve adequate control, especially for late-season applications to large Palmer amaranth
- Previous research[2, 3] suggests that the sequence in which glufosinate and 2,4-D are applied and the interval between applications can influence control of small Palmer amaranth

Objective

Identify the herbicide sequences and intervals that adequately control large Palmer amaranth

Methods

- Enlist (P42A84E) soybeans were established in 76-cm rows at a population of 300,000 seeds ha^{-1}
- 3 x 9.1 m plots at Ashland Bottoms Research Farm on June 4, 2024
- All plots were treated with 1 kg ha^{-1} *S*-metolachlor at planting to suppress Palmer amaranth
- Post-emergence treatments (Table 1) were applied when pigweeds were approximately 20 to 30 cm tall using XR11002 nozzles for glufosinate-only applications or AIXR11002 nozzles for applications that included 2,4-D
- Visual ratings of weed control were recorded 3, 17, and 73 DAA
- At soybean harvest, visible weed control, weed counts, weed biomass, and soybean yield were collected
- Data were subjected to analysis of variance and means were separated using Tukey's HSD

Table 1. Herbicide combinations and treatment intervals used in study.

	Application A	Application B	Re-spray Interval
1	Nontreated	Nontreated	Not applicable
2	Glufosinate[a]	None	Not applicable
3	Glufosinate + 2,4-D[b]	None	Not applicable
4	Glufosinate	Glufosinate	3 DAA[c]
5		Glufosinate + 2,4-D	
6	Glufosinate + 2,4-D	Glufosinate	
7		Glufosinate + 2,4-D	
8	Glufosinate	Glufosinate	10 DAA
9		Glufosinate + 2,4-D	
10	Glufosinate + 2,4-D	Glufosinate	
11		Glufosinate + 2,4-D	
12	Glufosinate	Glufosinate	14 DAA
13		Glufosinate + 2,4-D	
14	Glufosinate + 2,4-D	Glufosinate	
15		Glufosinate + 2,4-D	

[a]Liberty 280 SL; [b]Enlist One; [c]Days after application A

Results and Discussion

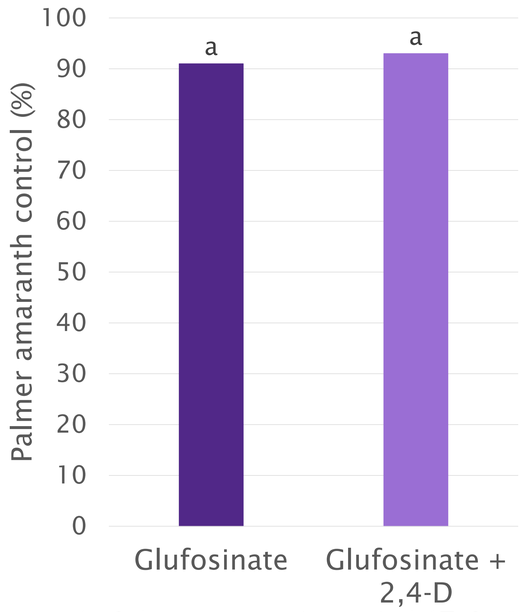

Figure 1. Palmer amaranth control 17 DAA. Bars with similar letters are similar (α <0.05).

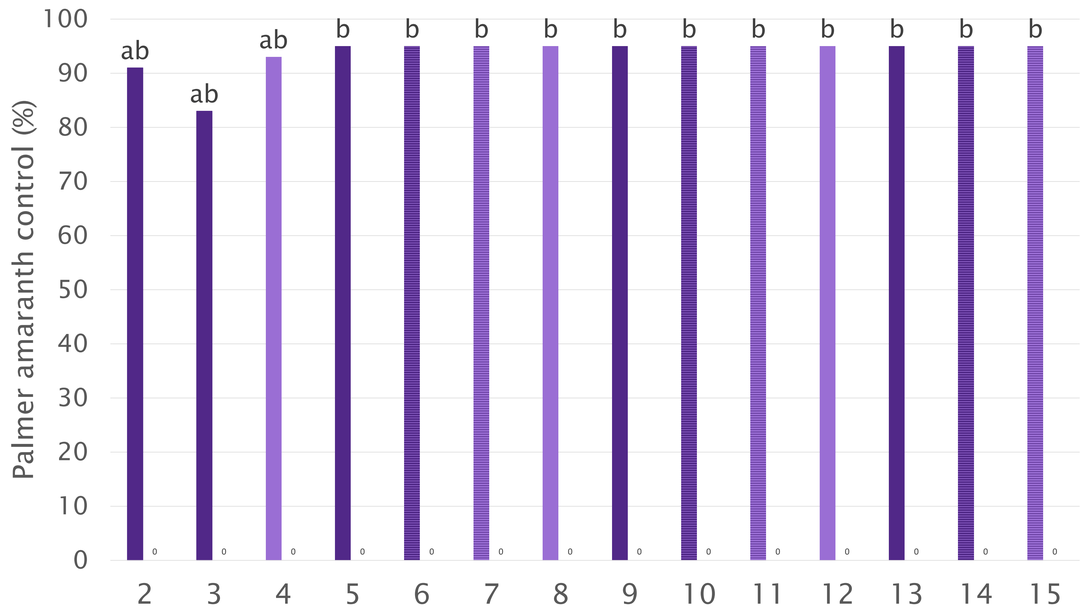

Figure 2. Palmer amaranth control 73 DAA. Bars with similar letters are similar (α <0.05).

Figure 3. Soybean yield. Bars with similar letters are similar (α <0.05).

- Palmer amaranth control by S-metolachlor was better than expected (>90%; data not shown)
- Prior to sequential applications, Palmer amaranth control was similar following applications of glufosinate and glufosinate + 2,4-D (Figure 1)
- Single applications of glufosinate and glufosinate + 2,4-D controlled Palmer amaranth similarly 73 DAA (Figure 2)
- Palmer amaranth control 73 DAA was similar for all sequential applications, regardless of herbicide or interval (Figure 2)
- Soybean yield was similar for all treatments evaluated in this study (Figure 3)

Conclusion

When pre-emergence herbicides are effective, the selection and timing of subsequent post-emergence applications become more flexible

Future Work

This research will be repeated at two locations in 2025 using a lower dose of S-metolachlor as the pre-treatment.

Literature cited

1. Ward, Sarah M., Theodore M. Webster, and Larry E. Steckel. "Palmer amaranth (Amaranthus palmeri): a review." Weed Technology 27, no. 1 (2013): 12-27
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3. Reed, Jacob D., J. Wayne Keeling, and Peter A. Dotray. "Palmer amaranth (Amaranthus palmeri) management in GlyTol® LibertyLink® cotton." Weed Technology 28, no. 4 (2014): 592-600

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