

Weed Height and the Inclusion of Atrazine Influence Control of Multiple-Resistant Palmer Amaranth with HPPD Inhibitors

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Introduction

- Multiple (glyphosate/ALS)-resistant Palmer amaranth has been identified in nine Michigan counties.
- While this weed has been more prevalent in soybean fields, there have been increased reports of Palmer amaranth issues in corn production.
- In order to maximize control of this weed we need to utilize all the tools that are available. This includes the use of HPPD-inhibiting herbicides and atrazine.

Objectives

- Evaluate effectiveness of HPPD-inhibiting herbicides applied alone and in combination with atrazine for control of multiple-resistant Palmer amaranth.
- Determine the influence of weed height on the management of multiple-resistant Palmer amaranth.

Materials and Methods

- Experiment was conducted in 2013 in a commercial corn field near Middleville, Michigan.
- Randomized complete block design; with 4 replications
- Herbicide applications were made when Palmer amaranth was 8 and 15 cm tall.
- Herbicide treatments are listed in Table 1.
- Herbicide applications were made with CO₂ backpack sprayer delivering 187 l/ha at 207 kPa.

Table 1. Herbicide treatments and rates

Herbicide*	Rate (g/ha)
atrazine	560
mesotrione	105
mesotrione + atrazine	105 + 560
topramezone	18
topramezone + atrazine	18 + 560
tembotrione	92
tembotrione + atrazine	92 + 560

* All treatments were applied with COC or MSO (1% v/v) + AMS

- Weed control was evaluated 7 and 21 days after each application timing (DAT) and weed biomass was harvested 21 DAT of final application timing.
- Data were analyzed in PROC MIXED in SAS. Means were separated using Fisher's protected LSD ($p \leq 0.05$).

Results and Discussion

- Combined over all treatments, herbicides applied to 8 cm tall Palmer amaranth provided greater control and biomass reduction (Figure 2).
- None of the herbicides alone, except tembotrione at 8 cm, effectively controlled Palmer amaranth (Figures 3 and 4).
- The addition of atrazine, in most cases, improved control of Palmer amaranth compared with the HPPD inhibitors alone, regardless of weed height.
- The combination of atrazine with the HPPD inhibitors applied to 8 cm tall Palmer amaranth were the only treatments that provided greater than 90% control.

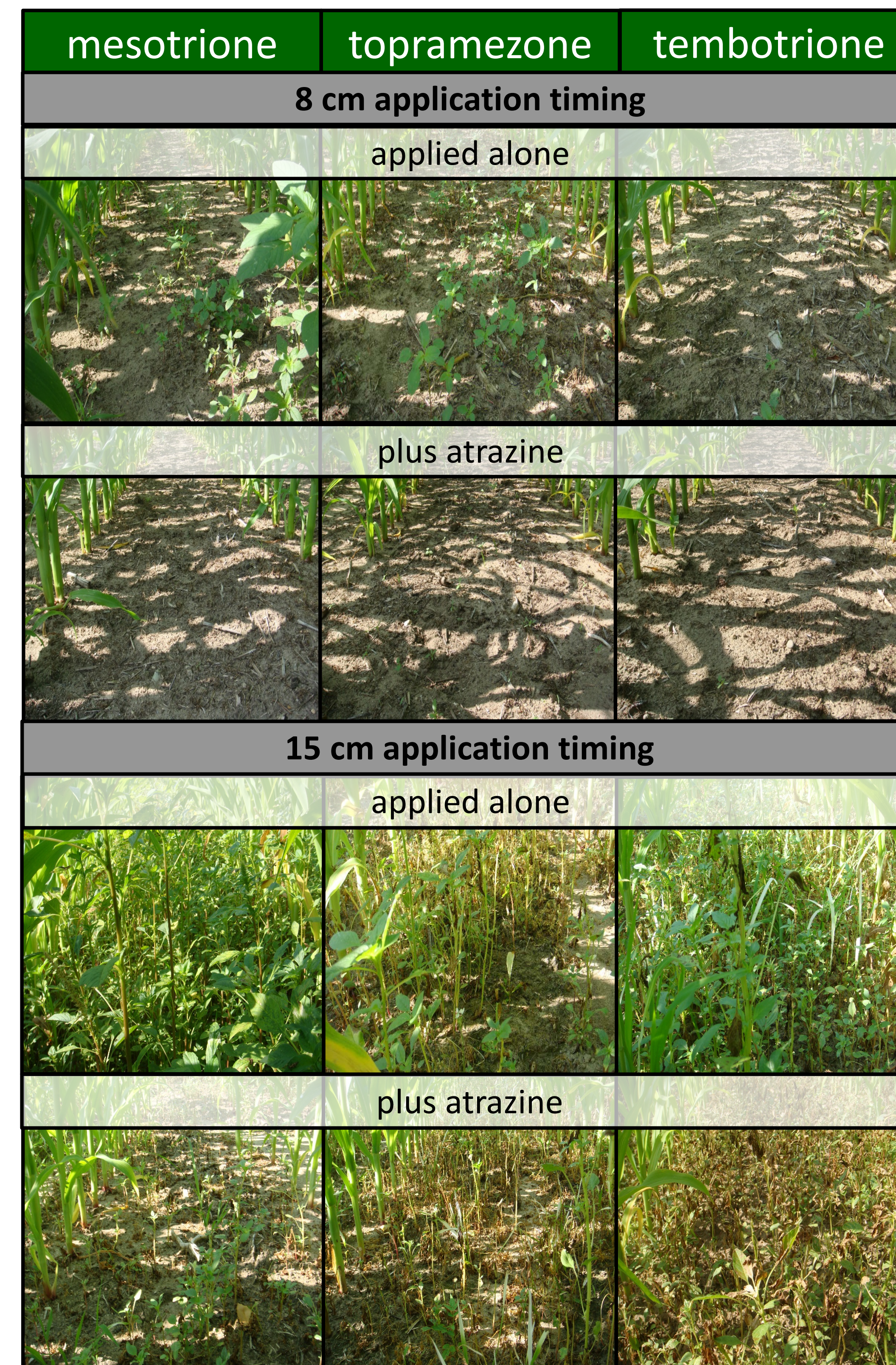


Figure 1. Palmer amaranth control from HPPD inhibitors with and without atrazine, 21 DAT.

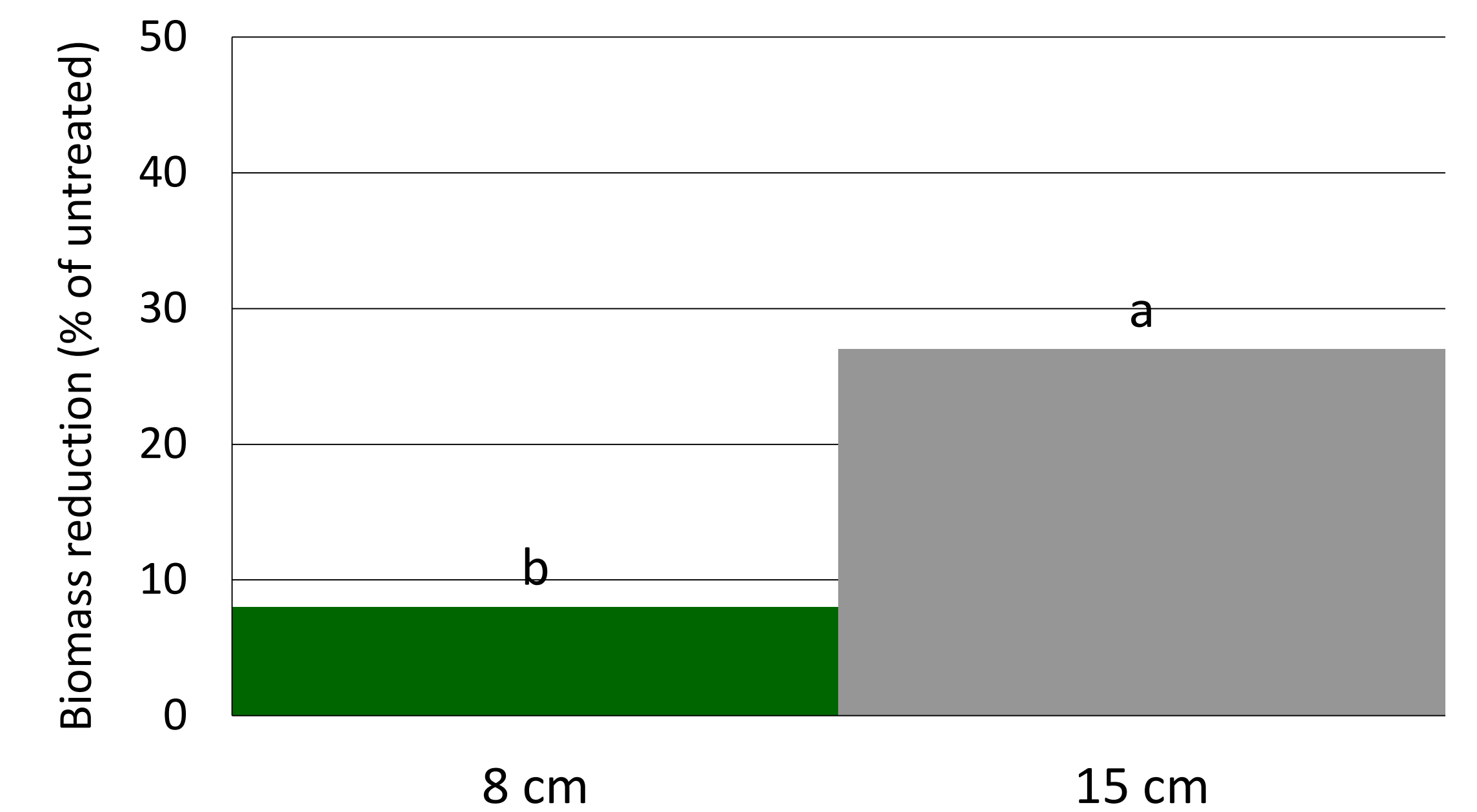


Figure 2. Effect of application height on Palmer amaranth biomass reduction (combined over herbicide trts).

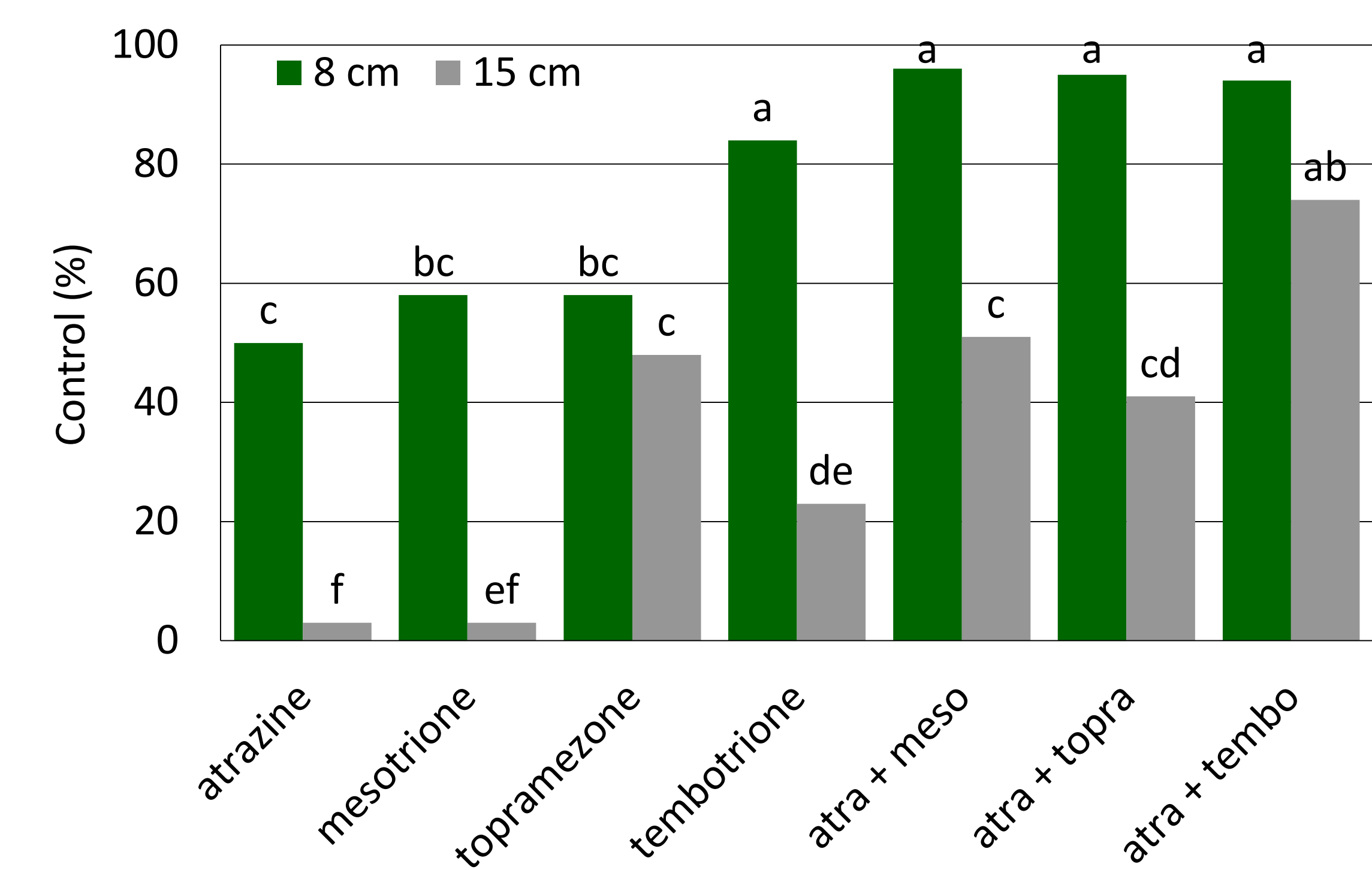


Figure 3. Palmer amaranth control, 21 DAT.

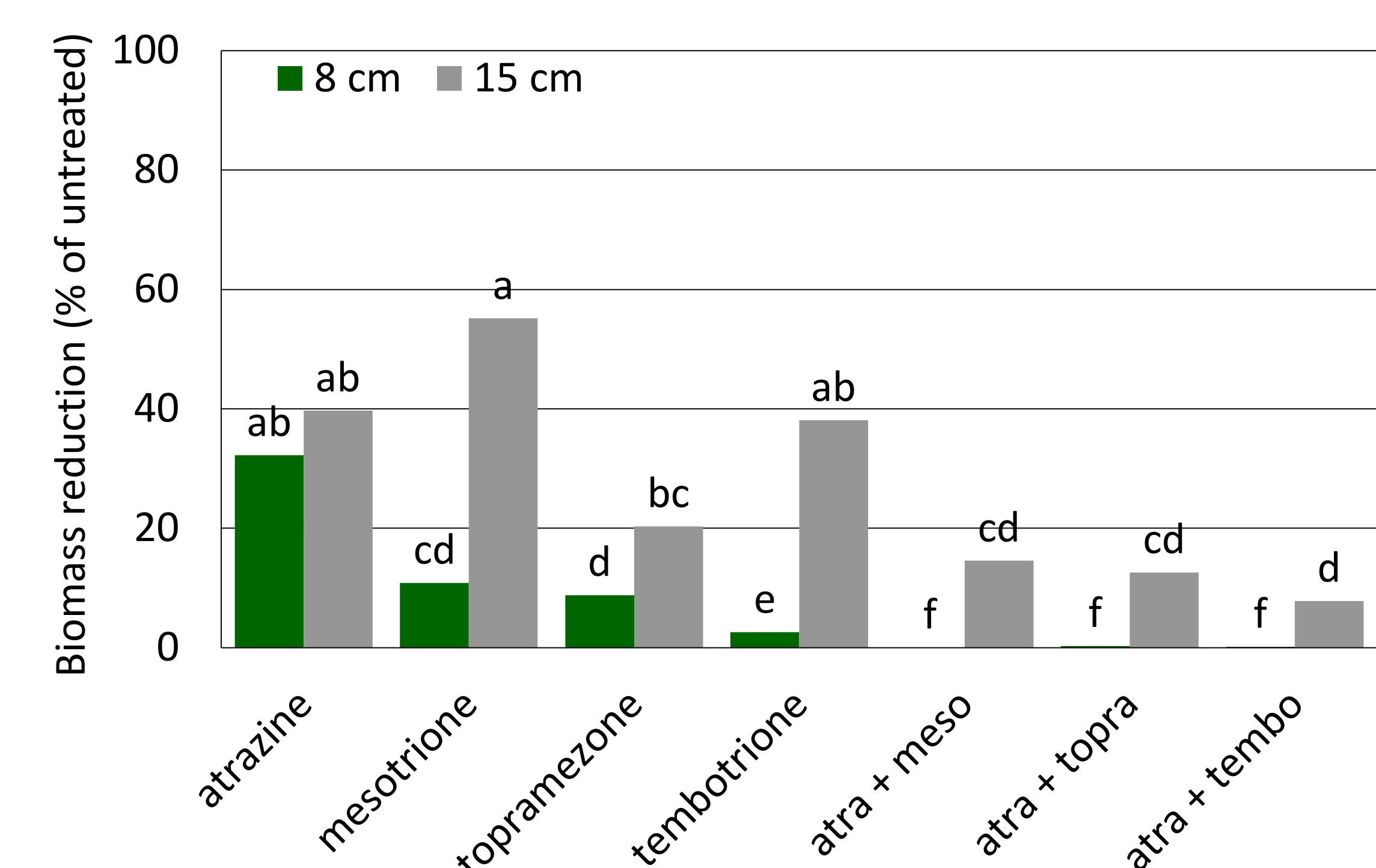


Figure 4. Palmer amaranth biomass reduction.

Conclusions

- This research suggests that the optimal timing for effective postemergence control of multiple (glyphosate/ALS)-resistant Palmer amaranth is 8 cm or less with the use of an HPPD inhibitor in combination with atrazine.
- While these treatments were effective at controlling emerged Palmer amaranth, good Palmer amaranth management practices should include the use of an effective soil-applied residual herbicide preemergence to reduce initial Palmer amaranth populations.

Acknowledgements

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