

Control of Palmer amaranth using a premix of dicamba and tembotrione in corn

*Amy Hauver¹, Parminder Chahal¹, Kevin Watteyne², Amit Jhala¹
¹University of Nebraska-Lincoln, Lincoln, NE; ²Bayer Crop Science, Lincoln, NE
 E-mail: amy.hauver@gmail.com

INTRODUCTION

- Palmer amaranth (*Amaranthus palmeri*) is a pervasive weed species in several agronomic crops.
- Emerges throughout the growing season (March to October).
- Can cause an estimated corn yield loss of up to 91% (Massinga et al. 2016).
- Ranked the number one troublesome weed in the United States (WSSA 2016).
- Has high genetic variability – leads to a high potential for evolving resistance to herbicides (Norsworthy et al. 2008).
- DiFlexx DUO is a combination of 19.73% dicamba (group 4), 2.83% tembotrione (group 27) and crop safety innovation (CSI), which inhibits photosynthesis in the plant (Anonymous 2017).
- Registered for field corn, silage corn, seed corn, and popcorn.
- CSI allows corn plants to better withstand herbicidal activity, increases root growth, and has a wide window of application (Anonymous 2017).
- DiFlexx DUO can be applied as a tank-mix partner with glufosinate, atrazine, or glyphosate – used as an additional mode of action on grass and broadleaves, like Palmer amaranth.

OBJECTIVE

- To evaluate different site-of-action (SOA) herbicides premixes, including dicamba + tembotrione applied POST for Palmer amaranth control in glyphosate-resistant corn.

HYPOTHESIS

- Herbicide programs containing dicamba + tembotrione would provide greater Palmer amaranth control compared with other herbicide premixes.

MATERIALS AND METHODS

- A field experiment was conducted at South Central Agricultural Laboratory (SCAL), NE in 2017.
- Herbicide treatments were laid out in a randomized complete block design with four replications.
- POST herbicides were applied when Palmer amaranth was 10-12 cm tall.
- Palmer amaranth control was visually estimated at 14 and 28 DAT and at harvest.
- Data were analyzed in SAS (9.3) using PROC GLIMMIX procedure.

Table 1. Herbicide treatments, trade names, site of action, and rates for Palmer amaranth control.

Trt No.	Herbicide treatments*	Trade name	Site of action	Rate (g ai ha ⁻¹)
T1	Nontreated Control	---	---	---
T2	Dicamba/tembotrione + glyphosate + atrazine	DiFlexx® DUO + Roundup WeatherMAX + Aatrex	4/27 + 9 + 5	454 + 1263 + 561
T3	Dicamba/tembotrione + atrazine**	DiFlexx® DUO + Aatrex	4/27 + 5	454 + 561
T4	Dicamba/tembotrione + glyphosate + atrazine	DiFlexx® DUO + Roundup + Aatrex	4/27 + 9 + 5	340 + 1263 + 561
T5	Dicamba/tembotrione + glufosinate-ammonium + atrazine	DiFlexx® DUO + Liberty 280 + Aatrex	4/27 + 10 + 5	340 + 450 + 561
T6	Thiencarbazone-methyl/tembotrione + glyphosate + atrazine	Capreno + Roundup + Aatrex	2/27 + 9 + 5	120 + 1263 + 561
T7	S-metolachlor/glyphosate/mesotrione + atrazine***	Halex GT + Aatrex	9/15/27 + 5	2213 + 561
T8	Topramezone + dimethenamid + glyphosate + atrazine	Armezon + Outlook Roundup + Aatrex	27 + 15 + 9 + 5	14 + 736 + 1263 + 561
T9	Topramezone + diflufenopyr/dicamba + glyphosate + atrazine	Armezon + Status + Roundup + Aatrex	27 + 4/19 + 9 + 5	14 + 128 + 1263 + 561
T10	Bicyclopyrone/mesotrione/S-metolachlor/atrazine**	Acuron	5/15/27	5.85
T11	Clopyralid/acetochlor/mesotrione	Resicore	4/15/27	5.85

* N-PAK AMS added at 2.5% volume/volume to treatments except nontreated control,

** Crop oil concentrate (COC) added at 1% volume/volume,

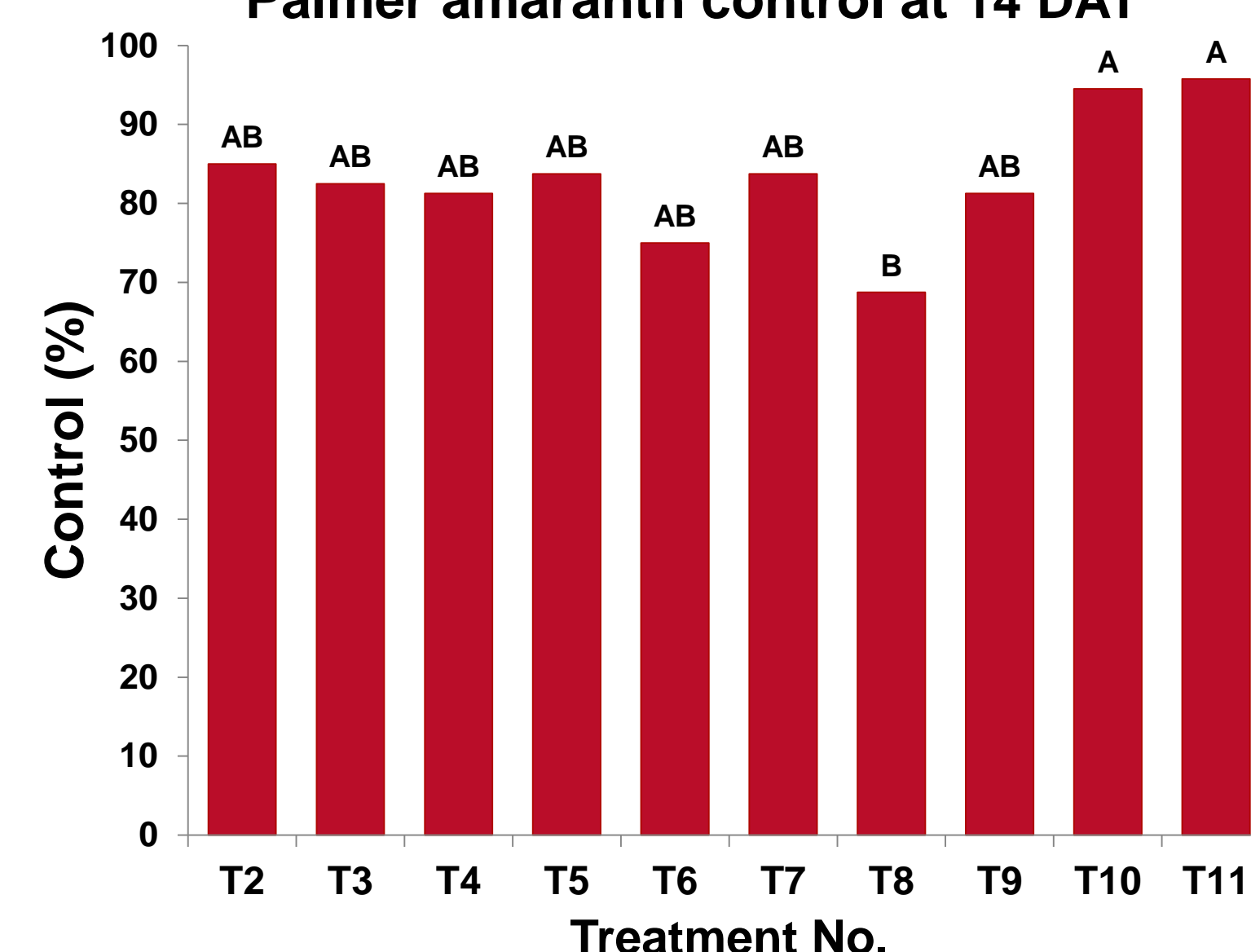
*** NIS added at 0.25% volume/volume.

LITERATURE CITED

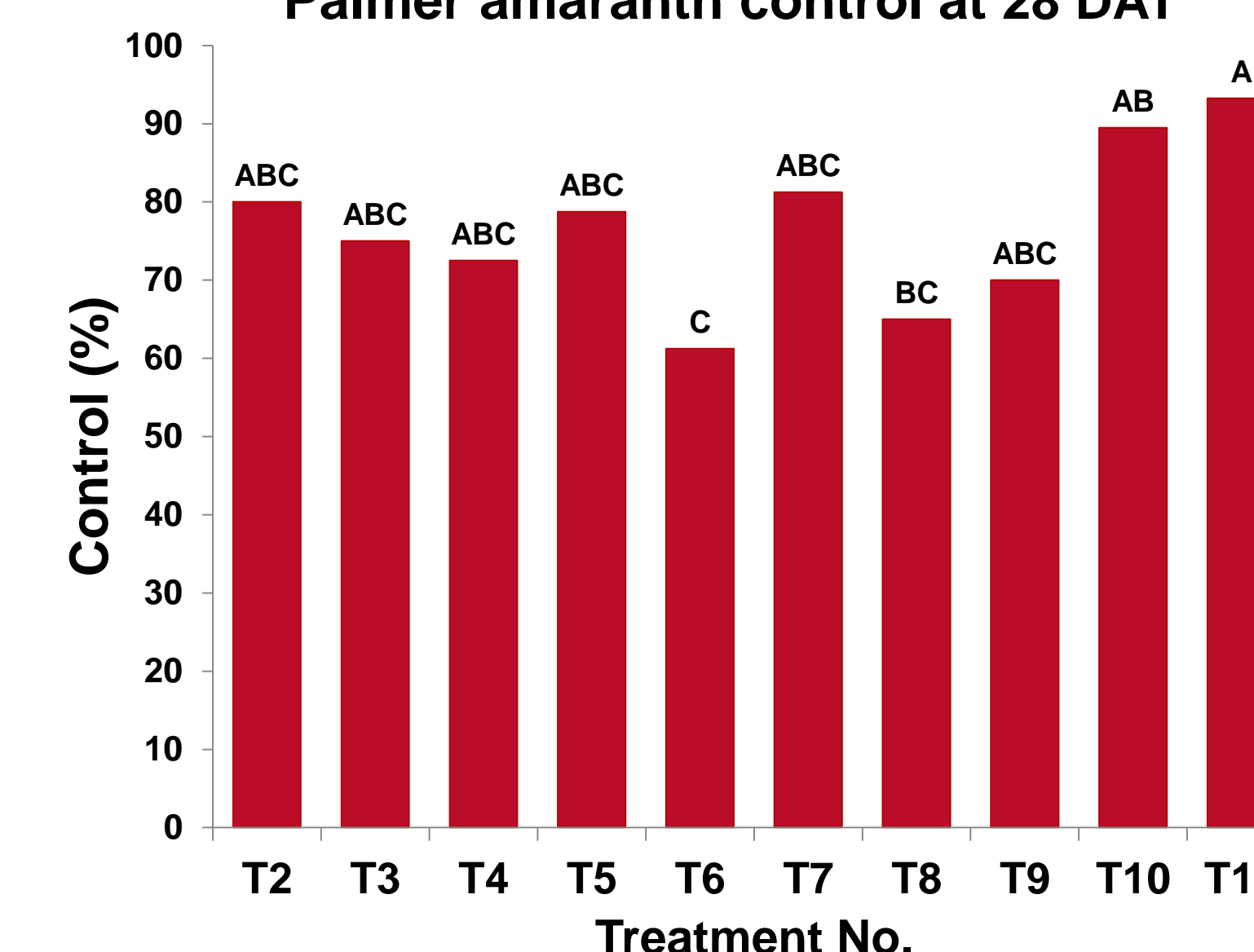
- Anonymous (2017) DiFlexx Duo Herbicide label.
- Massinga RA, Currie RS, Horak MJ, Boyer J (2001) Weed Science, 49(2), 202-208.
- Riar DS, Norsworthy JK, Steckel LE, Stephenson DO, Eubank TW, Bond J, Scott RC (2013) Weed Technology 27 (4), 788-797.
- WSSA (Weed Science Society of America) (2016).

RESULTS & DISCUSSION

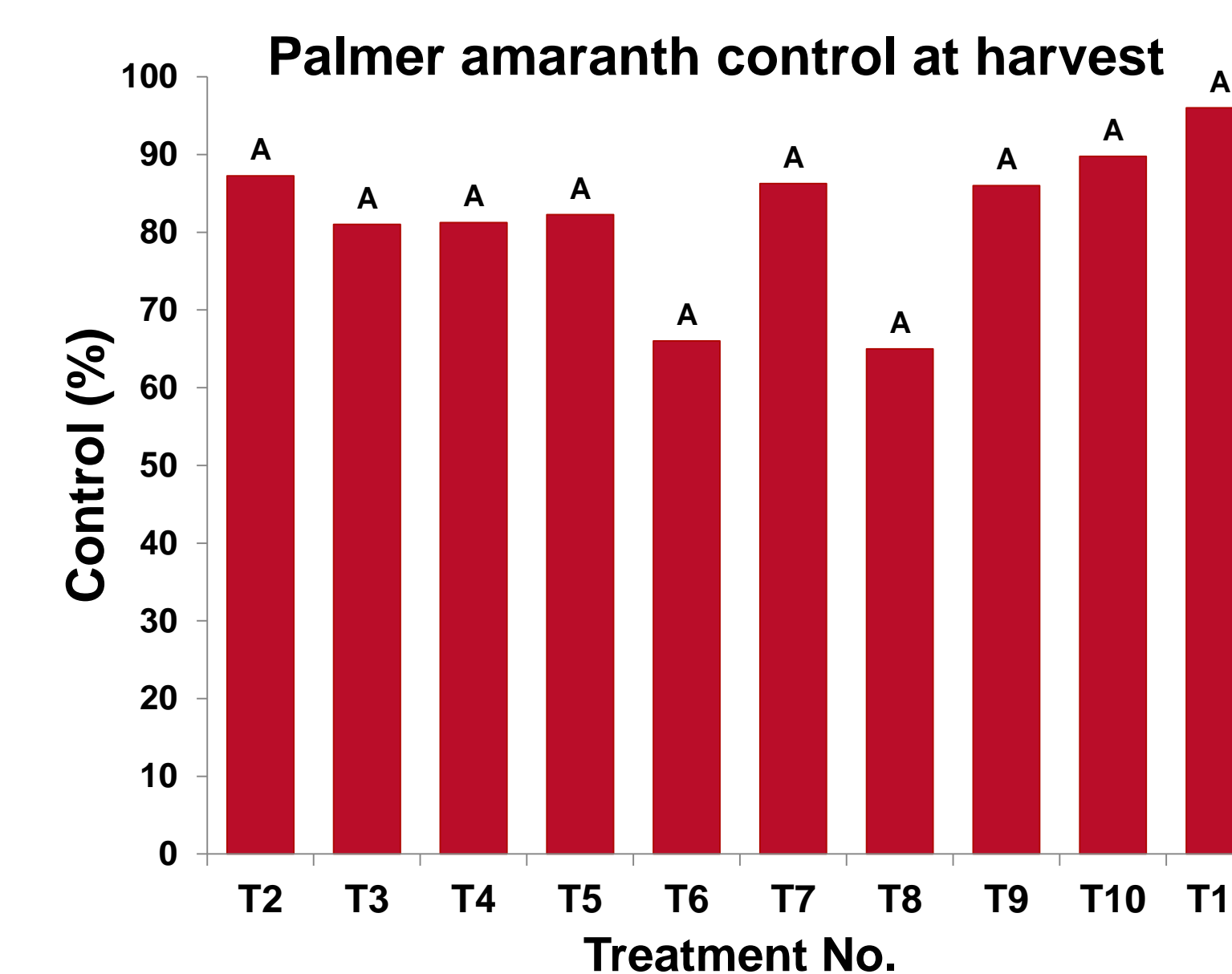
Palmer amaranth control at 14 DAT



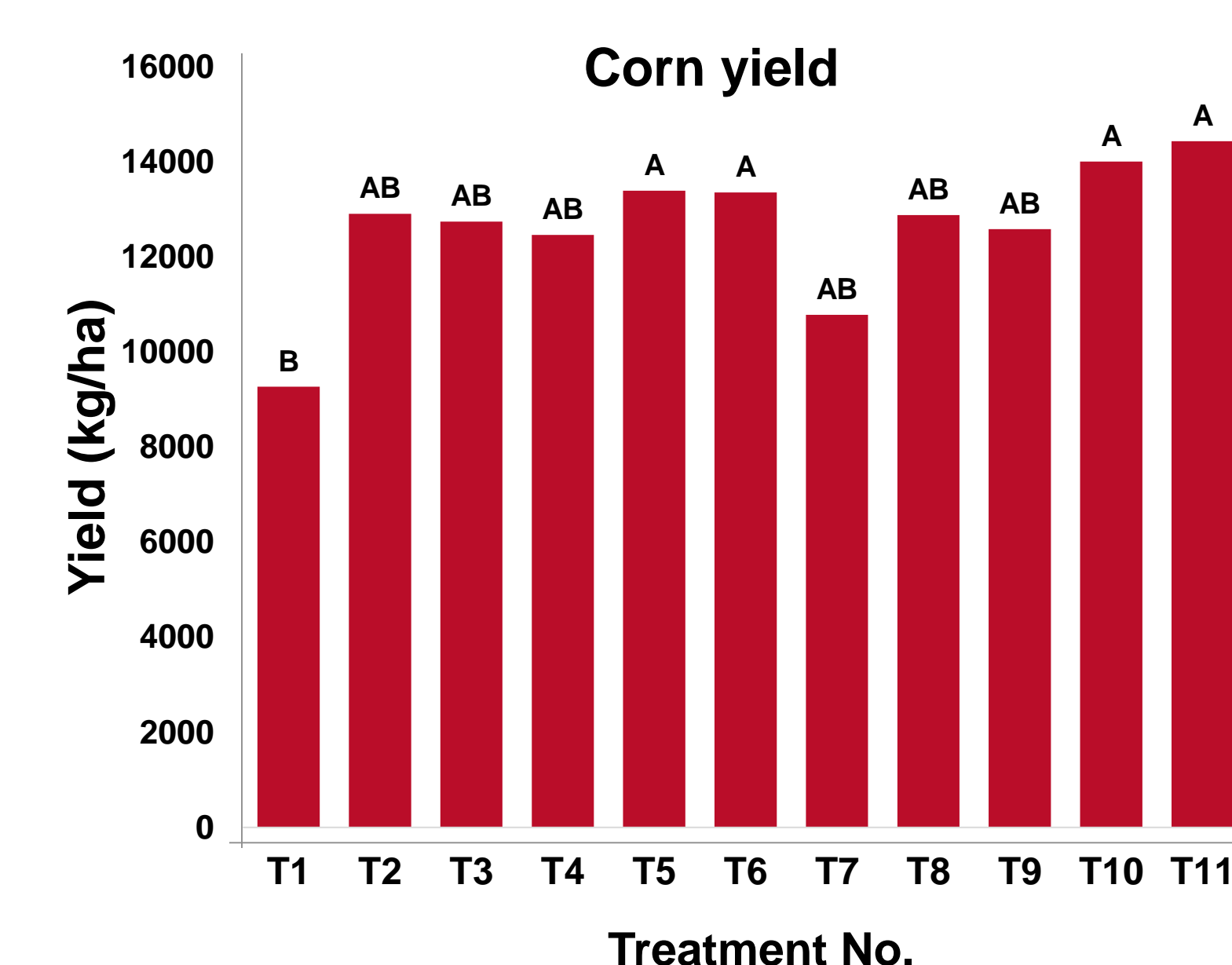
Palmer amaranth control at 28 DAT



Palmer amaranth control at harvest



Corn yield



Nontreated control



Dicamba/tembotrione + glyphosate + atrazine



Dicamba/tembotrione + atrazine



Dicamba/tembotrione + glufosinate + atrazine



Thiencarbazone/tembotrione + glyphosate + atrazine

CONCLUSIONS

- Atrazine + bicyclopyrone + mesotrione + s-metolachlor, or acetochlor + clopyralid + mesotrione premixes applied alone provided 73 to 93% control of Palmer amaranth at 28 days after treatment (DAT), which is similar to the control with the application of dicamba + tembotrione tank-mixed with atrazine, or atrazine and glyphosate, or atrazine and glufosinate.
- The above-mentioned POST herbicide treatments provided 65 to 95% control at 42 DAT.
- PRE herbicides were not applied in the study and a high population of Palmer amaranth was present at the time of POST herbicide applications, which also resulted in lower and variable control.
- Additionally, Palmer amaranth has an extended period of emergence (March to October) in the Midwestern USA, making it difficult to control. Therefore, to achieve season-long Palmer amaranth control and to reduce the evolution of herbicide resistant weeds, different SOA soil-residual herbicides can be applied within 2-3 days of crop planting and in tank-mixture with foliar active herbicides in a POST application.

FUTURE RESEARCH

- Evaluate different PRE followed by POST herbicide programs for Palmer amaranth control.
- Evaluate corn response to tembotrione + dicamba applied using drop nozzle versus broadcast application.