

# Potential Weed Control Antagonism in Glyphosate/Glufosinate Tank Mixes

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## Introduction

Palmer amaranth (*Amaranthus palmeri*) is the most common and troublesome weed in Texas High Plains cotton production. Residual herbicides are typically used in conjunction with glyphosate to control Palmer amaranth, but glyphosate control of some other weeds is less consistent.

GlyTol® + LibertyLink® (GL) cotton provides producers with opportunities to manage other troublesome weeds while maintaining effective control of Palmer amaranth, but there are concerns about antagonism between glyphosate and glufosinate when tank-mixed. Field studies were conducted in 2010 and 2011 near Lubbock, TX to evaluate Palmer amaranth control with tank-mixes of glyphosate and glufosinate. Greenhouse studies in 2011 evaluated levels of antagonism following various tank-mix ratios.

## Objectives

- Evaluate Palmer amaranth control with tank-mixes of glyphosate (Roundup PowerMax) and glufosinate (Ignite)
- Determine if Roundup PowerMax and Ignite are antagonistic in tank-mix combinations in field and greenhouse studies

## Materials and Methods

### Field

Design: RCBD with 3 reps  
Plot Size: 4 rows x 30 feet  
App. Equip: CO<sub>2</sub>-pressurized backpack sprayer  
Spray Volume: 10 GPA  
Weed size: 2-4 in.



Treatment	lbs/A*
RUPM	0.75
RUPM + Ignite	0.75 + 0.52
RUPM + Ignite	0.75 + 0.39
RUPM + Ignite	0.75 + 0.26
RUPM + Ignite	0.75 + 0.13
Ignite	0.52
Ignite + RUPM	0.52 + 0.5625
Ignite + RUPM	0.52 + 0.375
Ignite + RUPM	0.52 + 0.1875

### Greenhouse

Design: RCBD with 4 reps  
3 x 3 in. pots, 2 plants per pot (2 to 4 in. weeds)  
App. Equip: CO<sub>2</sub>-pressurized spray chamber  
Spray Volume: 10 GPA  
Analysis: augmented mixed-model methodology

Treatment	lbs/A*
Untreated	
RUPM	0.75, 0.5625, 0.375, 0.1875
Ignite	0.52, 0.39, 0.26, 0.13
RUPM + Ignite (10-13)	0.75 + 0.52, 0.39, 0.26, 0.13
RUPM + Ignite (14-17)	0.5625 + 0.52, 0.39, 0.26, 0.13
RUPM + Ignite (18-21)	0.375 + 0.52, 0.39, 0.26, 0.13
RUPM + Ignite (22-25)	0.1875 + 0.52, 0.39, 0.26, 0.13

\*Roundup PowerMax (RUPM) rates given in lbs ae/A; Ignite rates given in lbs ai/A

## Results

### Field – 2010

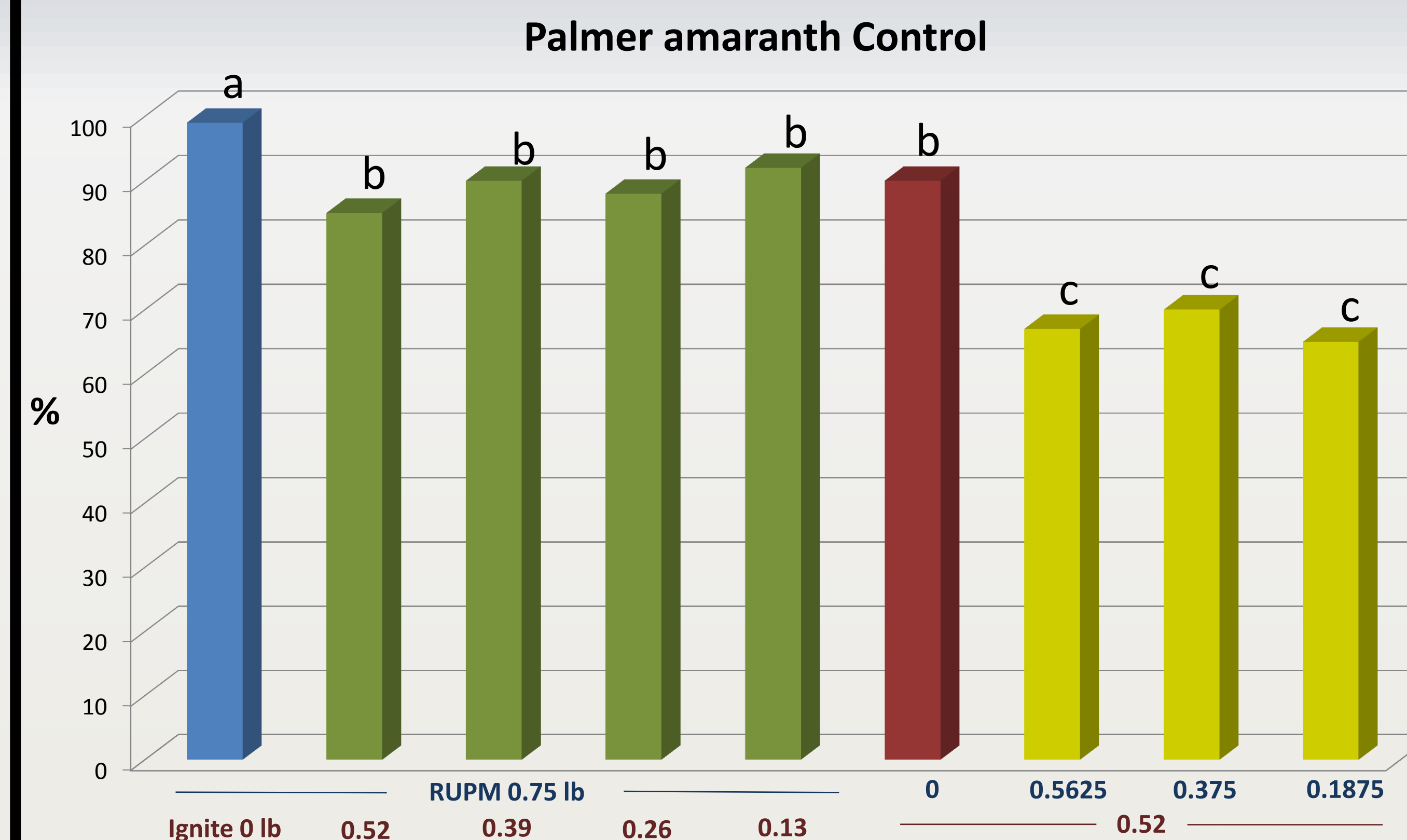


Fig 1: Palmer amaranth control with RUPM, Ignite, and tank-mixes 14 days after application.



A – Palmer amaranth control 14 DAT with RUPM alone and B – Palmer amaranth control 14 DAT with 0.75 lbs ae RUPM + 0.52 lbs ai Ignite in 2010.

### Field – 2011

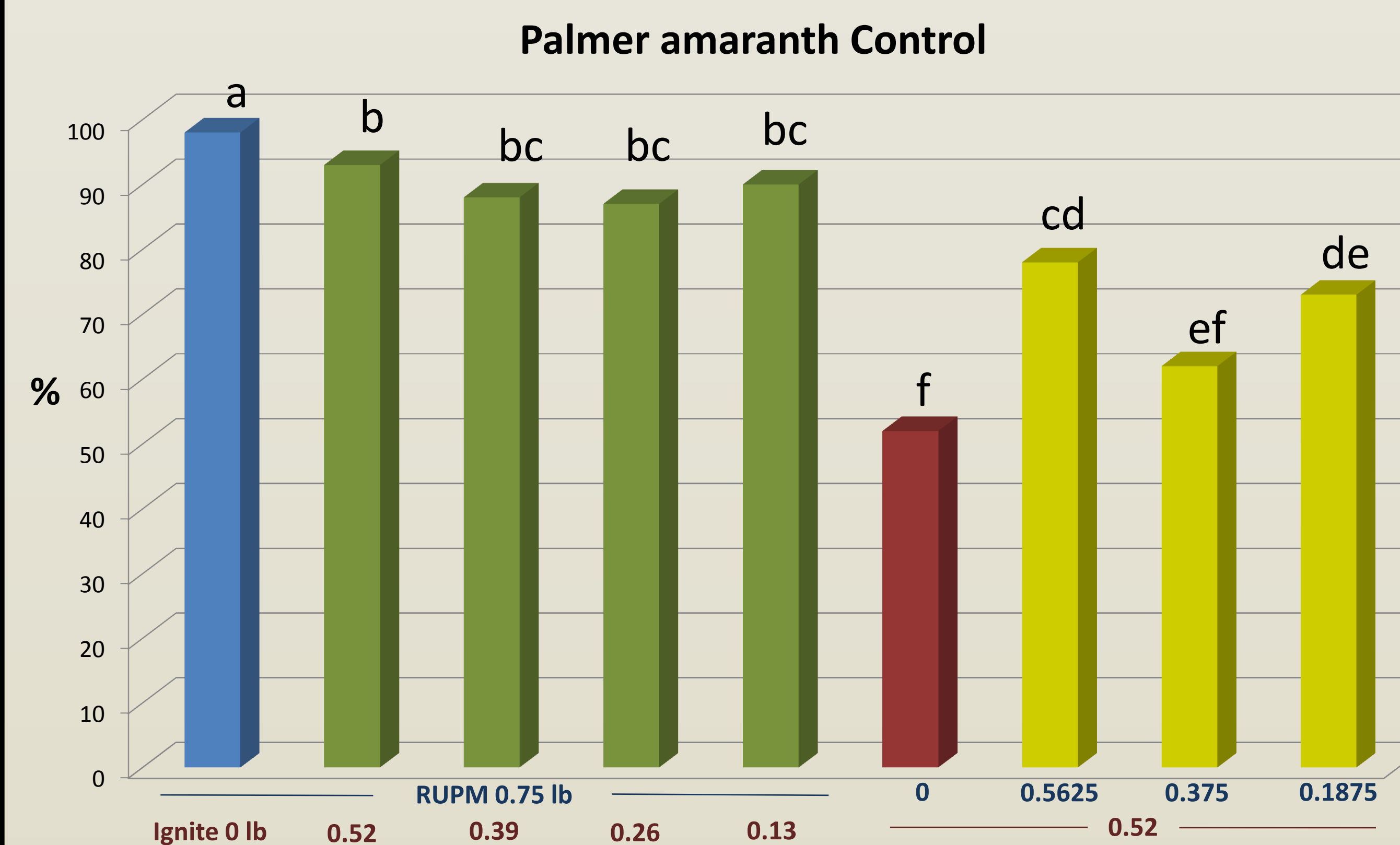


Fig 2: Palmer amaranth control with RUPM, Ignite, and tank-mixes 14 days after application.



C – Palmer amaranth control 14 DAT with RUPM alone and D – Palmer amaranth control 14 DAT with 0.75 lbs ae RUPM + 0.52 lbs ai Ignite in 2011.

## Greenhouse

### Palmer amaranth Control

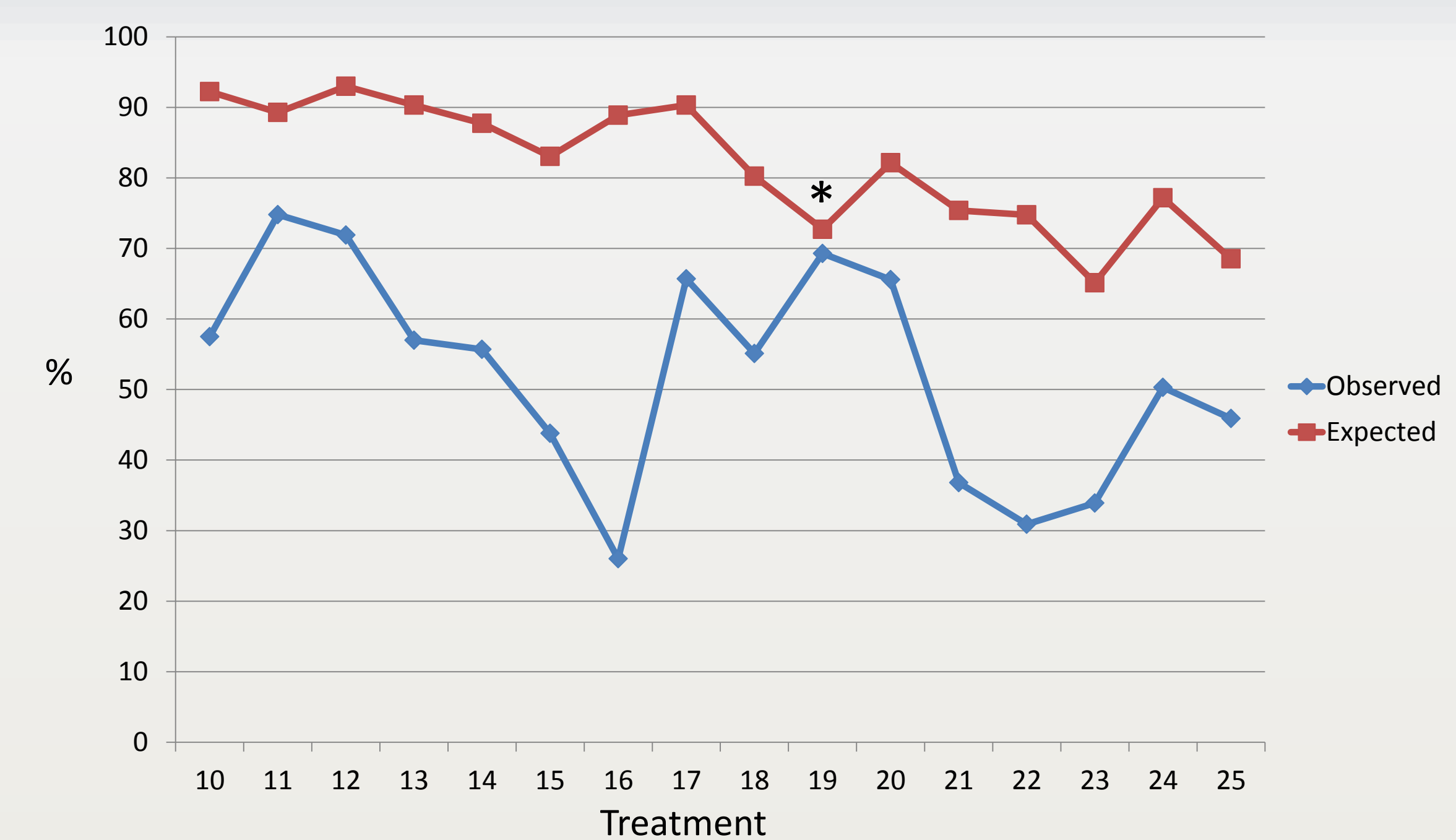


Fig 3: Observed vs. expected Palmer amaranth control with tank mixtures of RUPM and Ignite. \*Indicates no significant difference between observed and expected at  $\alpha = 0.05$ .

- Expected percent growth values for herbicide mixtures calculated using Colby's method ( $E = X+Y-(XY/100)$ ) (Colby 1967).
- Augmented mixed-model methodology used to determine significant differences between observed and expected % growth values (Blouin et al. 2010).
- All tank-mix treatments except treatment 19 (RUPM 0.375 + Ignite 0.39) provided less control than expected.
- Tank mixtures of RUPM and Ignite were highly antagonistic on Palmer amaranth in greenhouse studies.

## Summary and Conclusions

- The addition of any rate of Ignite to RUPM reduced Palmer amaranth control compared to RUPM alone.
- Antagonism observed in the field was confirmed in greenhouse studies.
- These results indicate that tank-mixing RUPM and Ignite will result in decreased Palmer amaranth control in the Texas High Plains and likely other regions.
- RUPM or Ignite should be applied in sequential applications and not tank-mixed to manage Palmer amaranth.

## References

- Blouin, D., E. Webster, and J. Bond. 2010. On a method of analysis for synergistic and antagonistic joint-action effects with fenoxaprop mixtures in rice (*Oryza sativa*). *Weed Technol.* 24:583-589.
- Colby, S.R. 1967. Calculating synergistic and antagonistic responses of herbicide combinations. *Weeds.* 15:20-22.

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