

Introduction

Glyphosate-resistant (GR) volunteer corn (*Zea mays*) (VC) is a common weed escape in soybean fields, as corn is grown in rotation with soybean in the Midwest.

ACCase inhibitor herbicides are known for their good control on VC in post-emergence applications.¹ However, antagonistic interactions have been reported when they are applied in tank-mixtures with growth regulators.²

Yet, there is limited information on the efficacy of tank-mixtures of clethodim and dicamba on VC (F1).

Hypothesis

Interactions in this tank-mixture, associated with different growth stages, droplet size spectra, and use of non-ionic surfactant (NIS), may affect VC control.

Objectives

To evaluate the effects of this tank-mixture on VC control at different growth stages, using different droplet size spectra, with and without the use of NIS.

Materials and Method

Greenhouse trial

- Randomized complete block design:
 - ✓ 10 x 4 factorial arrangement
 - ✓ 5 replications spatially and 2 repetitions temporally
- Treatments:
 - ✓ Clethodim: 12.8 and 34 g ai ha⁻¹
 - ✓ Dicamba: 280 g ae ha⁻¹
 - ✓ Clethodim + Dicamba: 12.8 g ai ha⁻¹ + 280 g ae ha⁻¹
34 g ai ha⁻¹ + 280 g ae ha⁻¹
 - ✓ With and without NIS at 0.25% v v⁻¹
- XR, TT, AIXR, TTI 11004. 140 L ha⁻¹, 276 KPa, 17 km h⁻¹
- Plant height: 25 and 38 cm

Field trial

- Randomized complete block design:
 - ✓ 4 replications spatially and 1 repetition temporally
- Treatments:
 - ✓ Clethodim: 76.8, 102 and 136 g ai ha⁻¹
 - ✓ Dicamba: 560 g ae ha⁻¹
 - ✓ Clethodim + Dicamba: 76.8 g ai ha⁻¹ + 560 g ae ha⁻¹
102 g ai ha⁻¹ + 560 g ae ha⁻¹
136 g ai ha⁻¹ + 560 g ae ha⁻¹
 - ✓ With DRA (drift retardant agent) at 0.5% v v⁻¹
 - ✓ With and without NIS at 0.25% v v⁻¹
- TTI 11002. 140 L ha⁻¹, 276 KPa, 6.2 km h⁻¹
- Plant height: 30, 60 and 90 cm

Plants were rated until 28 days after treatment (DAT) and then harvested for biomass evaluation.

Data were subjected to ANOVA and means were separated using Fisher's Protected LSD test with Tukey adjustment at $\alpha = 0.05$.

Colby's Equation was used to determine the type of interaction occurred.

Results and Discussion

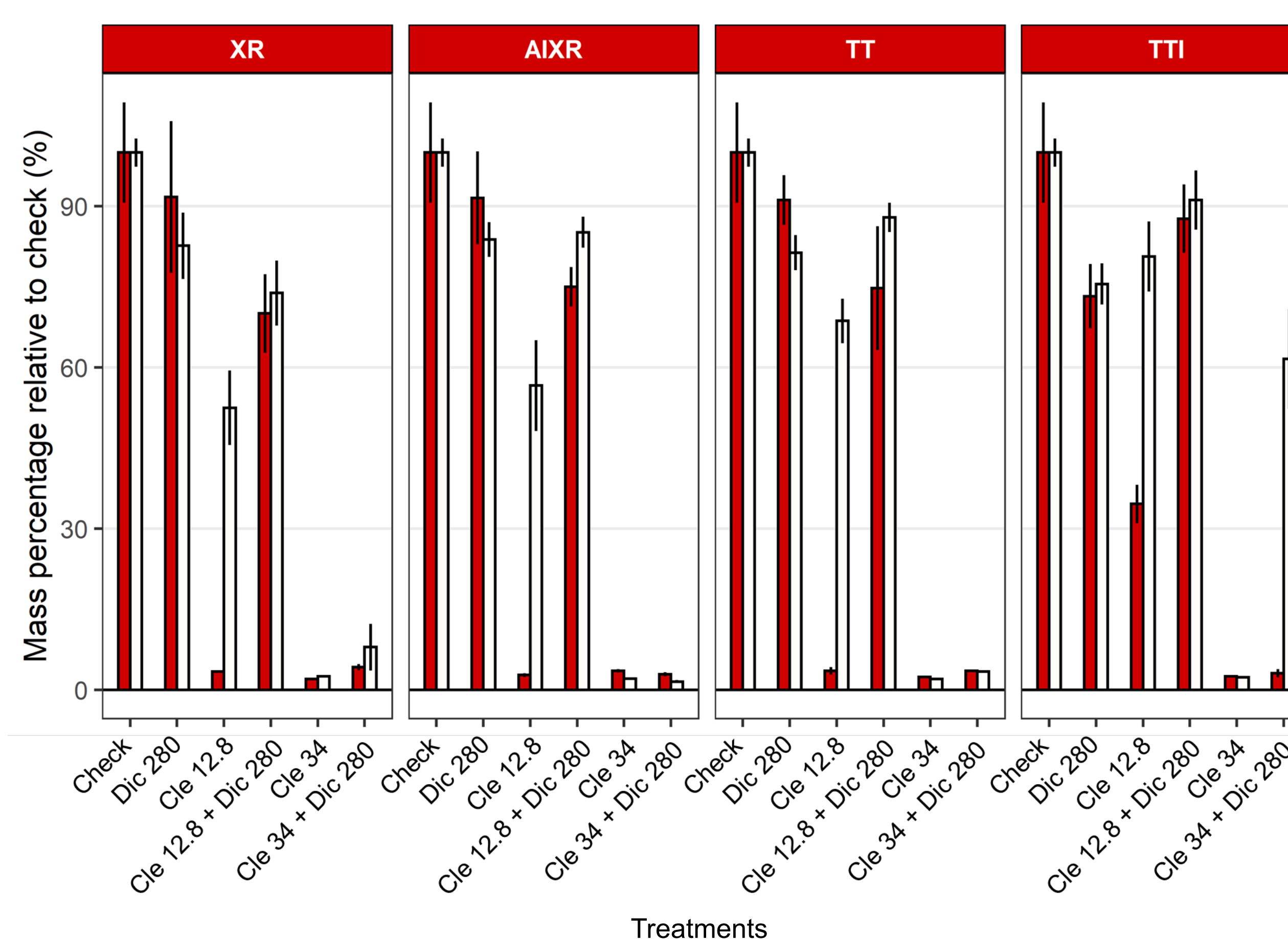


Figure 1: greenhouse results from plants sprayed at V2 stage (25 cm).

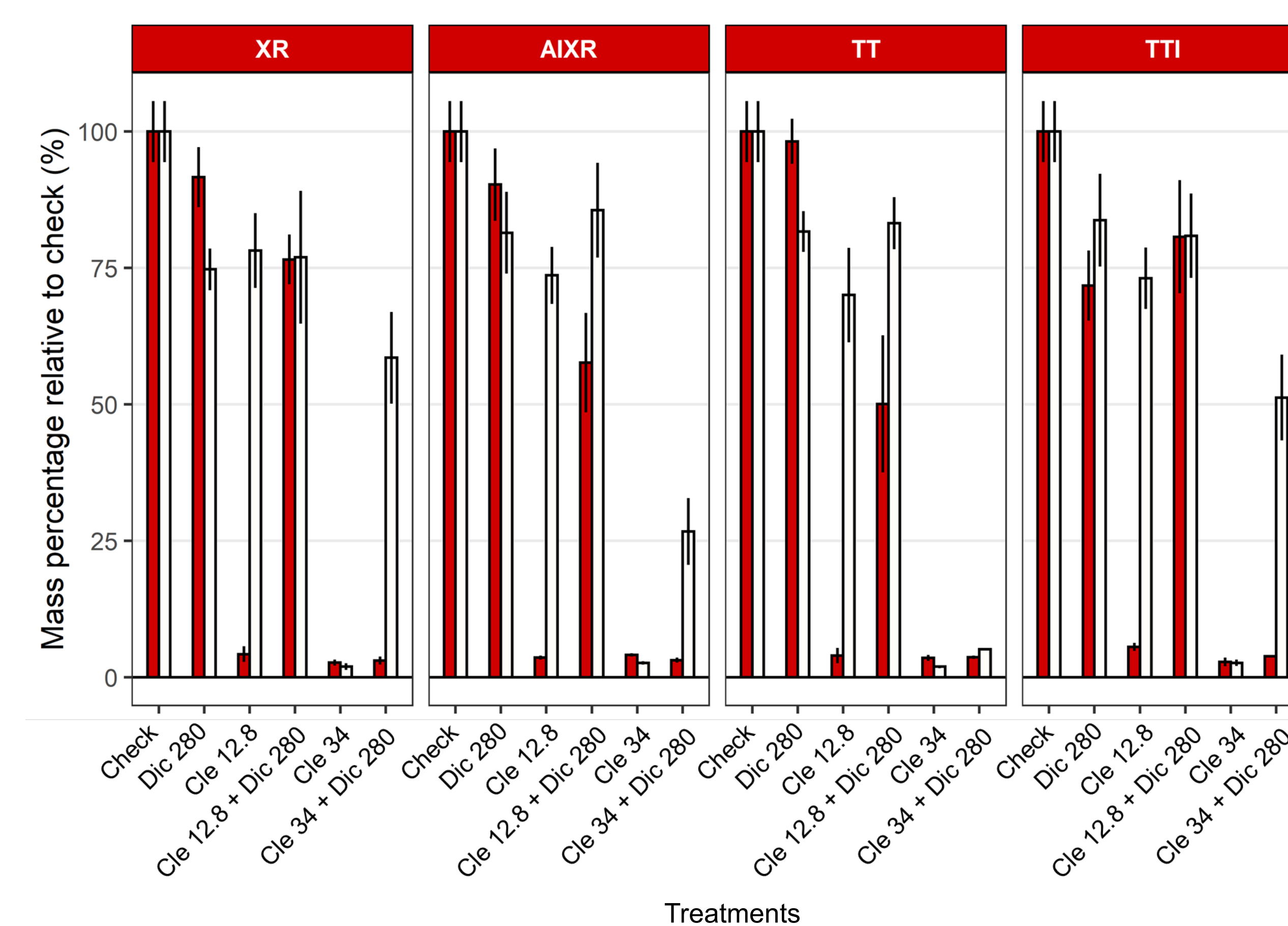


Figure 2: greenhouse results from plants sprayed at V3 stage (38 cm).

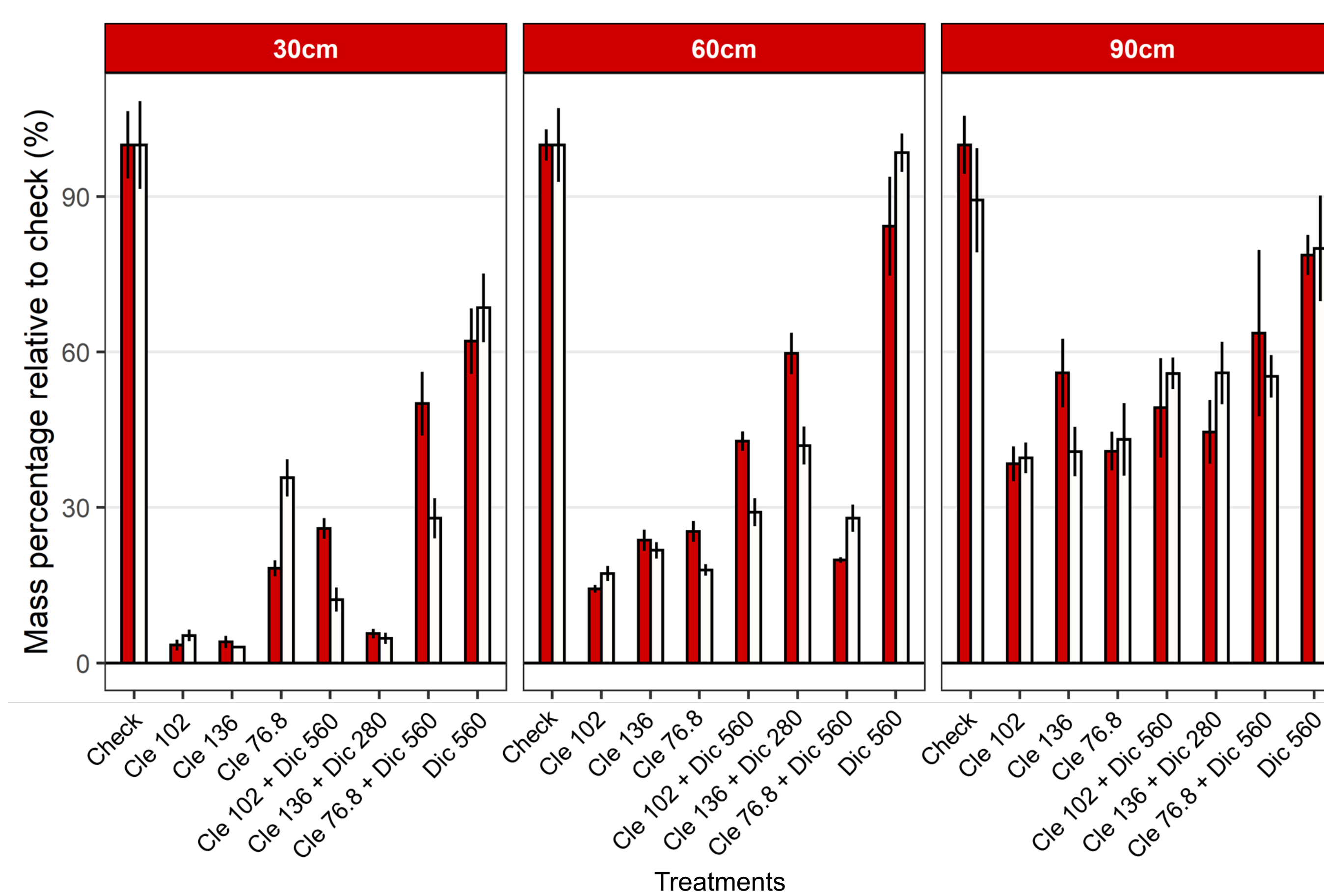


Figure 3: field results from plants sprayed at 30, 60 and 90 cm

■ With NIS □ Without NIS

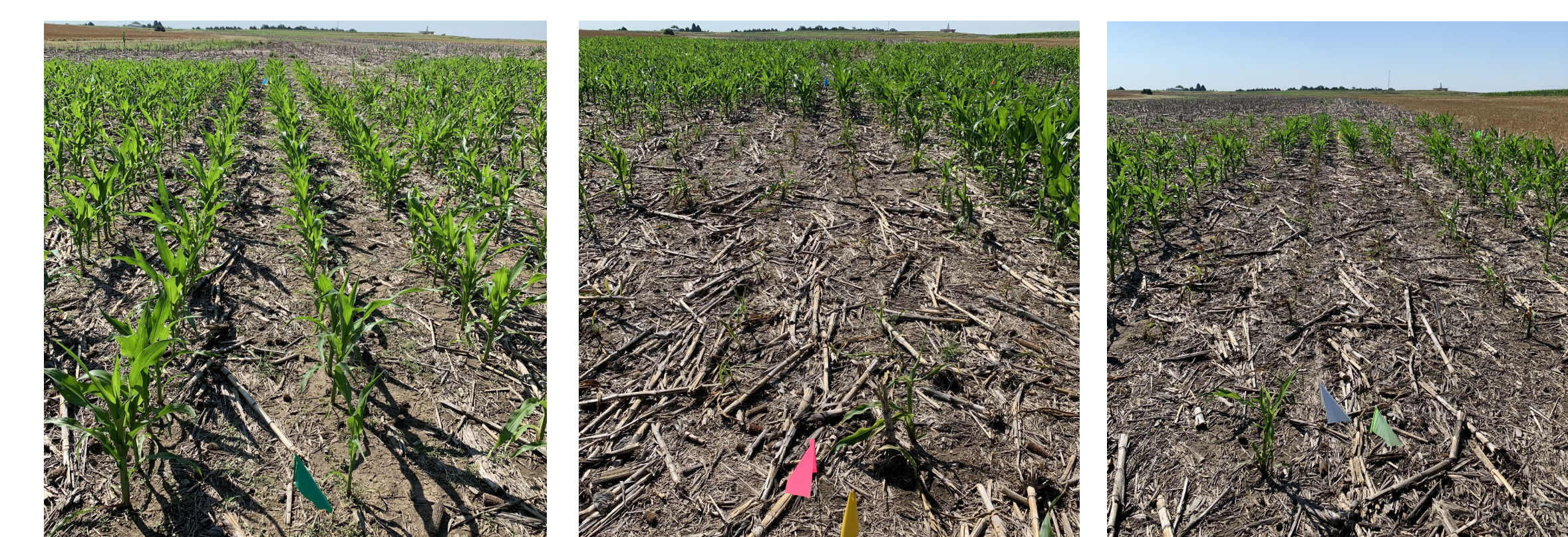


Figure 4, 5, 6: plants sprayed at 30 cm with clethodim 136 g ai ha⁻¹ + dicamba 560 g ae ha⁻¹, 14 DAT. Check, without NIS, with NIS.



Figure 7, 8, 9: plants sprayed at 60 cm with clethodim 136 g ai ha⁻¹ + dicamba 560 g ae ha⁻¹, 14 DAT. Check, without NIS, with NIS

Conclusions

Greenhouse

- ✓ The highest dose of clethodim (34 g ai ha⁻¹ + dicamba 280 g ae ha⁻¹) overcame the antagonism and provided an adequate control (> 70%);
- ✓ Early stage plants applications (25 cm) had greater control;
- ✓ Smaller droplet sizes (XR, TT) had greater control compared to larger droplets (AIXR, TTI).

Field

- ✓ The highest dose of clethodim (136 g ai ha⁻¹ + dicamba 560 g ae ha⁻¹) overcame the antagonism and provided an adequate control (> 70%), but only on the early stage plants (30 cm) sprayed.

Future Research

Investigate the use of adjuvants to mitigate the antagonism in dicamba and clethodim tank-mixture and therefore improve VC control on dicamba-tolerant soybean.

References

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