Weed control from dicamba plus glufosinate as affected by drift-reducing adjuvants and carrier volume

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Introduction

- Drift-reducing adjuvants (DRAs) have been commonly used in dicamba applications (Anonymous, 2016).
- Dicamba tank-mixed with glufosinate is important to reduce evolution of herbicide-resistant weeds.
- Our hypothesis is that DRAs may affect weed control depending on the carrier volume and nozzle type.

Objective

- Evaluate weed control from dicamba plus glufosinate tank-mixed with different DRAs using two carrier volumes and nozzle types.

Materials and Methods

- Study conducted under greenhouse conditions
- 6 x 2 x 2 split-split-plot arrangement in a RCB design
  - 6 herbicide solutions - 2 carrier volumes - 2 nozzle types
  - 6 replications
- Herbicide solution
  - dicamba plus glufosinate (186 g ae ha^{-1} plus 218 g ai ha^{-1})
- Adjuvants
  - polyethoxylated hydroxyl aliphatics (PEHA – 0.25% v v^{-1})
  - polyethylene glycol (PEG – 0.5% v v^{-1})
  - polyvinyl polymer (PVP – 0.5% v v^{-1})
  - surfactant blend (SB – 0.5% v v^{-1})
  - sodium polycarbox (SPC – 0.625% v v^{-1})
- Applications made using a spray chamber
  - 140 and 187 L ha^{-1}
  - TTI 11004 and ULD 12004 at 276 kPa
  - 51 cm nozzle spacing and boom height

TTI11004

ULD12004

- Weed species
  - common waterhemp (*Amaranthus rudis*)
  - kochia (*Bassia scoparia*)

- Dry weight recorded at 21 DAT
- Data subjected to ANOVA
  - Means compared using Tukey's test at α = 0.05

Results

Table 1. Biomass reduction of kochia treated with dicamba plus glufosinate tank-mixed with DRAs sprayed through two nozzle types.

Nozzle	Adjuvant					
	none	PEG	SB	PVP	SPC	PEHA
	----------%----------					
TTI 11004	66.0bA	72.6abA	69.5bA	69.0bA	82.5aA	78.7abA
ULD 12004	72.2abA	82.6aA	79.1aA	79.2aA	82.7aA	61.4bB

Means followed by the same letter, lower case in the row and upper case in the column, do not differ using Tukey's test at α = 0.05.
PEG - polyethylene glycol; SB - surfactant blend; PVP - polyvinyl polymer; SPC - sodium polycarbox; PEHA - polyethoxylated hydroxyl aliphatics.

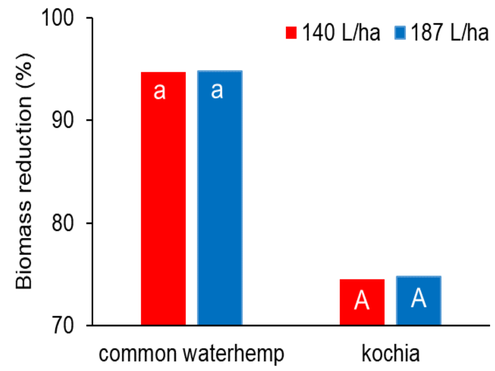

Fig 3. Biomass reduction of weeds treated with dicamba plus glufosinate using two carrier volumes. Bars with the same letter do not differ using Tukey's test at α = 0.05.

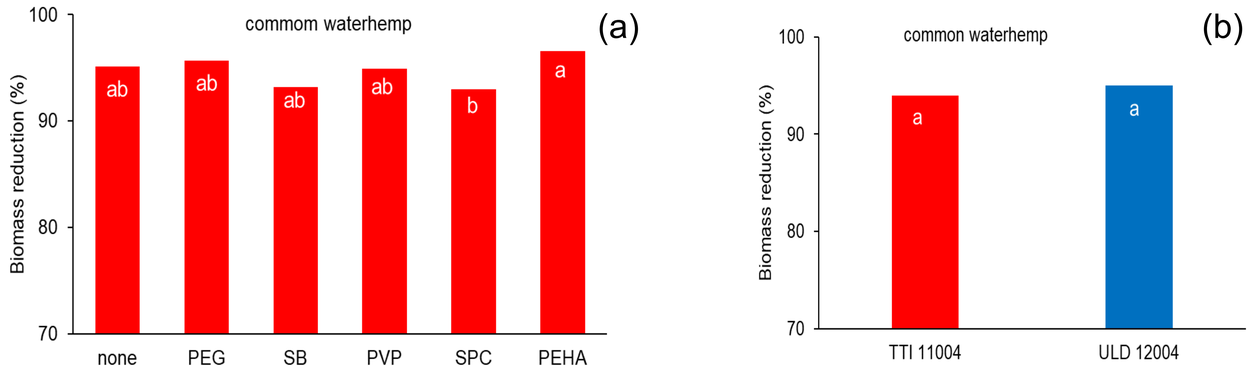

Fig 4. Biomass reduction of c. waterhemp treated with dicamba plus glufosinate using different DRAs (a) and nozzle types (b). Bars with the same letter do not differ using Tukey's test at α = 0.05.

Fig 5. Effect of DRAs on kochia at 21 DAT using 140 L ha^{-1} through ULD 12004 (left) and TTI 11004 (right).

Discussion & Conclusions

- No significant interaction between factors was observed for c. waterhemp control. A significant interaction between adjuvant and nozzle was observed for kochia control.
- Control of c. waterhemp and kochia was not affected by reducing the carrier volume in dicamba plus glufosinate applications. Drift-reducing adjuvants influenced weed control depending on the weed species and nozzle type.

Future Research

- Evaluate more nozzle types, carrier volumes, and weed species.

References

- Anonymous, 2016. Xtendimax® herbicide label. https://cpb-us-w2.wpmucdn.com/u.osu.edu/dist/7/3461/files/2017/01/Xtendimax-overall-label-2f57grt.pdf (accessed Oct. 26, 2019).

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