

Weed Control and Response of Dicamba-resistant Soybean to a Premix of Dicamba and Pyroxasulfone

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Introduction

- Producers in Nebraska and across North America are combating mounting herbicide-resistant weed populations.
- In 2017, Nebraska produced 3.3 billion bushels of soybean on 5.7 million acres at a production value of three billion dollars.
- In 2017, dicamba-resistant soybean came to the market with an intent to improve broadleaf weed control using dicamba.
- Dicamba-based premixes are under development and need to be tested to evaluate efficacy and crop safety.

Objective

To measure weed control of *Amaranthus spp.* (pigweeds), velvetleaf, and common lambsquarters and dicamba-resistant soybean response to a premix of dicamba and pyroxasulfone.

Materials and Methods

- In 2018, field research was conducted at the University of Nebraska-Lincoln at South Central Agricultural Laboratory near Clay Center, Nebraska.
- 15 herbicide treatments, including a nontreated control, were laid out in a randomized complete block design with four replications.
- PRE herbicide application was made the day of planting, followed by POST application at the following soybean growth stages: V1 (early), V4 (mid), and V6 (late).
- Weed control ratings of pigweeds, velvetleaf, and common lambsquarters were taken visually at 14, 28, 35, 42, 56, and 70 days after planting
- Above ground biomass of weeds was harvested from two 0.5 m² quadrats at 60 days after the final POST application and dry weight was recorded. Dry weight was converted to percent biomass reduction and compared to nontreated control.
- Data were analyzed in R software

Code	Herbicide Treatments	Trade Name	Timing	Rate (g ai ha ⁻¹)
1	nontreated control	-	-	-
2	dicamba + pyroxasulfone + glyphosate	Zidua SC + Engenia + Roundup	early POST	77+560+1260
3	dicamba + pyrox + gly fomesafen + gly	Zidua SC + Engenia + Roundup Flexstar GT	early POST late POST	77+560+1260 1610
4	dicamba + pyrox + gly fomesafen + gly + dimethenamid-P	Zidua SC + Engenia + Roundup Flexstar GT + Outlook	early POST late POST	77+560+1260 1610+525
5	dicamba + pyrox + gly glyphosate	Zidua SC + Engenia + Roundup Roundup PowerMAX	early POST late POST	77+560+1260 1260
6	dicamba + pyrox + gly gly + dimeth-P	Zidua SC + Engenia + Roundup Roundup PowerMAX + Outlook	early POST late POST	77+560+1260 1260+525
7	dicamba + pyrox + imazethapyr + saflufenacil + gly dicamba + gly	Zidua PRO + Engenia + Roundup Engenia + Roundup	PRE mid POST	161+560+1260 560+1260
8	dicamba + pyrox + imaz + saflu + gly dicamba + gly	Zidua PRO + Engenia + Roundup Engenia + Roundup	PRE mid POST	161+560+1260 560+1260
9	pyrox + imaz + saflu + gly dicamba + gly	Zidua PRO + Roundup Engenia + Roundup	PRE mid POST	215+1260 560+1260
10	pyrox + imaz + saflu + gly dicamba + pyrox + gly	Zidua PRO + Roundup Zidua SC + Engenia + Roundup	PRE mid POST	215+1260 77+560+1260
11	dicamba + pyrox + imaz + saflu + gly dicamba + pyrox + gly	Zidua PRO + Engenia + Roundup Zidua SC + Engenia + Roundup	PRE mid POST	215+560+1260 77+560+1260
12	dicamba + pyrox + gly dicamba + pyrox + gly	Zidua SC + Engenia + Roundup Zidua SC + Engenia + Roundup	early POST mid POST	77+560+1260 77+560+1260
13	dicamba + pyrox	Zidua SC + Engenia	PRE	77+560
14	dicamba + pyrox dicamba + pyrox	Zidua SC + Engenia Zidua SC + Engenia	PRE mid POST	77+560 77+560
15	dicamba dicamba	Engenia Engenia	mid POST late POST	560 560



Nontreated control



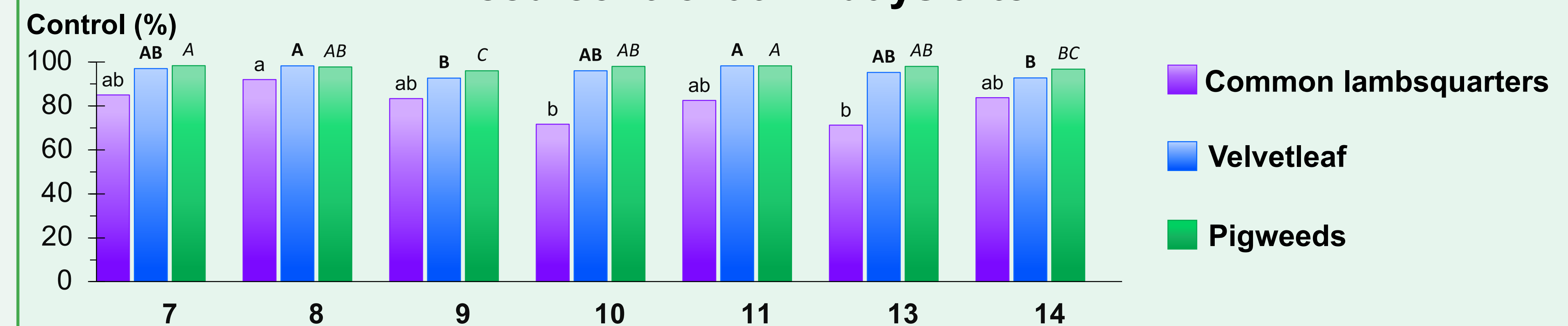
PRE: Zidua Pro + Engenia + Roundup Powermax
mid POST: Engenia + Roundup Powermax



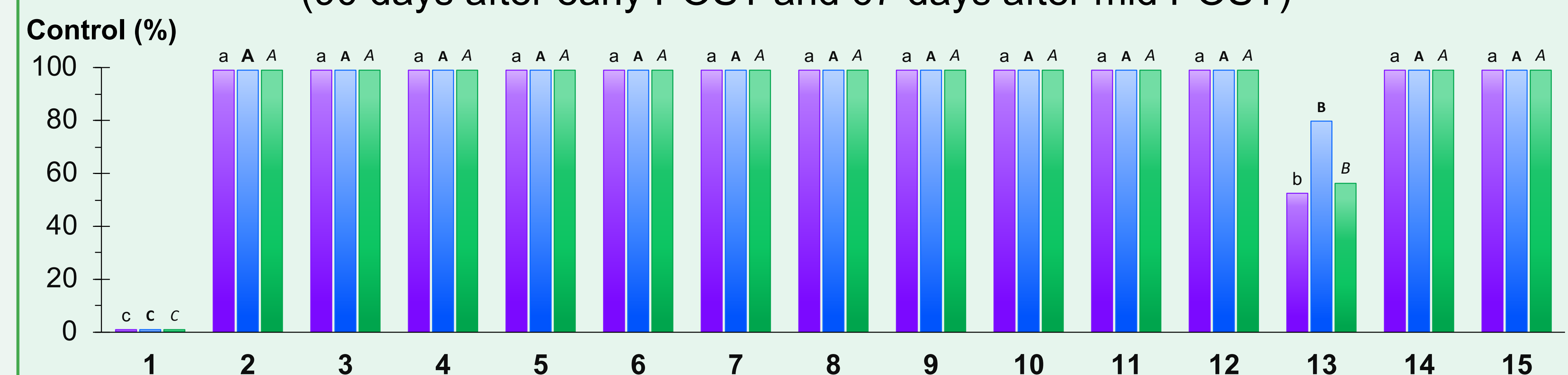
PRE: Zidua SC + Engenia

Results

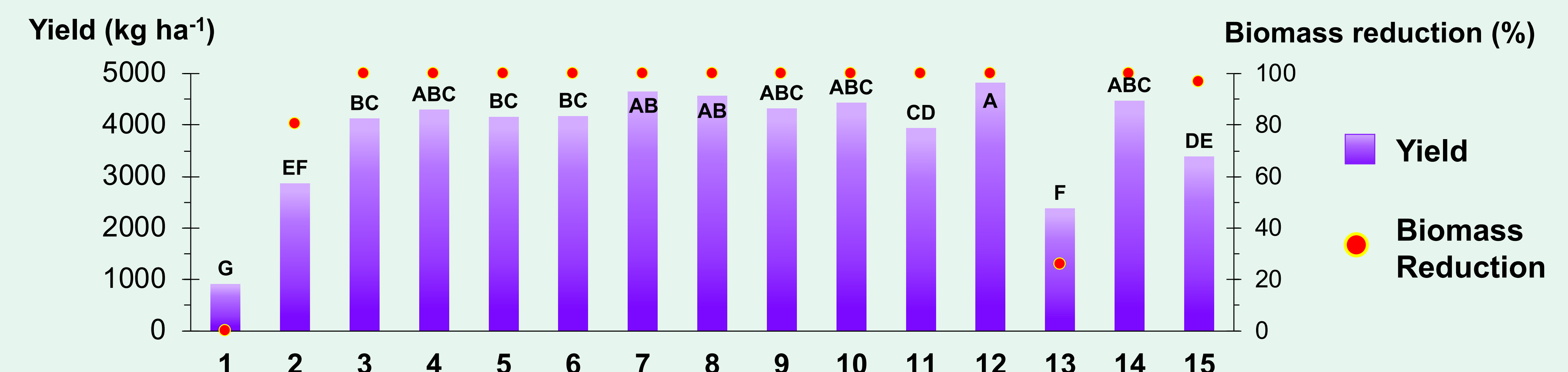
Weed control at 14 days after PRE



Weed control at 100 days after planting (90 days after early POST and 67 days after mid POST)



Soybean yield and weed biomass reduction



Discussion

- PRE herbicide tank-mixes with and without dicamba provided similar control: Pigweeds (96-98%), velvetleaf (92-98%), and common lambsquarters (71-92%) at 14 DA PRE.
- All PRE followed by POST programs provided 99% control of pigweeds, velvetleaf, and common lambsquarters and 100% weed biomass reduction at 100 days after planting and yields from 3,939 to 4,828 kg ha⁻¹
- Pyroxasulfone plus dicamba applied PRE provided control for pigweeds (52%), velvetleaf (79%), and common lambsquarters (56%) at 100 days after planting, 25% biomass reduction, and yield 2382 kg ha⁻¹.
- Early-POST application of pyroxasulfone plus dicamba plus glyphosate resulted in 99% control of pigweeds, velvetleaf, and common lambsquarters at 100 days after planting, 80% biomass reduction, and yield of 2868 kg ha⁻¹.
- Sequential POST applications of dicamba achieved 99% control of pigweeds, velvetleaf, and common lambsquarters at 100 DA planting, 97% biomass reduction, and yield of 3386 kg ha⁻¹.

Conclusions and Future Research

- Results of this study suggest the pre-mix of pyroxasulfone plus dicamba utilized in a PRE followed by POST or sequential POST herbicide programs is an effective tool for the control of pigweeds, velvetleaf, and common lambsquarters.
- This project will be repeated in the summer of 2019 at the same location.
- Premix of dicamba and pyroxasulfone will be compared with other premixes.

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