Comparison of Herbicide Programs in Conventional, Glufosinate, and Glyphosate/Dicamba-Resistant Soybeans Across Nebraska

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INTRODUCTION

- Facing low commodity prices soybean producers in Nebraska have shown interest in growing conventional soybeans to reduce seed costs.
- Many producers are concerned about the efficacy of conventional herbicide programs in comparison to programs in herbicide-resistant (HR) varieties.
- The use of strong PREs provide the best opportunity for season-long weed control, higher grain yield and net returns in both conventional and HR soybean varieties (Rosenbaum et al. 2013).

OBJECTIVES & HYPOTHESIS

OBJECTIVE: Evaluate different PRE fb POST herbicide programs for weed control, crop safety and yield reductions in conventional, glufosinate (LibertyLink) and glyphosate/dicamba-resistant (RR2X) soybean varieties.

HYPOTHESIS: Across PRE fb POST programs, soybeans receiving conventional POST herbicides will have lower weed biomass/density reductions and higher yield reductions.

MATERIALS & METHODS

LOCATIONS: Field experiments were conducted in 2018 at five University of Nebraska–Lincoln Research and Education centers (Figure 1).
- Weed pressure was predominately Amaranthus spp. (AMAPA, AMATA), Abutilon theophrasti, and Chenopodium album.

EXPERIMENTAL DESIGN:
Split-plot design with four replications.
- Main-plot– PRE herbicides with three sites of action (Table 1).
- Sub-plot– Soybean varieties with POST herbicides based on HR-trait (Table 2).

DATA COLLECTION:
- 14 and 28 d after PRE/POST applications—
  - Visual assessment of weed control from 0 to 100%.
  - Weed biomass and density using two 0.5 m² quadrants.
  - Visual assessment of crop injury from 0 to 100%.

DATA ANALYSIS:
- Data were analyzed in R (3.5.2) using the sp.plot function in agricolae.
- ANOVA was conducted with means separated using protected Fisher’s LSD.

RESULTS

WEED BIOMASS REDUCTION:
- All PREs provided 95 to 99% reduction at 28 d after PRE.
- Most POSTs provided >95% reduction at 28 d after POST (Figure 2).

WEED DENSITY REDUCTION:
- Within locations, most PRE programs preformed similarly on density reduction at 28 d after PRE (Figure 3).
- Conventional POSTs provided 83% weed density reduction at 28 d after POST.
- Dicamba, glyphosate, and glufosinate provided 91 to 96% density reductions at 28 d after POST.

CROP INJURY:
- No injury to crop at 28 d after PRE.
- 12.5% and 18.7% injury at 28 d after POST for LibertyLink and conventional soybeans respectively at Clay Center and Concord.

SOYBEAN YIELD REDUCTION:
- Most PRE programs preformed comparably within locations (Figure 4).
- Dicamba plus glyphosate provided lowest yield reductions across locations (Figure 5).

CONCLUSIONS & DISCUSSION

- PRE– Most PRE programs provided similar weed biomass and weed density reductions within locations.
- PRE– All PRE programs decreased yield reductions by >75% in comparison to the weed free check.
- POST– Conventional program provided comparable weed biomass reduction and yield reductions at Concord and Scottsbluff, agreeing with Owen et al. 2010.
- POST– Conventional program provided lower density reductions across all locations and lower biomass reduction and higher yield reductions at Clay Center, agreeing with Rosenbaum et al. 2014.
- OVERALL– Fail to reject null hypothesis due to mixed location results. Further study is required.

FUTURE DIRECTION

- This study will be replicated again in 2019, and cost analysis on treatments will be conducted to determine the most economic and effective management strategies.

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REFERENCES

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