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INTRODUCTION

- Glyphosate-resistant (GR) horseweed is a major concern for no-till soybean production throughout the Midwest.
- Preplant applications of synthetic auxin herbicides are commonly used to control GR horseweed.
- Halauxifen-methyl is a new synthetic auxin active ingredient, which controls horseweed at low use rates (5 g ae ha⁻¹).

HYPOTHESIS

- Halauxifen effectively controls GR horseweed in preplant applications and is an important addition to existing herbicide programs.

OBJECTIVE

- To evaluate the efficacy of preplant herbicide programs using halauxifen compared to existing herbicide programs for GR horseweed control.

MATERIALS AND METHODS

- Field experiments were conducted in 2015 and 2016 at three locations with GR horseweed: Brookston, IN; Cortland, IN; and Lafayette, IN.
- The following herbicide programs were applied to horseweed plants 13 to 20 cm tall, 14 days prior to soybean planting:

Treatment	Rate (g ha ⁻¹)
non-treated	-
2,4-D	560
dic*	280
gly*	1120
glu*	594
hal*	5
2,4-D + hal	560 + 5
2,4-D + gly	560 + 1120
2,4-D + gly + metri*	560 + 1120 + 210
2,4-D + gly + saflu*	560 + 1120 + 37.4
gly + saflu	1120 + 37.4
dic + gly	280 + 1120
gly + hal	1120 + 5
dic + hal	280 + 5
cloran* + gly + hal	17.7 + 1120 + 5
cloran + flumi* + gly + hal	25.25 + 75.75 + 1120 + 5
cloran + gly + hal + sulf*	24.83 + 1120 + 5 + 195.17
cloran + flumi + glu	25.25 + 75.75 + 594
chlori* + flumi + glu	21.9 + 63 + 594

*Abbreviations: chlori: chlorimuron-ethyl; cloran: cloransulam-methyl; dic: dicamba; flumi: flumioxazin; gly: glyphosate; glu: glufosinate; hal: halauxifen-methyl; metri: metribuzin; saflu: saflufenacil; sulf: sulfentrazone.

- Visual estimates of horseweed control and crop injury were collected at 35 days after treatment (DAT).
- Horseweed density and soybean stands were counted at 35 DAT.
- Plots were harvested for soybean grain yield.
- Data were analyzed using PROC MIXED with SAS 9.4 for mean separation. A contrast of herbicide programs with halauxifen vs. no halauxifen was also tested.

RESULTS AND DISCUSSION

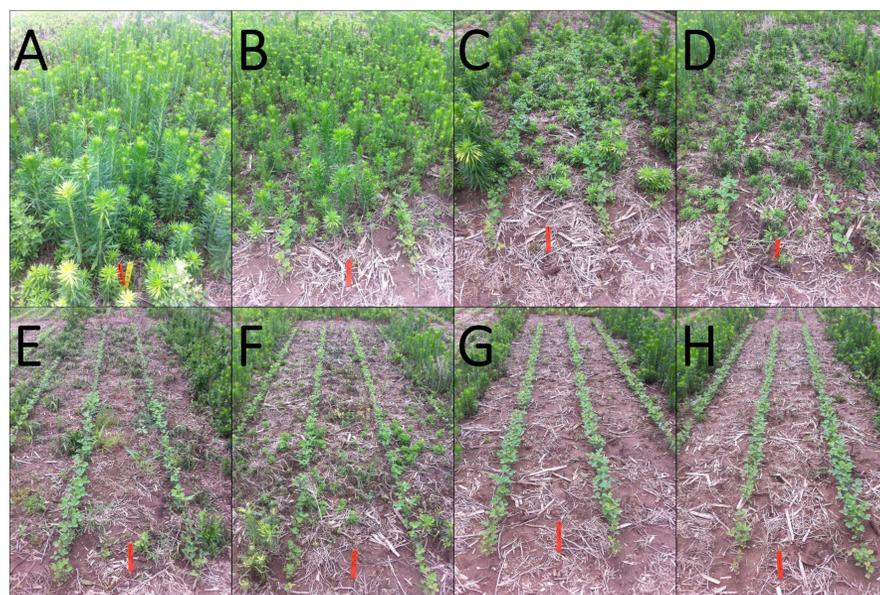


Figure 1. – A: non-treated; B: gly (1120 g ha⁻¹); C: glu (594 g ha⁻¹); D: 2,4-D (560 g ha⁻¹); E: dic (280 g ha⁻¹); F: hal (5 g ha⁻¹); G: 2,4-D + gly + saflu (560 g ha⁻¹ + 1120 g ha⁻¹ + 37.4 g ha⁻¹); H: dic + hal (280 g ha⁻¹ + 5 g ha⁻¹) – Horseweed control 35 DAT at Cortland, IN (2015).

- 2,4-D, glyphosate, and glufosinate alone, as well as some of their tank mixtures (chlori + flumi + glu, cloran + flumi + glu, 2,4-D + gly, 2,4-D + gly + metri), resulted in GR horseweed control ≤82% and showed greater variability across locations (Fig. 2).
- Treatments containing halauxifen resulted in GR horseweed control ≥ 87%, with lower variability across locations (Fig. 2).

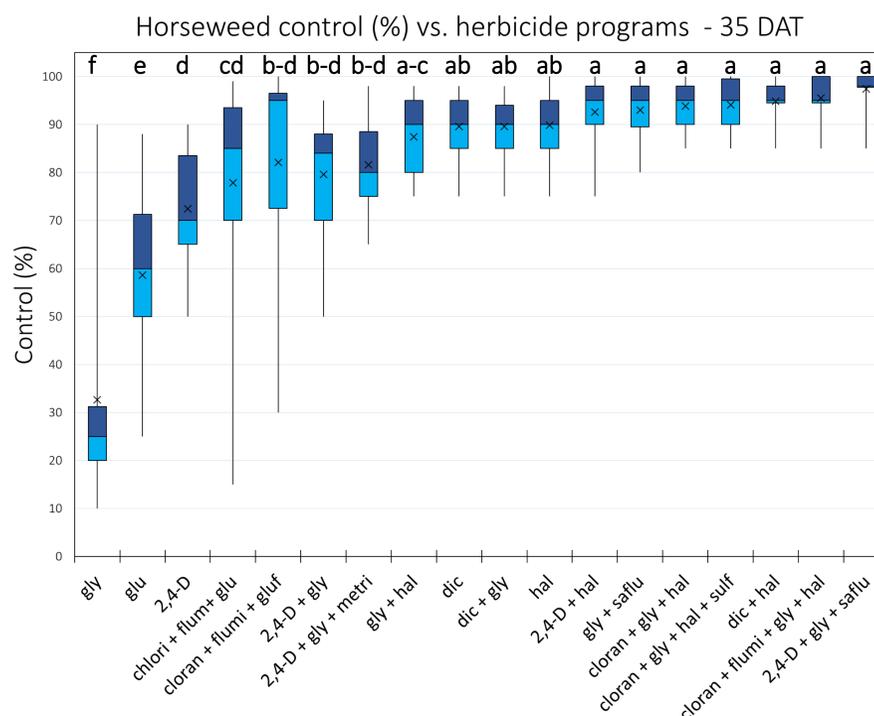


Figure 2. – Boxplot for GR horseweed control at 35 DAT. Data were pooled across locations.

RESULTS AND DISCUSSION

Table 1. – Horseweed density (m²) at 35 DAT (all sites combined).

Treatment	Weed density (m ²)
non-treated	125 a
gly	103 ab
2,4-D	71 bc
gly + hal	48 cd
glu	47 c-e
2,4-D + gly	44 c-f
dic + gly	38 d-g
dic	34 d-h
hal	29 d-h
2,4-D + hal	24 d-h
2,4-D + gly + metri	19 d-h
cloran + gly + hal + sulf	16 d-h
dic + hal	16 d-h
chlori + flumi + glu	14 e-h
cloran + flumi + gly + hal	12 f-h
cloran + gly + hal	11 f-h
cloran + flumi + glu	8 gh
gly + saflu	4 h
2,4-D + gly + saflu	1 h

- In addition, treatments containing dicamba or saflufenacil resulted in ≥89% and ≥93 control of GR horseweed, respectively.
- A contrast comparing the efficacy of herbicide programs utilizing halauxifen against current herbicide programs was significant with an increase of 15% in GR horseweed control.
- Horseweed density at 35 DAT did not correspond to the visual control ratings due to the longer period of time required between herbicide application and complete plant death for synthetic auxins.
- Soybean grain yield was lower for the non-treated check (1190 kg ha⁻¹), and glyphosate alone (2750 kg ha⁻¹) treatments.
- Soybean crop injury up to 10% was observed for treatments with dicamba, however, it did not impact soybean yield.
- No crop injury was observed for plots treated with halauxifen.

CONCLUSIONS

- Herbicide programs utilizing halauxifen are a valuable addition for management of GR horseweed prior to soybean planting compared to existing herbicide programs.
- Dicamba and saflufenacil also control GR horseweed in preplant herbicide applications.
- Preplant herbicide applications of glyphosate, glufosinate and 2,4-D alone and some of their tank mixtures did not control GR horseweed.

ACKNOWLEDGMENT

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