Control of Glyphosate-Resistant Giant Ragweed (*Ambrosia trifida* L.) using 2,4-D choline plus Glyphosate-Resistant (Enlist™) Soybean

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Introduction

- Glyphosate–resistant giant ragweed (*Ambrosia trifida* L.) is a problematic and one of the most competitive weeds in soybean.
- Giant ragweed present at a density of 1 plants m^{-2} can cause up to 77% yield loss in soybean (Webster et al. 1994).
- Management of glyphosate-resistant weeds including giant ragweed is the most significant predicament for growers.
- With the intent to control glyphosate-resistant and hard to control weeds, Dow AgroSciences has recently developed a formulation of 2,4-D choline (24.4%) and glyphosate (22.1%), also known as Enlist Duo™, to be used post-emergence in corn and soybean tolerant to Enlist Duo™ in the United States.
- Newly developed 2,4-D choline is a low-volatile form of 2,4-D manufactured using Colex-D™ technology.

Objective

To evaluate efficacy of 2,4-D choline plus glyphosate premix or glufosinate applied early POST (E–POST) followed by late POST (L–POST) applications for control of glyphosate-resistant giant ragweed in soybeans resistant to 2,4-D choline, glyphosate, and glufosinate (Enlist™).

Materials & Methods

- Field study was conducted in a soybean field infested with glyphosate-resistant giant ragweed near McCool Junction, Nebraska in 2013.
- Study was laid out in a randomized complete block design with fifteen herbicide treatments and four replications.
- Each plot was 3.0 m wide and 9.0 m long and consisted of four rows of Enlist™ soybean spaced 0.76 m apart. A minimum of 12 m isolation distance was maintained on the crop borders as per label recommendation
- E-POST herbicide application was made five weeks after planting followed by L-POST herbicide application at 12 d after E-POST using a CO2 pressurized back pack sprayer at a spray volume of 15 gallons $acre^{-1}$.
- Visual control estimates of giant ragweed were collected at 7 and 14 d after E-POST and L-POST herbicide applications on a scale of 0 to 100%, with 0% meaning no control and 100% meaning complete death of weed.
- No aboveground biomass of giant ragweed was observed in any of the herbicide treatment plots except in the nontreated control plots. Soybean crop was destructed at R3 growth stage.
- Data were analyzed in SAS (9.3) using Proc GLIMMIX model.

Trt	Early-POST	Rate-E-POST (g ae or ai/ha)	Late-POST	Rate (L-POST)
1	No	-	No	-
2	Glufosinate	411	Glufosinate	411
3	Glufosinate	542	Glufosinate	542
4	Enlist Duo	1640	Glufosinate	542
5	Enlist Duo	2185	Glufosinate	542
6	Glufosinate	542	Enlist Duo	1640
7	Glufosinate	542	Enlist Duo	2185
8	Glufosinate + 2,4-d choline	411 + 800	Glufosinate + 2,4-d choline	411 + 800
9	Glufosinate + 2,4-d choline	542 + 800	Glufosinate + 2,4-d choline	542 + 800
10	Glufosinate + 2,4-d choline	542 + 1065	Glufosinate + 2,4-d choline	542 + 1065
11	Glufosinate + 2,4-d choline	542 + 1065	Enlist Duo	2185
12	Enlist Duo	2185	Glufosinate + 2,4-d choline	542 + 1065
13	Durango DMA	1120	Durango DMA	1120
14	Enlist Duo	1640	Enlist Duo	1640
15	Enlist Duo	2185	Enlist Duo	2185

Enlist Duo™, 2,4-D choline plus Glyphosate; Durango DMA, Glyphosate

Results and Discussion

- At 14 days after E–POST, glyphosate-resistant giant ragweed was controlled ≥ 99% with all the POST herbicides, except with glyphosate applied alone, used in this study.
- Similarly, at 14 days after L–POST or 28 days after E-POST, all the herbicide treatments controlled GR giant ragweed ≥ 99%.
- Soybean injury (10 to 15%) was observed at 7 and 14 d after E-POST and L-POST application of 2,4-D choline plus glyphosate premix, or 2,4-D choline applied as tank-mix partner with glufosinate; however, no soybean injury was observed at 21 d after application.
- No aboveground biomass of giant ragweed was observed in any of the herbicide treatment plots except in the nontreated control plots.
- Soybean crop was destructed at R3 growth stage.

Trt	Early-POST	Rate-E-POST (g ae/ha)	Late-POST	Rate-L-POST (g ae/ha)	Control (%)			
					7 DAEP	14DAEP	7DALP	14DALP
1	No	-	No	-	0	0	0	0
2	Glufosinate	411(22fl)	Glufosinate	411(22fl)	100a	100a	100a	100a
3	Glufosinate	542 (29fl)	Glufosinate	542 (29fl)	100a	100a	100a	100a
4	Glufosinate	1640	Glufosinate	542 (29fl)	100a	100a	100a	100a
5	Glufosinate	2185	Glufosinate	542 (29fl)	100a	100a	100a	100a
6	Glufosinate	542 (29fl)	Enlist Duo	1640	100a	100a	100a	100a
7	Glufosinate	542 (29fl)	Enlist Duo	2185	100a	100a	100a	100a
8	Glufosinate + 2,4-d choline	411 + 800	Glufosinate + 2,4-d choline	411 + 800	99ab	99ab	100a	100a
9	Glufosinate+ 2,4-d choline	542 + 800	Glufosinate + 2,4-d choline	542 + 800	100a	100a	100a	100a
10	Glufosinate + 2,4-d choline	542 + 1065	Glufosinate + 2,4-d choline	542 + 1065	100a	100a	100a	100a
11	Glufosinate + 2,4-d choline	542 + 1065	Enlist Duo	2185	99ab	99ab	100a	100a
12	Enlist Duo	2185	Glufosinate + 2,4-d choline	542 + 1065	100a	100a	100a	100a
13	Durango DMA	1120	Durango DMA	1120	50b	40b	45b	35b
14	Enlist Duo	1640	Enlist Duo	1640	100a	100a	100a	100a
15	Enlist Duo	2185	Enlist Duo	2185	100a	100a	100a	100a
SE				-	0.54	0.54	0.54	0.54

DAEP, days after early-postemergence; DALP, days after late-postemergence

Conclusions & Implications

- Glyphosate-resistant giant ragweed control was ≥ 99% with the application of E-POST followed by L-POST herbicides, except with glyphosate alone, in this study.
- With giant ragweed having developed resistance to ALS– and EPSP Synthase–Inhibitors, growers need to consider an integrated weed management strategy that includes crop rotation, tillage, rotating different herbicide-tolerant crops, herbicide rotation and use of residual herbicides.
- Dow AgroSciences is promoting the use of soil residual herbicides such as Sonic (cloransulam + sulfentrazone) followed by POST application of Enlist Duo™ as part of a weed resistance management program.
- Enlist™ soybean have tolerance to three modes of action with 2,4-D, glyphosate and glufosinate which provides ability to diversity the mode of actions in the POST applications.

Literature Cited

Webster T.M., Loux M.M., Regnier E.E., and Harrison S.K. 1994. Giant ragweed (*Ambrosia trifida*) canopy architecture and interference studies in soybean. Weed Technology 8:559-564.