

Reevaluating common ragweed control in sugarbeet in Minnesota and North Dakota

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Introduction

Glyphosate resistant (GR) weeds dominate sugarbeet production in Minnesota and North Dakota. Sugarbeet growers attending the 2024 grower seminars categorized GR waterhemp [*Amaranthus tuberculatus* (Moq.) J. D. Sauer] as their most important weed control challenge on 61% of the sugarbeet hectares in Minnesota and North Dakota. GR common ragweed (*Ambrosia artemisiifolia* L.) was identified on 7% of sugarbeet hectares, but was recognized as their most important weed control challenge on 29% of hectares in Trail and Grand Forks counties in North Dakota and Polk, Norman, and Marshall Counties in Minnesota.

Common ragweed may have been too large at clopyralid application (Figure 1) since excessive rainfall in May and June delayed application. Below normal soil temperatures extended ragweed germination and emergence into June and early July (Figure 2). Two times clopyralid at 66 or 79 g ha⁻¹ in combination with glyphosate on common ragweed less than 5 cm (2 lf sugarbeet) and 14 days later is the most frequent control program. Clopyralid must be applied before sugarbeet reach the 8-lf stage or approximately end of May in Minnesota and North Dakota.

Common ragweed emerges in late April and May. Common ragweed must undergo a dormant period from late fall through winter before germinating the following year. Increasing air temperatures promote germination, but soil temperatures above 30C will halt germination and send the seeds back to dormancy until repeating the cold requirement the following winter. There are other accounts for ragweed escapes including biotypes more clopyralid tolerant, concerns about sugarbeet injury from clopyralid, and practice of delaying first clopyralid application until nurse crop termination. Experiments were conducted with sugarbeet growers in Norman County from 2022 to 2024.



Figure 1. Target common ragweed less than 5.1-cm (right) vs. common ragweed 10.2-cm (left)

Objectives

Objectives: The objectives of this research were: A) to improve common ragweed control from clopyralid; and B) to extend control further into the season.

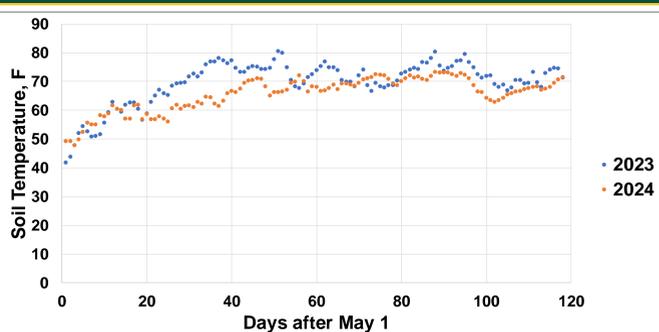


Figure 2. Daily average soil temperature at 10-cm at Sabin MN, May 1 to August 15, 2023 and 2024

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- We thank the Northwest Research and Outreach Center and the North Dakota State Experiment Station for facilities.

Materials and Methods

Clopyralid Rate and Timing:

- Hendrum, MN in 2022 and Rothsay, MN in 2024.

Experimental Design:

- RCBD and four replications.

Procedure:

- Experiment targeted common ragweed less than 5.1-cm and common ragweed greater than 5.1-cm (Figure 1).
- Repeat application 10 days after initial application.
- Adjuvants: Clopyralid + glyphosate plus Prefer 90 Non Ionic Surfactant (NIS) + Amsol liquid AMS at 0.25% v/v + 2.5% v/v.
- Application delivering 159 L ha⁻¹ through 8002XR nozzles (XR TeeJet® Flat Fan Spray Tips, TeeJet® Technologies, Glendale Heights, IL) spaced 51 cm apart and pressurized with CO₂ at 207 kPa.
- Sugarbeet injury and waterhemp control evaluated 3, 7, 14 and 21 days after application. Visible growth reduction injury evaluated using a 0 to 99% scale, 0 is no visible injury and 99 is complete loss of plant / stand; visible common ragweed control using a 0 to 99% scale, 0 is no control and 99 is complete control.

Data Analysis:

- Data were analyzed with the ANOVA procedure of ARM, version 2024.4 software package.

Clopyralid mixed with Phenmedipham for Common Ragweed Control:

- Shelley, MN in 2024.

Experimental Design:

- RCBD and four replications.

Procedure:

- Experiment targeted common ragweed less than 2-inch and 2-inch plus 7-days.
- Adjuvants: Phenmedipham and ethofumesate with HSMOC at 1.17 L ha⁻¹. Glyphosate with NIS and Amsol liquid AMS at 0.25% + 2.5% v/v. Phenmedipham, ethofumesate, and glyphosate with HSMOC at 1.17 L ha⁻¹ and Amsol liquid AMS at 2.5% v/v.
- Application POST delivering 159 L ha⁻¹ through 8002XR nozzles (XR TeeJet® Flat Fan Spray Tips, TeeJet® Technologies, Glendale Heights, IL) spaced 51 cm apart and pressurized with CO₂ at 207 kPa.
- Sugarbeet injury and waterhemp control evaluated 3, 7, 14, and 21 days after application. Visible growth reduction injury evaluated using a 0 to 99% scale, 0 is no visible injury and 99 is complete loss of plant / stand; visible common ragweed control using a 0 to 99% scale, 0 is no control and 99 is complete control.

Data Analysis:

- Data were analyzed with the ANOVA procedure of ARM, version 2024.4 software package.

Results – Clopyralid Rate and Timing

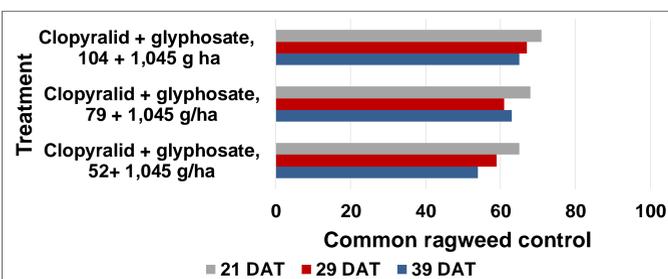
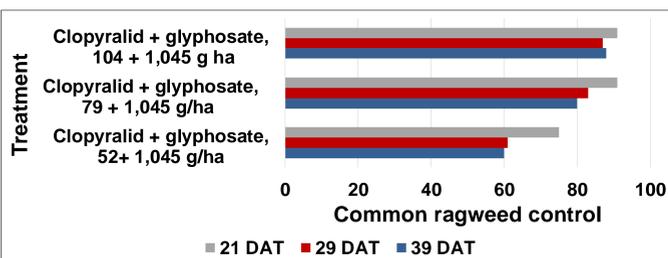


Figure 3A and Figure 3B. Common ragweed control in response to treatment, less than 5-cm and greater than 5-cm, Hendrum, MN, 2022

Literature Cited

- Lystad AL, Peters TJ. (2023) Reinventing common ragweed control with clopyralid in sugarbeet. J. Sugar Beet Res 60 (2) 5-6
- Peters TJ, Lystad AL (2023) Reinventing common ragweed control with Stinger HL in Sugarbeet. Sugarbeet Res and Ext Rep 53:33-36

Results – Clopyralid Rate and Timing cont.

Table 1. Common ragweed control in response to 1-time or 2-time clopyralid plus glyphosate application, less than 5-cm and greater than 5-cm, Hendrum, MN, 2022.

Treatment	Rate	Common Ragweed	July 8	July 26
			11 DAAD	29 DAAD
	g/ha	cm	%	%
Clopyralid+glyphosate	79 + 1,045	< 5	91 a	80 b
Clopyralid+glyphosate	104 + 1,045	<5	91 a	88 a
Clop+gly/clop+gly	79+1,045 / 79+1,045	<5 / 10 day	95 a	94 a
Clopyralid+glyphosate	79 + 1,045	>5	68 b	63 c
Clopyralid+glyphosate	104 + 1,045	>5	71 b	65 c
Clop+gly/clop+gly	79+1,045 / 79+1,045	>5 / 10 day	69 b	79 b
LSD (0.10)			0.0001	0.0001

^aMeans within a rating timing that do not share any letter are significantly different by the LSD at the 10% level of significance.

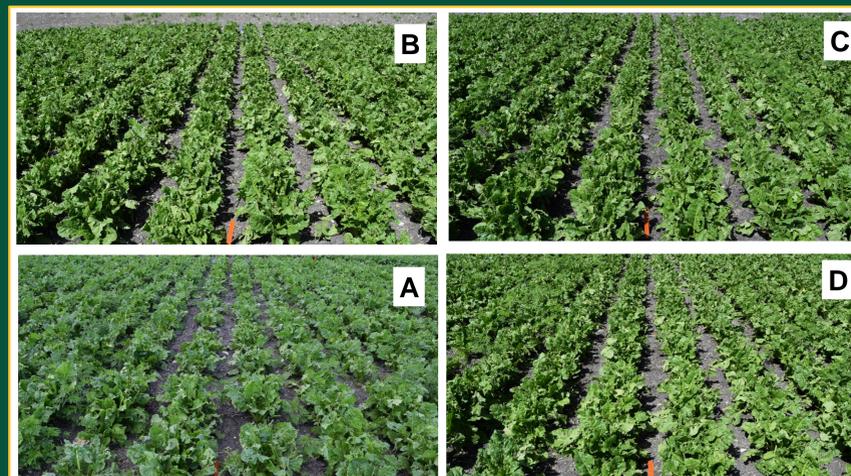


Figure 4. Common ragweed control in response to phenmedipham + HSMOC [A] clopyralid + HSMOC [B] phenmedipham + clopyralid with HSMOC [C] and ethofumesate fb phenmedipham + clopyralid with HSMOC [D] image 30 DAAC, Shelley MN, 2024^{a,b}

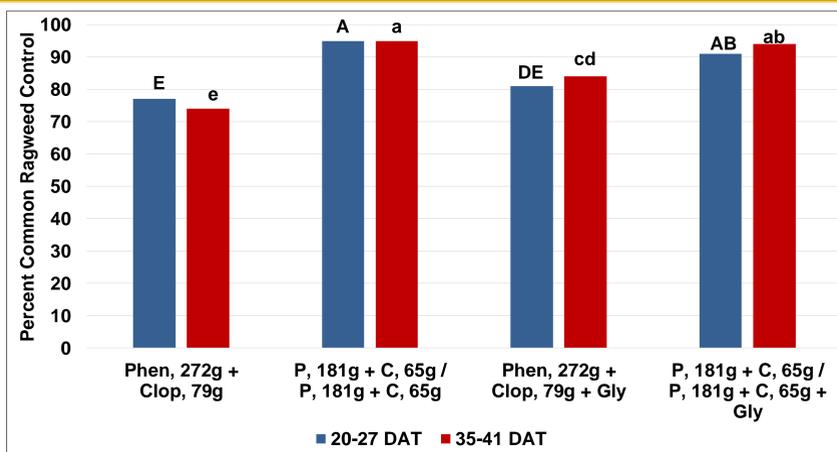


Figure 5. Common ragweed control in response to 1-time or 2-time phenmedipham plus clopyralid with or without glyphosate, Shelly MN, 2024.^{a,b}

^aMeans within a rating timing that do not share any letter are significantly different by the LSD at the 10% level of significance.

^bPhenmedipham plus clopyralid and HSMOC, phenmedipham plus clopyralid and glyphosate with HSMOC and AMS. Common ragweed <2-inch tall; sugarbeet 2 lf stage and 6 days later.

Conclusions and Implications

- Clopyralid at 105 g ha⁻¹ (Stinger HL at 2.4 fl oz/A) must be our lowest rate with a single application.
- Clopyralid (Stinger HL) applied to ragweed less than 5.1-cm.
- Time clopyralid (Stinger HL) application to ragweed size rather than sugarbeet stage.
- May need to separate glyphosate and clopyralid (Stinger HL) application to delay termination nurse crop to 4-lf sugarbeet.
- One-time phenmedipham (Spin-Aid) application does not provide acceptable common ragweed control (data not presented).
- Two-time phenmedipham (Spin-Aid) application is better but doesn't consistently deliver greater than 90% common ragweed control (data not presented).
- One or two-time clopyralid (Stinger HL) mixed with phenmedipham (Spin-Aid) application may improve tough to common ragweed populations or slightly larger common ragweed.
- Phenmedipham (Spin-Aid) mixed with clopyralid (Stinger HL) may be a strategy for early season common ragweed control without harming small grain nurse crop.