Weed Control in Sugarbeet

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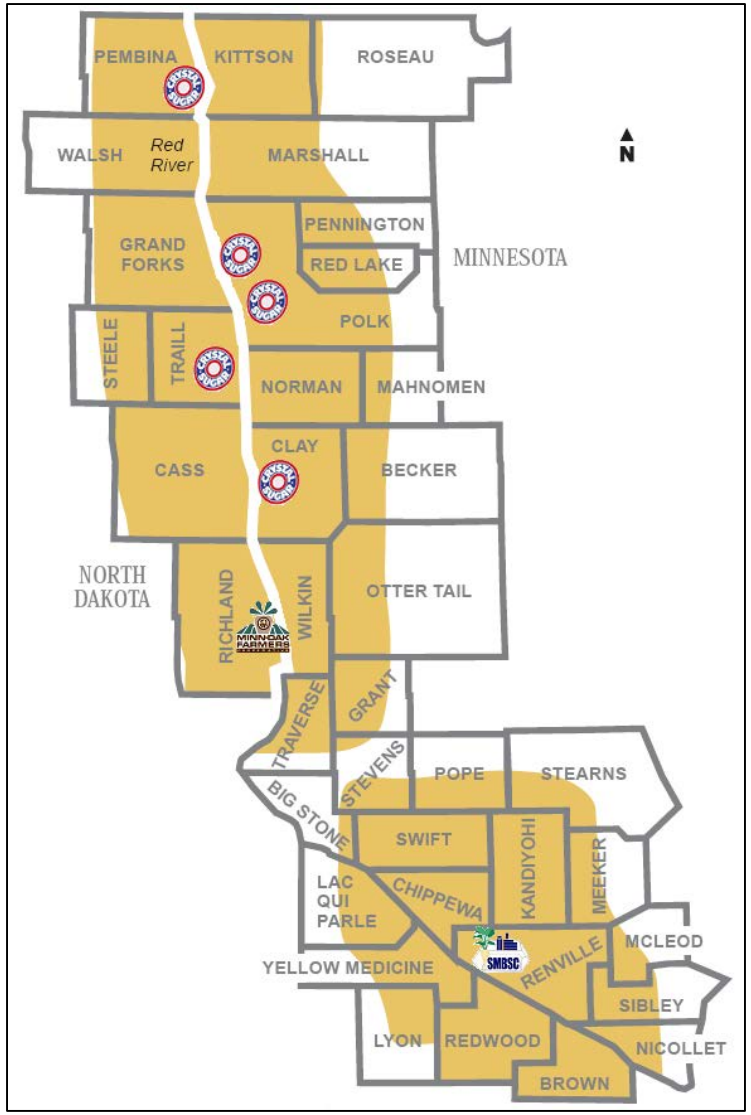
GR weeds dominate the landscape in Minnesota and eastern North Dakota

- GR waterhemp was the most troublesome weed control challenge on 381,163 acres or 61% of acreage according to 2024 survey.
- GR common ragweed was 7% overall but 29% in Crookston and EGF factory districts.
- GR kochia was 24% overall but 58% in Drayton factory district.

2023 survey of production practices conducted at the 2024 sugarbeet growers seminars

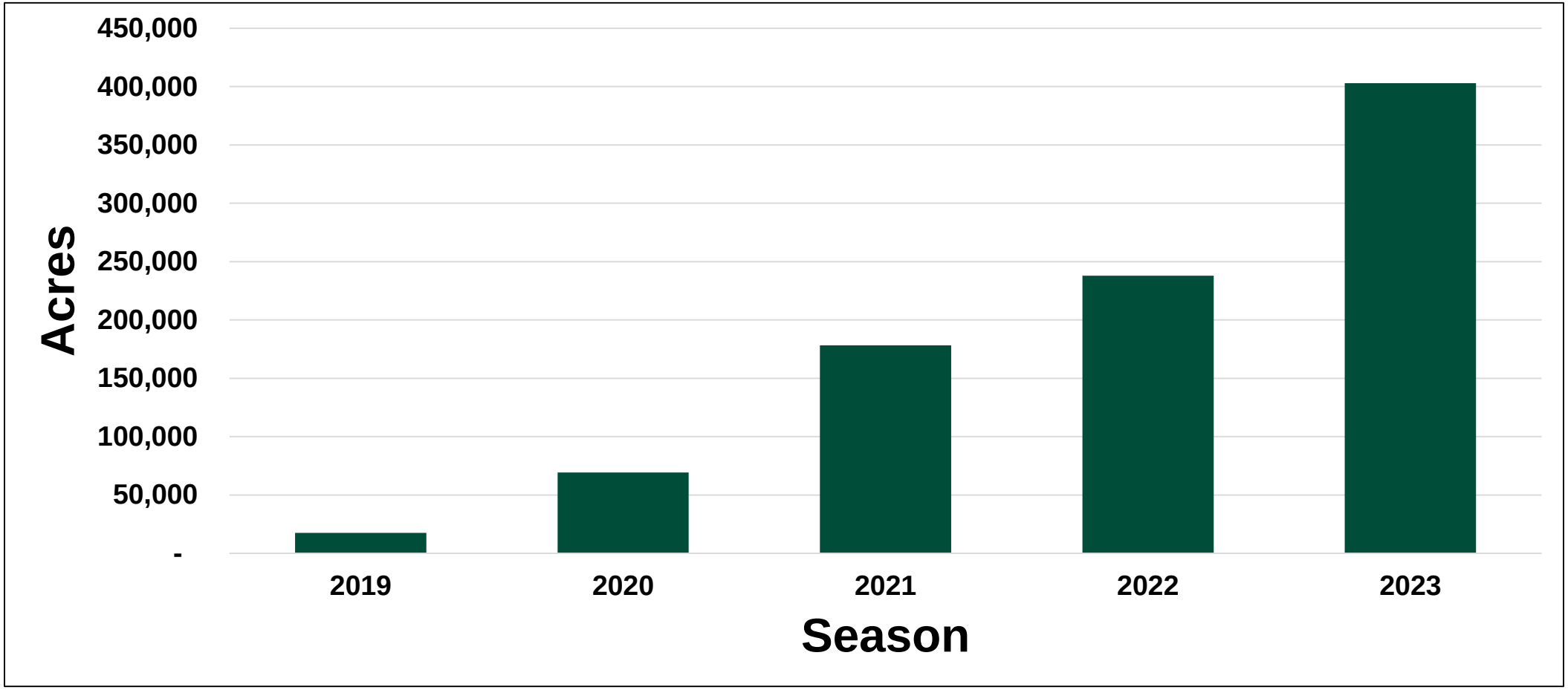


Weed Control in Sugarbeet

2024

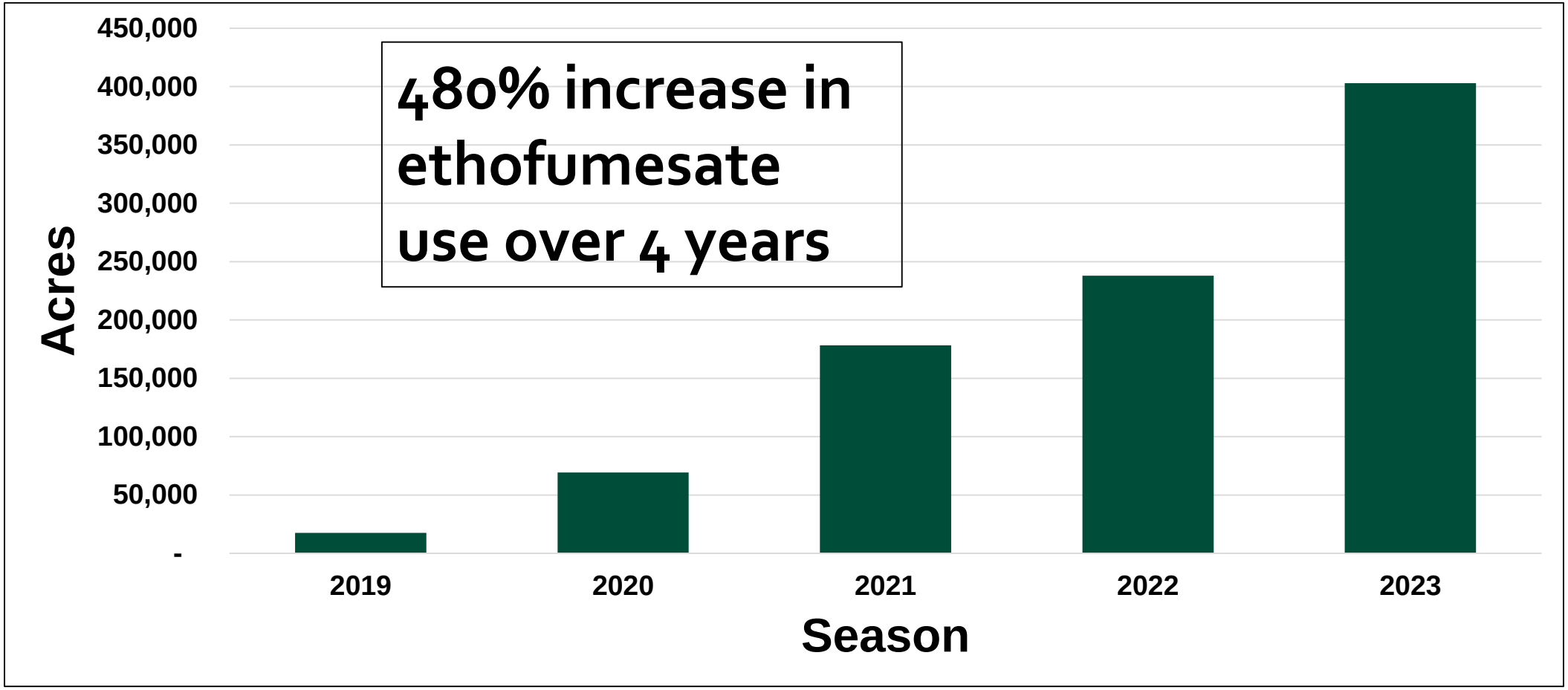
- Pigweed and ragweed control with ethofumesate
- Kochia control with phenmedipham
- Common ragweed control with clopyralid

Sugarbeet acres treated with ethofumesate, ACSC



Data provided by Kathy Wong, ACSC

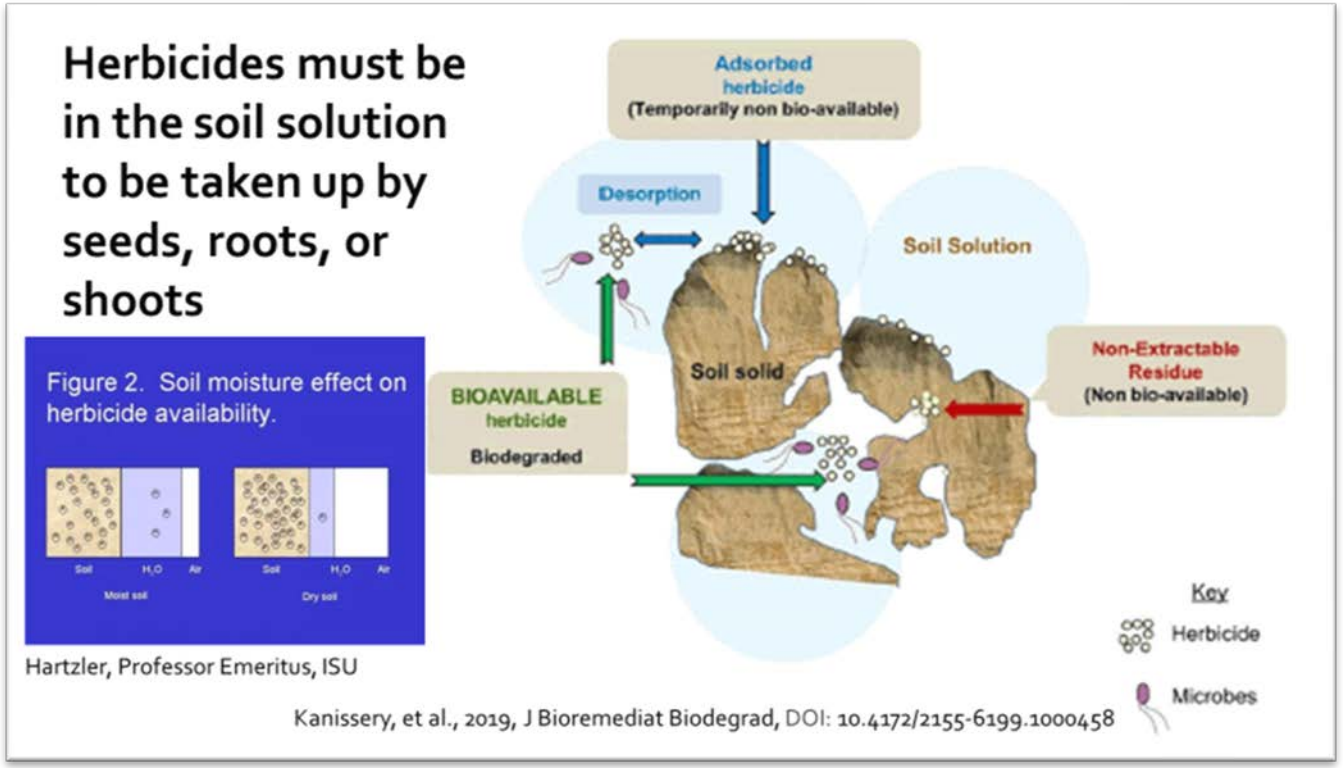
Sugarbeet acres treated with ethofumesate, ACSC



Data provided by Kathy Wong, ACSC

Ethofumesate use in Sugarbeet

- Soil-applied group 15 herbicide
- Used for PRE, PPI, and POST applications in sugarbeet
- Ethofumesate half life in soil
  - >14 weeks when dry and cold
  - <5 weeks when moist and warm
- Efficacy based on rainfall after application

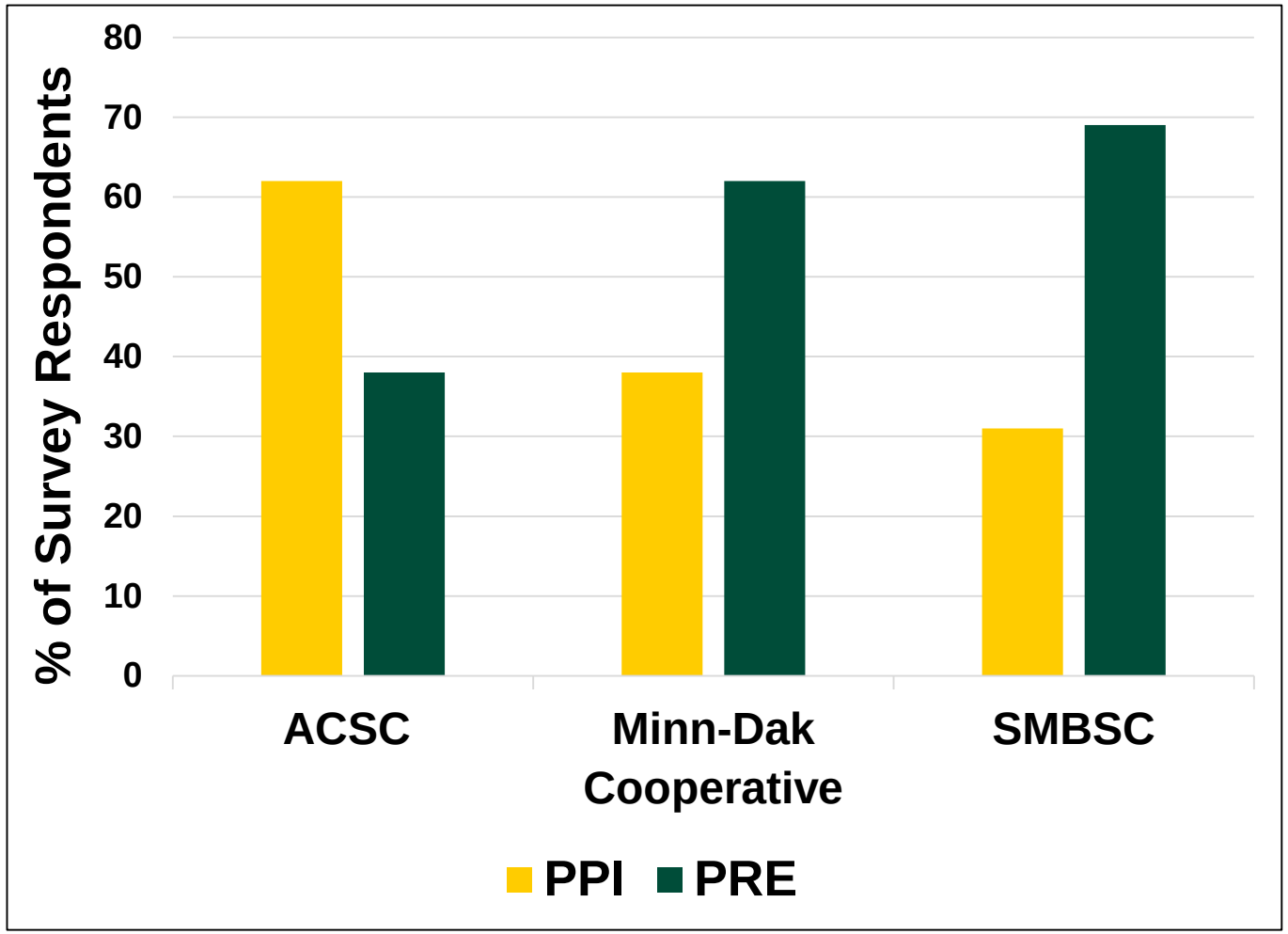


Comparison of PPI and PRE ethofumesate at 7.5 to 8 pt/A, redroot pigweed control, 1973-1986.[a]

Nortron	4 of 7 locations	3 of 7 locations
	%	%
Preplant Incorporated	97	91
Preemergence	79	93
LSD (0.05)	11	NS

[a]Slide courtesy of Dr. Alan Dexter

Ethofumesate incorporation technique across cooperatives in 2023.[a]



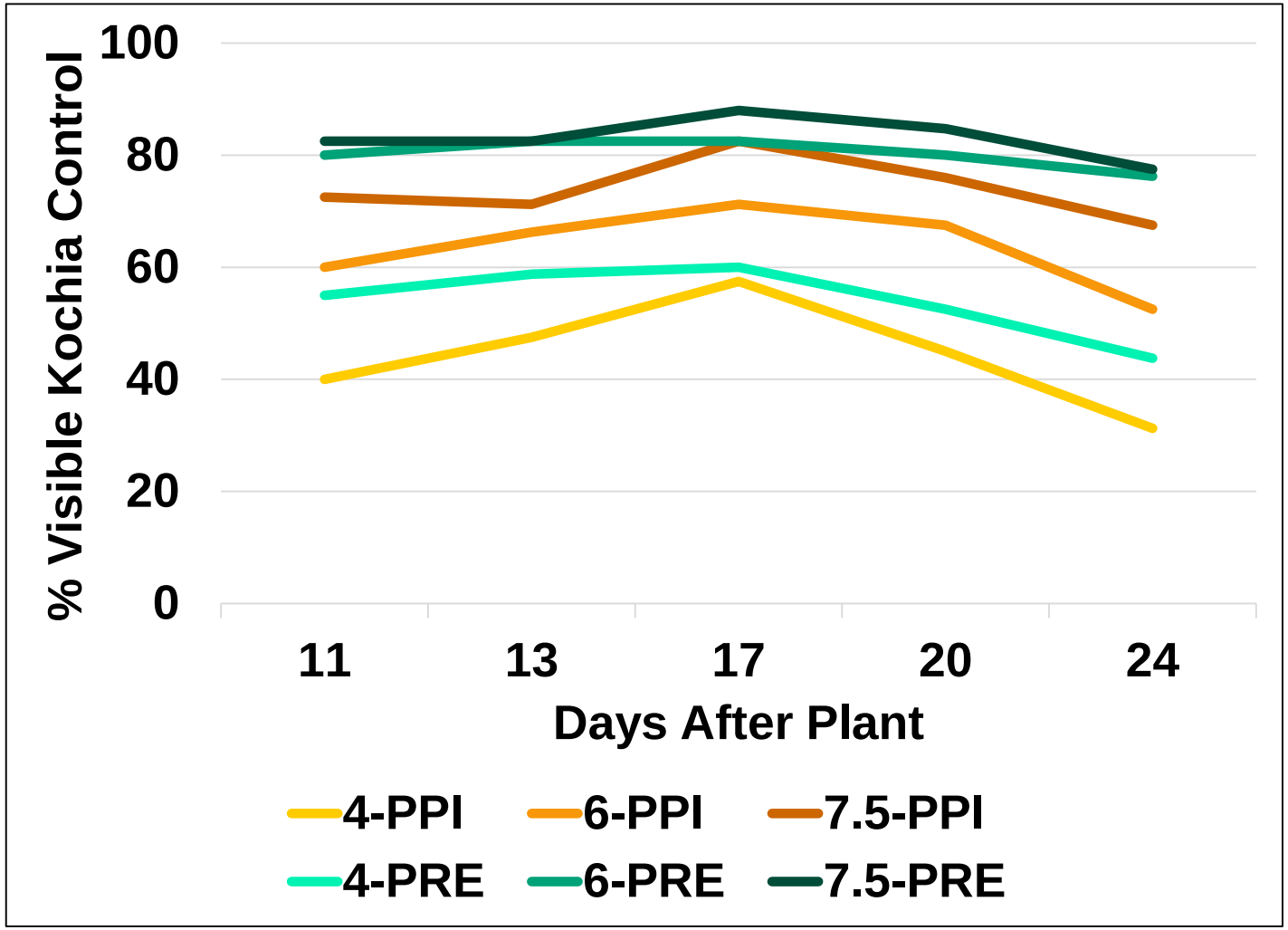
- Incorporation strategies depend by location/COOP
- Early season waterhemp control is critical to season long control
- Aided by:
  - Timely incorporation into soil
  - Tillage or rainfall

[a]Turning Point survey at 2024 grower seminars

PPI and PRE Comparison Study Results

- PRE applications performed better than PPI in 2024 due to timely rainfall
- Higher rates provided better control
- 6 and 7.5 pt/A rates PRE provided over 85% control

Kochia control in response to ethofumesate, Horace ND, 2024



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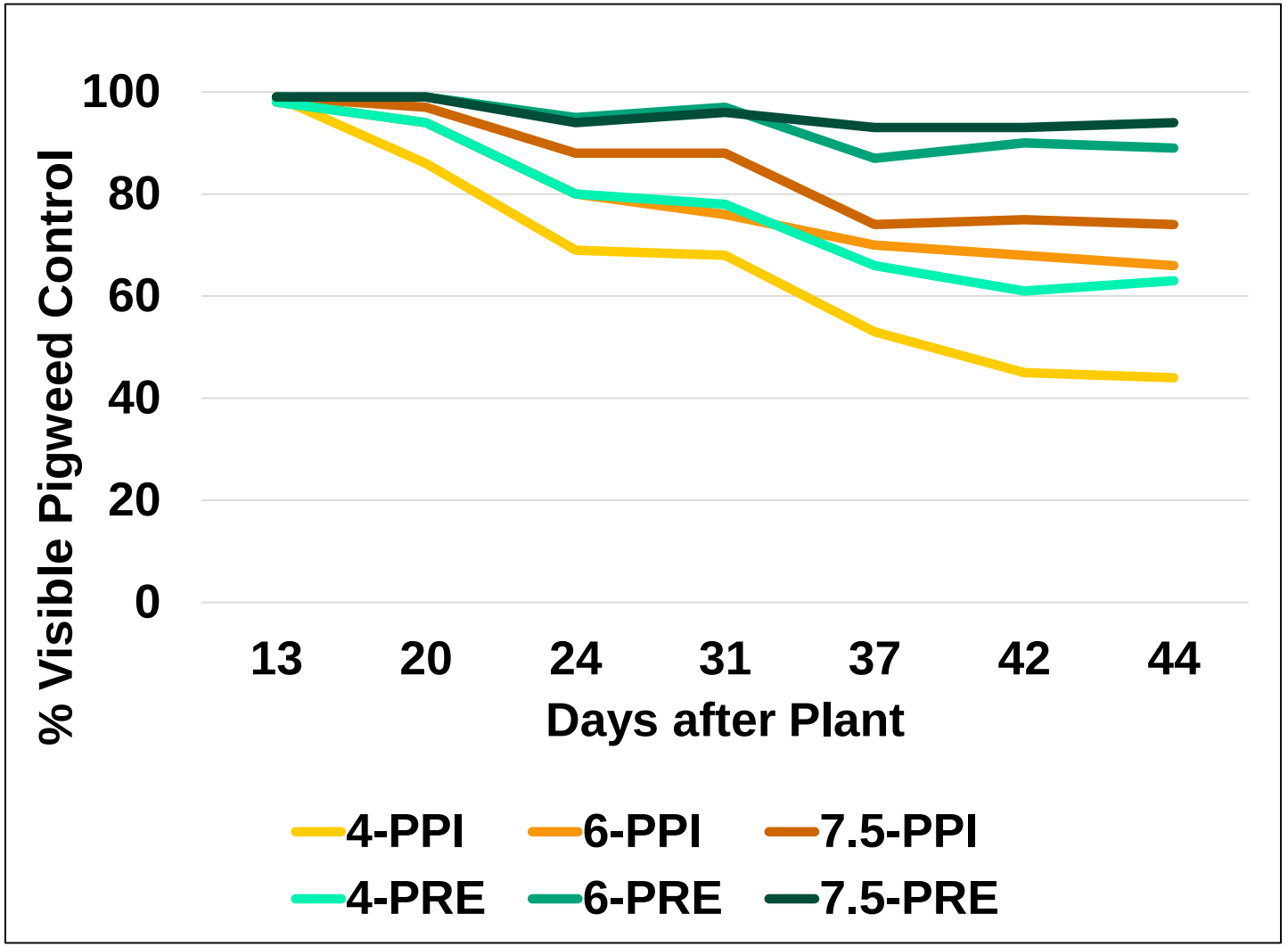
Redroot pigweed control in response to ethofumesate, Horace ND, 2024



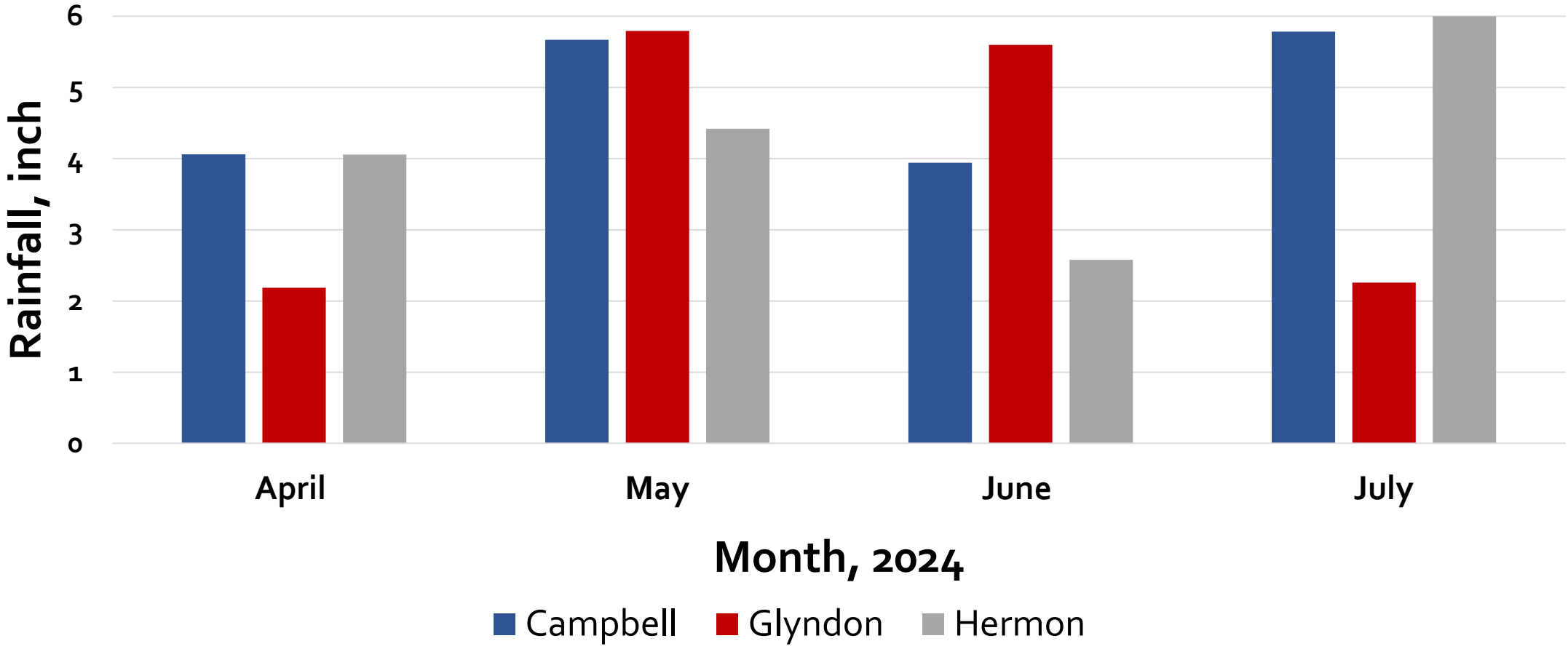
Experiment received timely rain

- Rainfall started around 7-8pm after PRE application.
- Measured 1.2 inch.
- Measured 1.5 inch in 7 days, 2.7 inch in 14 days and 4.7 in 30 days after planting.

Daily rainfall for 8 days beginning June 24, 2024 in Horace, ND. Data from KayJay weather station.

Date	Total Rainfall (inch)
Jun-24-2024	0.02
Jun-25-2024	0
Jun-26-2024	0
Jun-27-2024	0.32
Jun-28-2024	0.88
Jun-29-2024	0
Jun-30-2024	0
Jul-1-2024	0.17

Most growers received abundant rainfall to incorporate ethofumesate into soil in 2024



Spin-Aid integrated into our weed management systems

- Kochia, common lambsquarters, and common ragweed control
- We will use Spin-Aid differently depending on weed species
  - Kochia: small kochia, repeat applications, micro/mid range rates
  - Common lambsquarters: Spin-Aid mixed with RUPM3
  - Common ragweed: Spin-Aid mixed with Stinger HL and RUPM3

Spin-Aid, Belchim Ag Products USA

- Sugarbeet rapidly metabolize Spin-Aid to less toxic compounds (Hendrick et al. 1974)
- Spin-Aid should be applied over small weeds; rate dependent on sugarbeet growth stage
- Kochia control will required 2 or 3 applications
- Mixes with oils increase efficacy (and threat of injury)
- Environmental conditions influences PSII inhibitors efficacy
  - Weed control is less with cool temps and low light (Abbaspoor and Streibig 2007)
  - Risk of injury increases at maximum daily air temperatures greater than 80F, (Betamix BMPs).

Phenmedipham (Spin-Aid) chronology

- Phenmedipham was registered in 1970 and sold under trade name ‘Betanal’.
- Phenmedipham at 6 pt/A controlled 86% kochia (Schweizer and Weatherspoon, 1971).
- Schweizer and Weatherspoon (1971) reported phenmedipham should be applied when the rosette of kochia is less than 1-inch in diameter.
- Dexter (1994) reported phenmedipham at 3 pt/A applied to 4-leaf sugarbeet and a second treatment 5 to 7 d later gave less sugarbeet injury and improved control as compared with a single full-rate application.
- Phenmedipham mixed with ethofumesate improved kochia control from phenmedipham.

hit kochia at a very early stage

Kochia control from Spin-Aid, 11 DAAC, greenhouse, December/January 2023-24

Kochia Control 14 DAAD, Glyndon MN, 2024

Trt. Num.	Herbicide Treatment	Rate	Kochia Control[b]
		(fl oz/A)	----%----
1	Spin-Aid[a]	12	40 d
2	SA/ SA[c]	12 / 16	66 b
3	SA/ SA	12 / 24	55 c
4	SA/ SA/ SA	12 / 16 / 24	74 ab
5	SA/ SA/ SA	12 / 16 / 32	78 a
6	SA/ SA/ SA	12 / 24 / 24	83 a
7	SA/ SA/ SA	12 / 24 / 32	79 a
8	PRE / SA/ SA	PRE / 12 / 16	75 ab
9	PRE / SA/ SA/ SA	PRE / 12 / 16 / 24	76 ab

[a]Spin-Aid mixed with 4 fl oz/A ethofumesate. High surfactant methylated oil concentrate at 1 pt/A and AMS at 2.5% V/V.
[b]lsmeans with different letters significant at P=0.05
[c]Spin-Aid plus etho, glyphosate, HSMOC at 4 and 25 fl oz/A and 1 pt/A, respectively

Kochia Control 14 DAAD, Felton MN, 2024

Trt. Num.	Herbicide Treatment	Rate	Kochia Control[b]
		(fl oz/A)	----%----
1	Spin-Aid[a]	12	50 e
2	SA/ SA[c]	12 / 16	66 d
3	SA/ SA	12 / 24	68 cd
4	SA/ SA/ SA	12 / 16 / 24	80 ab
5	SA/ SA/ SA	12 / 16 / 32	85 ab
6	SA/ SA/ SA	12 / 24 / 24	79 ab
7	SA/ SA/ SA	12 / 24 / 32	78 bc
8	PRE / SA/ SA	PRE / 12 / 16	80 ab
9	PRE / SA/ SA/ SA	PRE / 12 / 16 / 24	89 a

[a]Spin-Aid mixed with 4 fl oz/A ethofumesate. High surfactant methylated oil concentrate at 1 pt/A and AMS at 2.5% V/V.
[b]lsmeans with different letters significant at P=0.05
[c]Spin-Aid plus etho, glyphosate, HSMOC at 4 and 25 fl oz/A and 1 pt/A, respectively

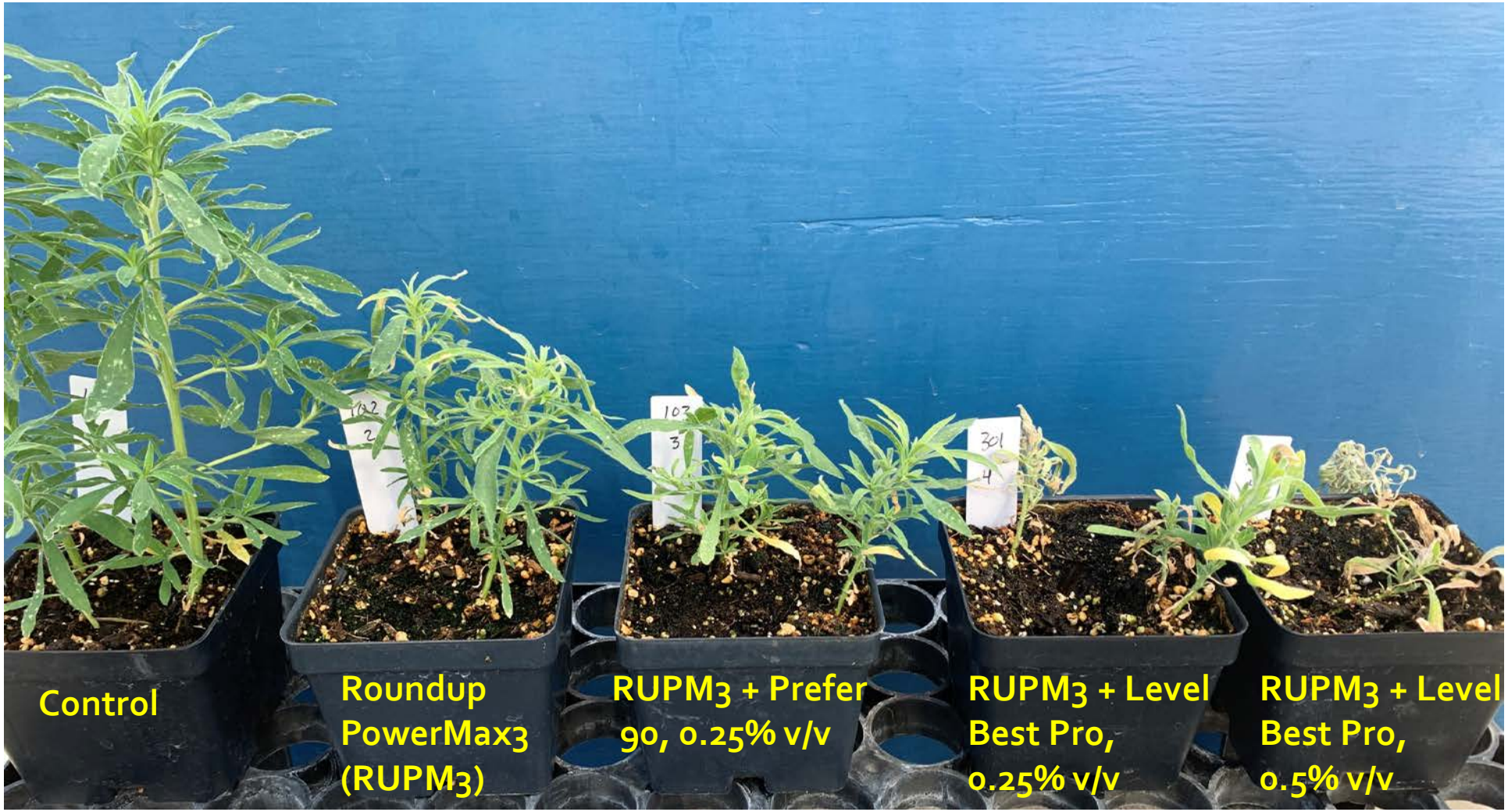
Kochia Control 14 DAAD, Felton MN, 2024

Kochia Control 28 DAAD, Felton MN, 2024

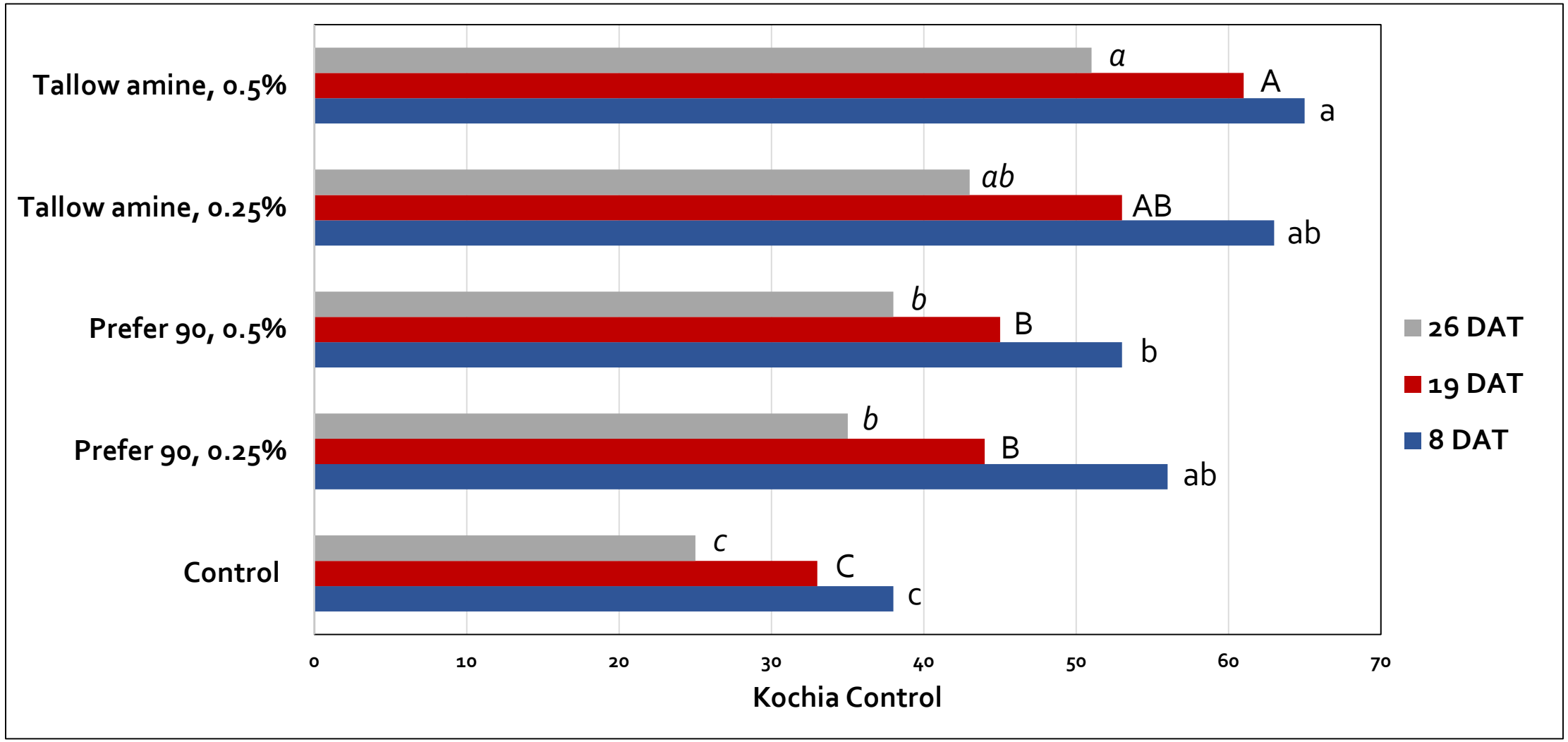
Tallow amine adjuvant

- Ethoxylated tallow amine (ETA) adjuvant was in the original glyphosate formulation.
- It was viewed by most old time weed scientists as the best formulation ever produced.
- ETA was repackaged as Level Best, non-ionic surfactant and water conditioner
- Level Best Pro is a non-ionic surfactant, water conditioner and deposition agent in 2024
- Last Chance; Last Chance Pro

Kochia control from Roundup PowerMax3 alone or with surfactants, 11 DAT, greenhouse, 2024.



Adjuvants with Roundup PowerMax3 at 30 fl oz/A for kochia control, Felton MN, 2024



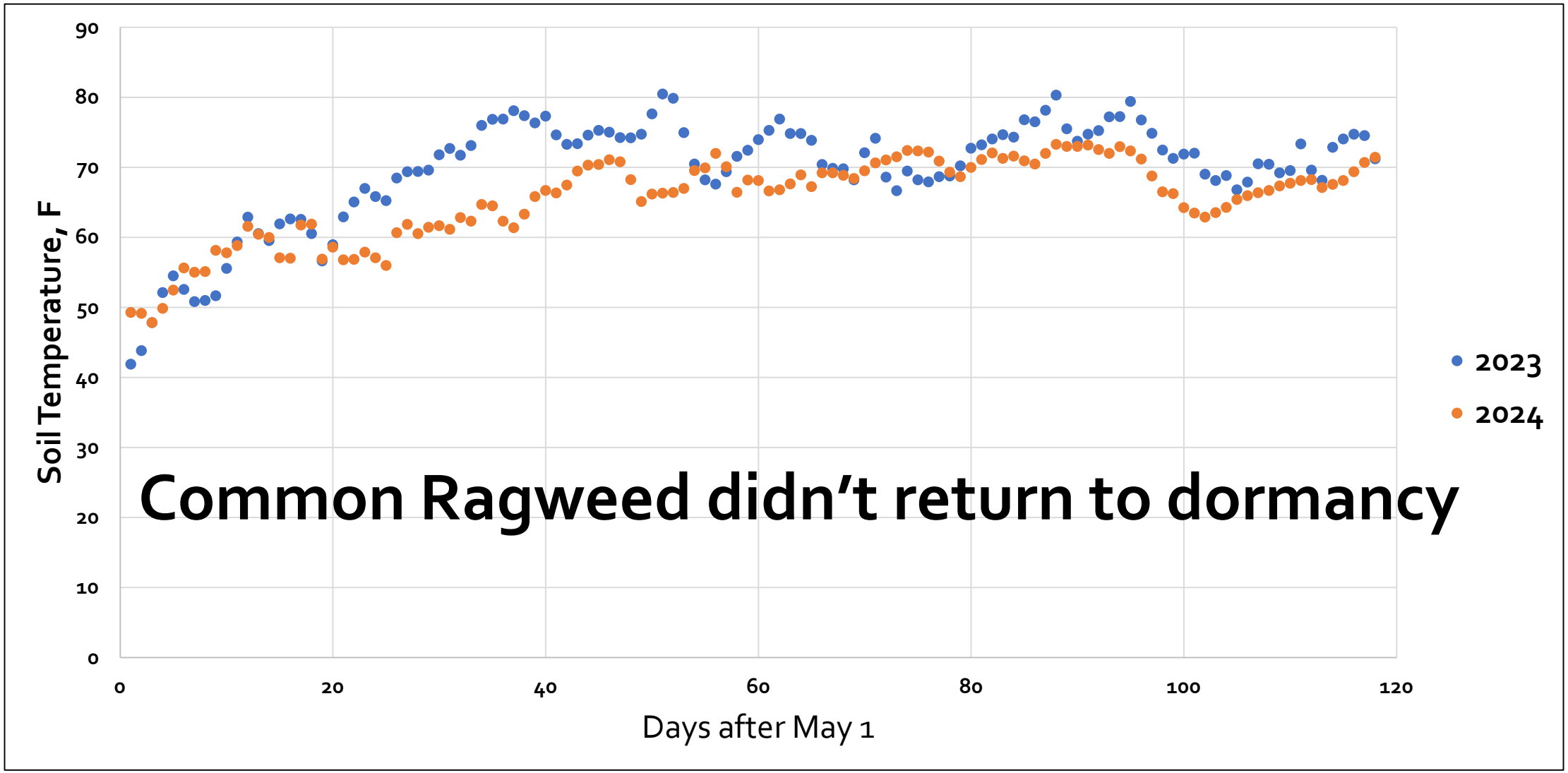
Best Management Practices for Stinger HL application and ragweed control

- Stinger HL at 2.4 fl oz/A must be our lowest rate with a single application.
- Stinger HL applied to ragweed less than 2-inch vs. greater than 2-inch.
- Time Stinger HL application to ragweed size rather than sugarbeet stage.
- May need to separate glyphosate and Stinger HL application if you want to delay termination nurse crop to 4-lf sugarbeet.

Why were there so many common ragweed escapes in 2024?

- Timing of the first Stinger HL application was influenced by weather.
- Growers didn't compensate with higher Stinger HL rates for the second application on larger, actively growing ragweed
- Carryover concerns
- Complex tank mixtures
  - Spray timed to waterhemp stage instead of common ragweed stage
- Ragweed continued to emerge well into June

Daily average soil temperature at 4-inch at Sabin, MN, May 1 to August 15, 2023 and 2024



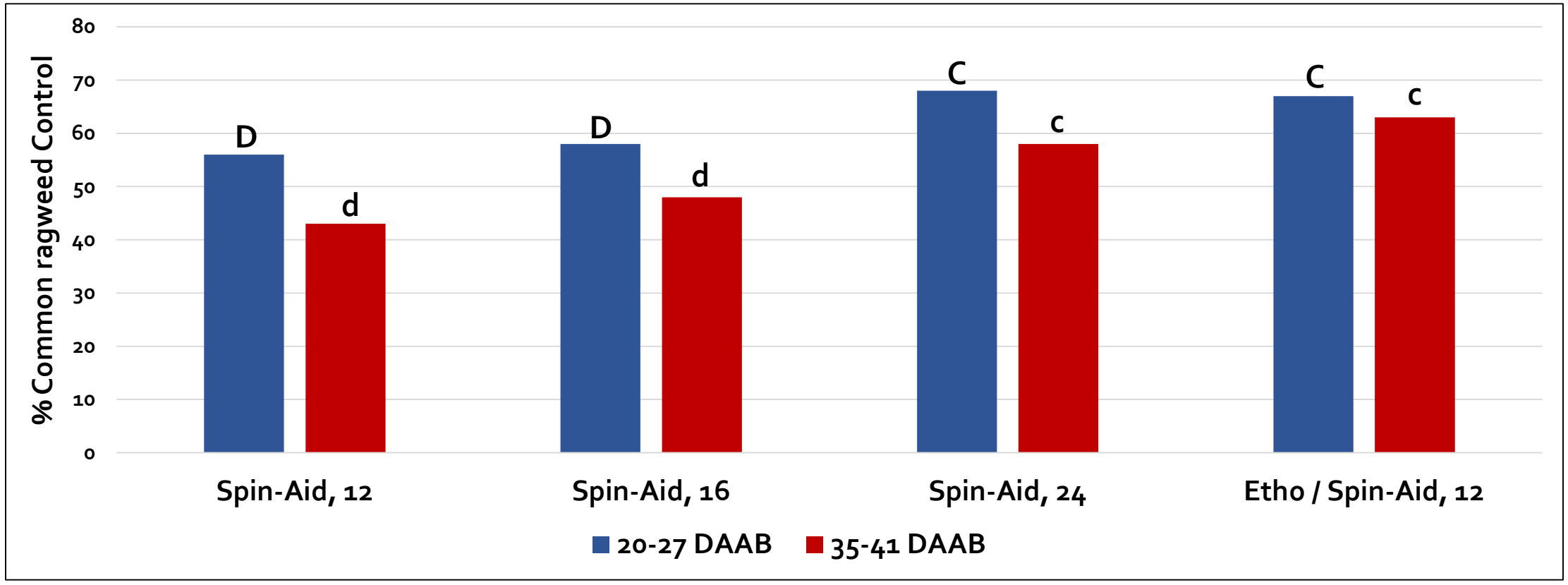
Other thoughts about Stinger HL

- 10.5 months **Rotation Interval** with soils greater than 2% organic matter AND rainfall more than 15 inches during 12 months following application
- Some of us measured 6-inch of rain in June, July and August. Very little rain in September and October
- Rainfall is especially important if Stinger HL rate is greater than 3.6 fl oz/A in a season
- Manage clopyralid products in the sequence with sugarbeet

Spring Wheat	Sugarbeet	Corn
WideMatch	Stinger HL	SureStart/II / TripleFlex/II
WideARmatch		Resicore / Resicore XL
Curtail		Maverick
PerfectMatch		Kyro

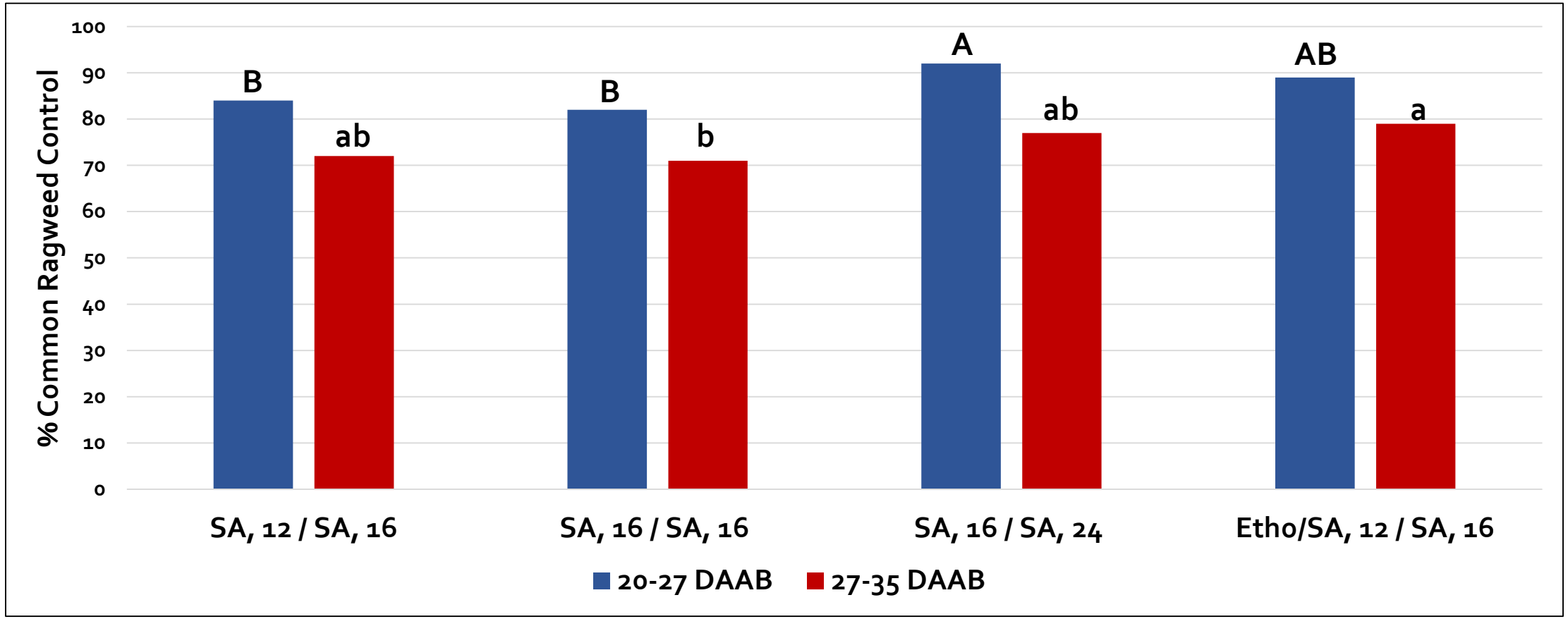
Common ragweed control from Stinger, 51 DAT, greenhouse biotype, Minn-Dak and ACS.

Common ragweed control in response to Spin-Aid + etho, Shelly MN 2024[a]



[a]Spin-Aid plus ethofumesate and HSMOC, 4 + 16 fl oz/A
[a]Common ragweed <2-inch tall; sugarbeet 2 lf stage
[a]Ethofumesate at 6 pt/A PRE

Common ragweed control in response to Spin-Aid + etho, Shelly MN 2024[a]

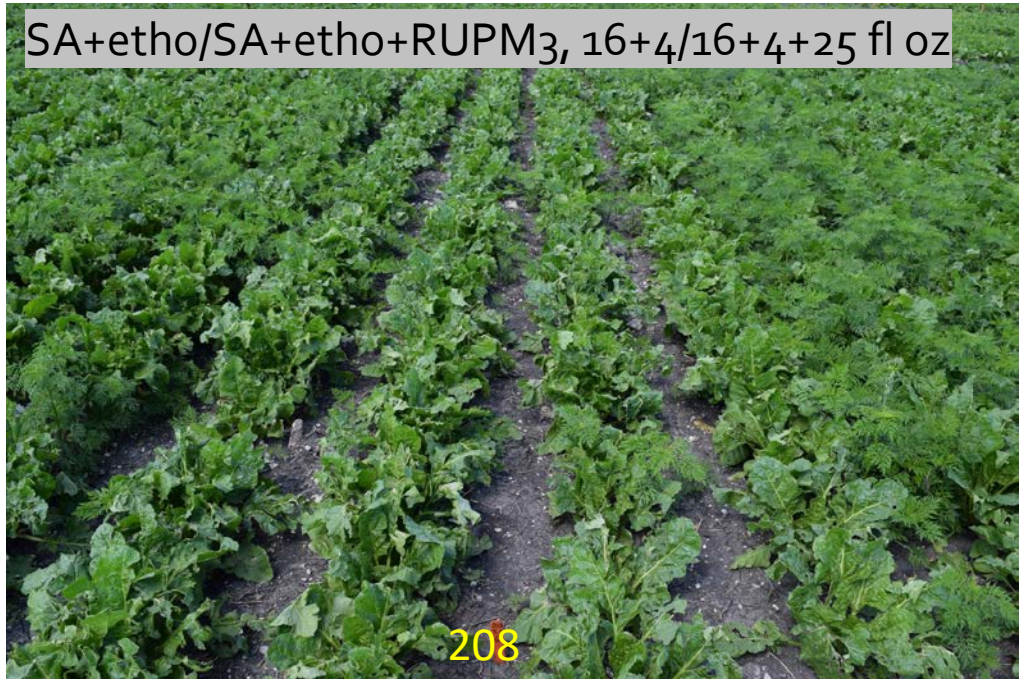


[a]Spin-Aid plus ethofumesate and HSMOC, 4 + 16 fl oz/A; Spin-Aid plus etho and Roundup PowerMax3
[a]Common ragweed <2-inch tall; sugarbeet 2 lf stage and 6 days later
[a]Ethofumesate at 6 pt/A PRE

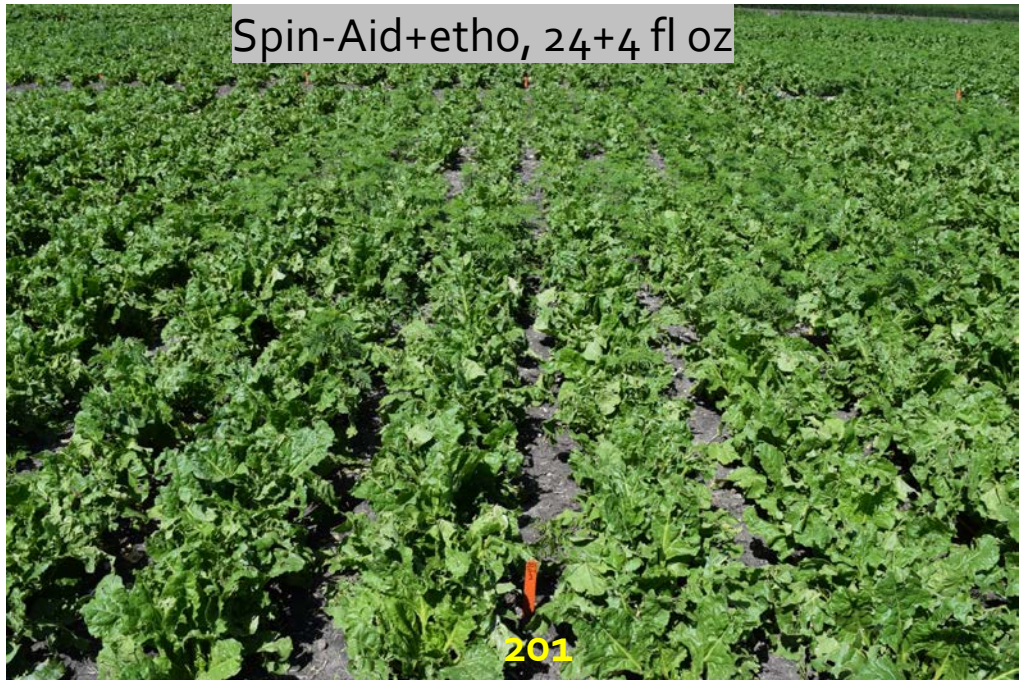
SA+etho/SA+etho+RUPM3, 12+4/16+4+25 fl oz

Images, 34 DAAB

SA+etho/SA+etho+RUPM3, 16+4/16+4+25 fl oz

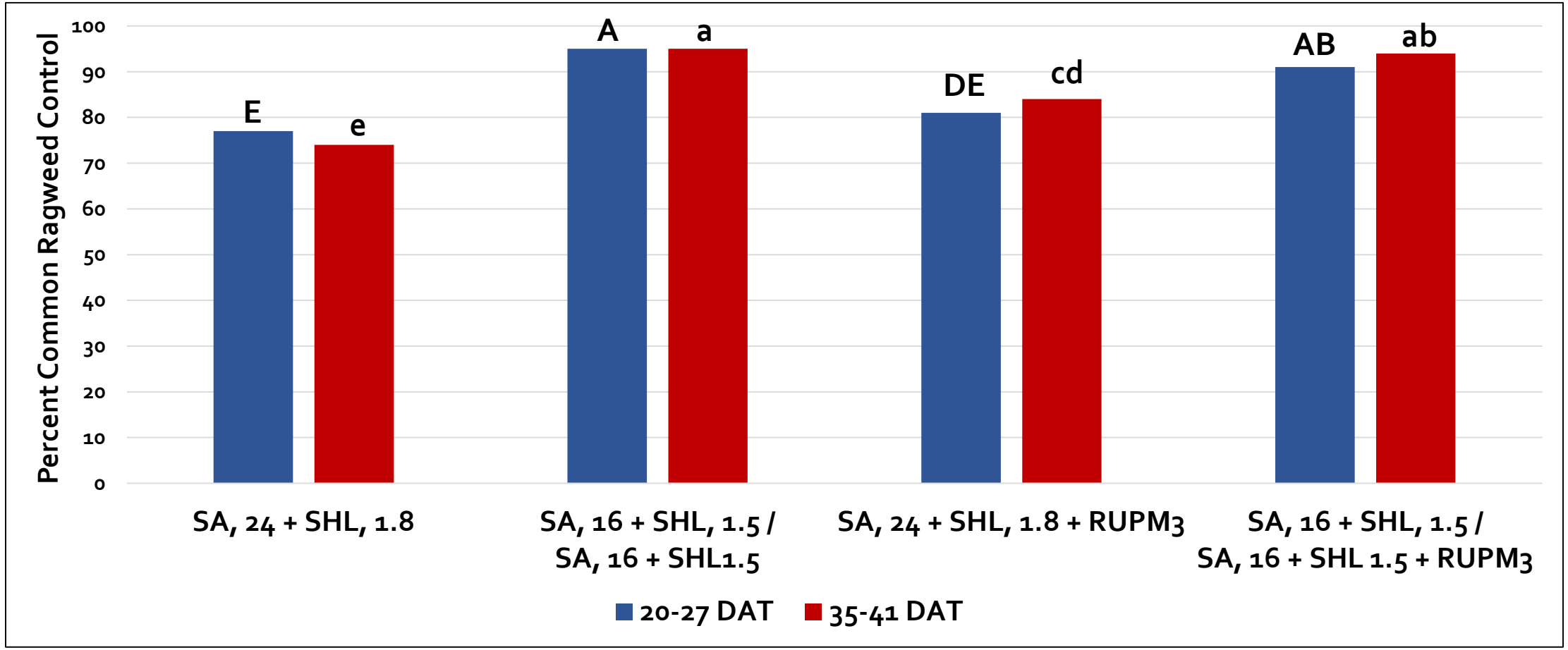


Spin-Aid+etho, 24+4 fl oz



Etho (PRE)/SA+etho/SA+etho+RUPM3, 6pt/12+4/16+4+25 fl oz

Common ragweed control in response to 1-time or 2-time Spin-Aid plus Stinger HL , Shelly MN 2024[a]



[a]Spin-Aid plus ethofumesate and HSMOC, 4 + 16 fl oz/A; Spin-Aid plus etho and Roundup PowerMax3

[a]Common ragweed <2-inch tall; sugarbeet 2 lf stage and 6 days later

Congratulations to our Student Athletes

- Extension Sugarbeet undergraduate students
- L-R, Bryce Friday, Mason Miller and Isaac Zatechka with the 2025 FCS national championship trophy

- Sometime after midnight

Thank you for your continued support

Tom Peters

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