

Weed Control in Sugarbeet

Thomas Peters

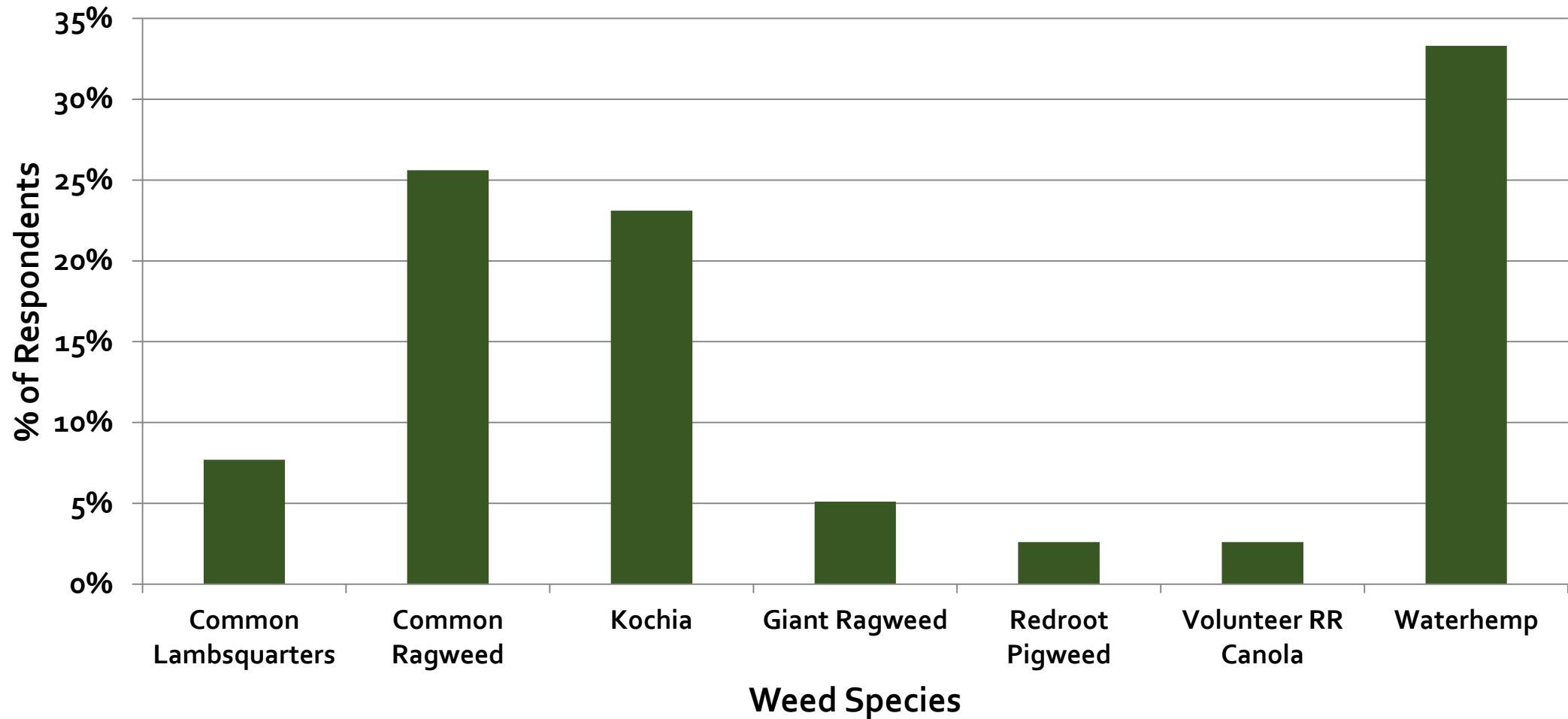
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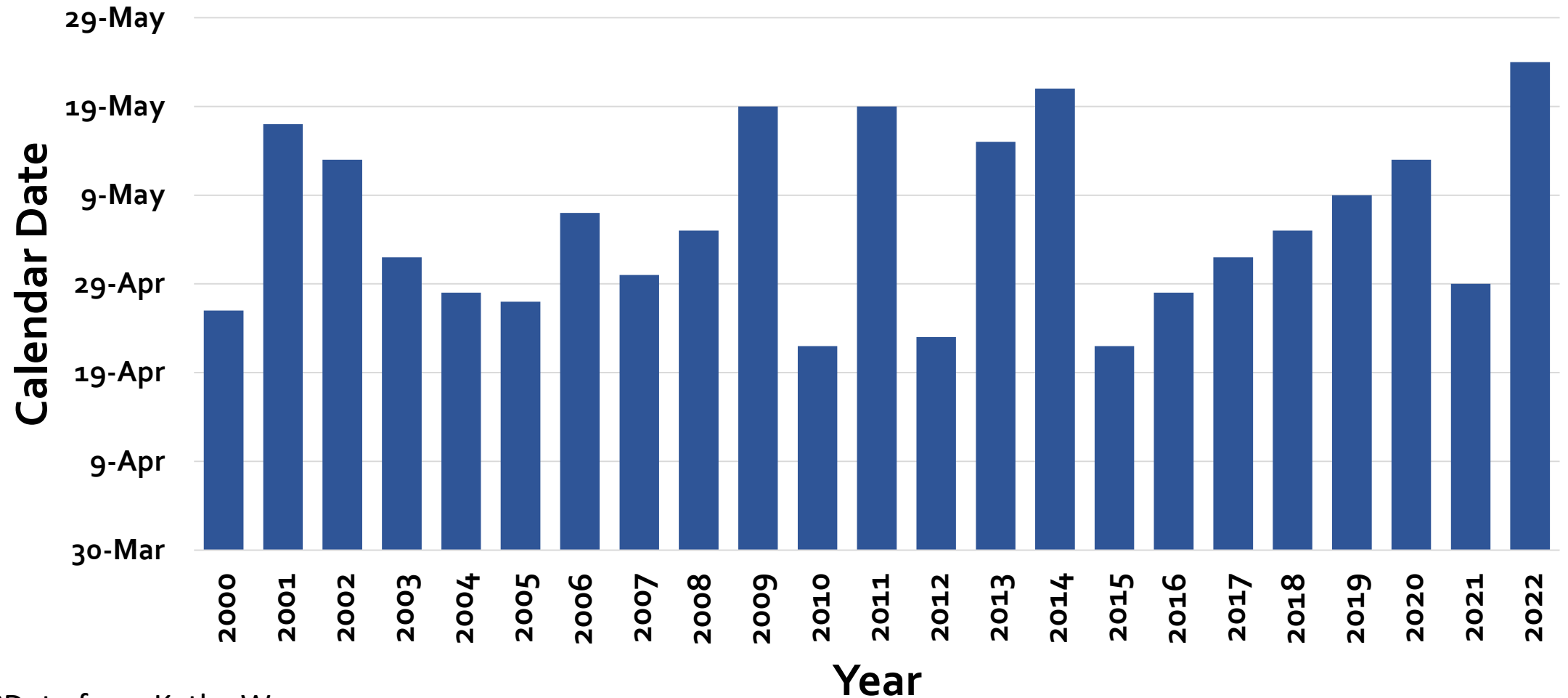
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What was your most troublesome weed control challenge in 2021, Grand Forks seminar.^a

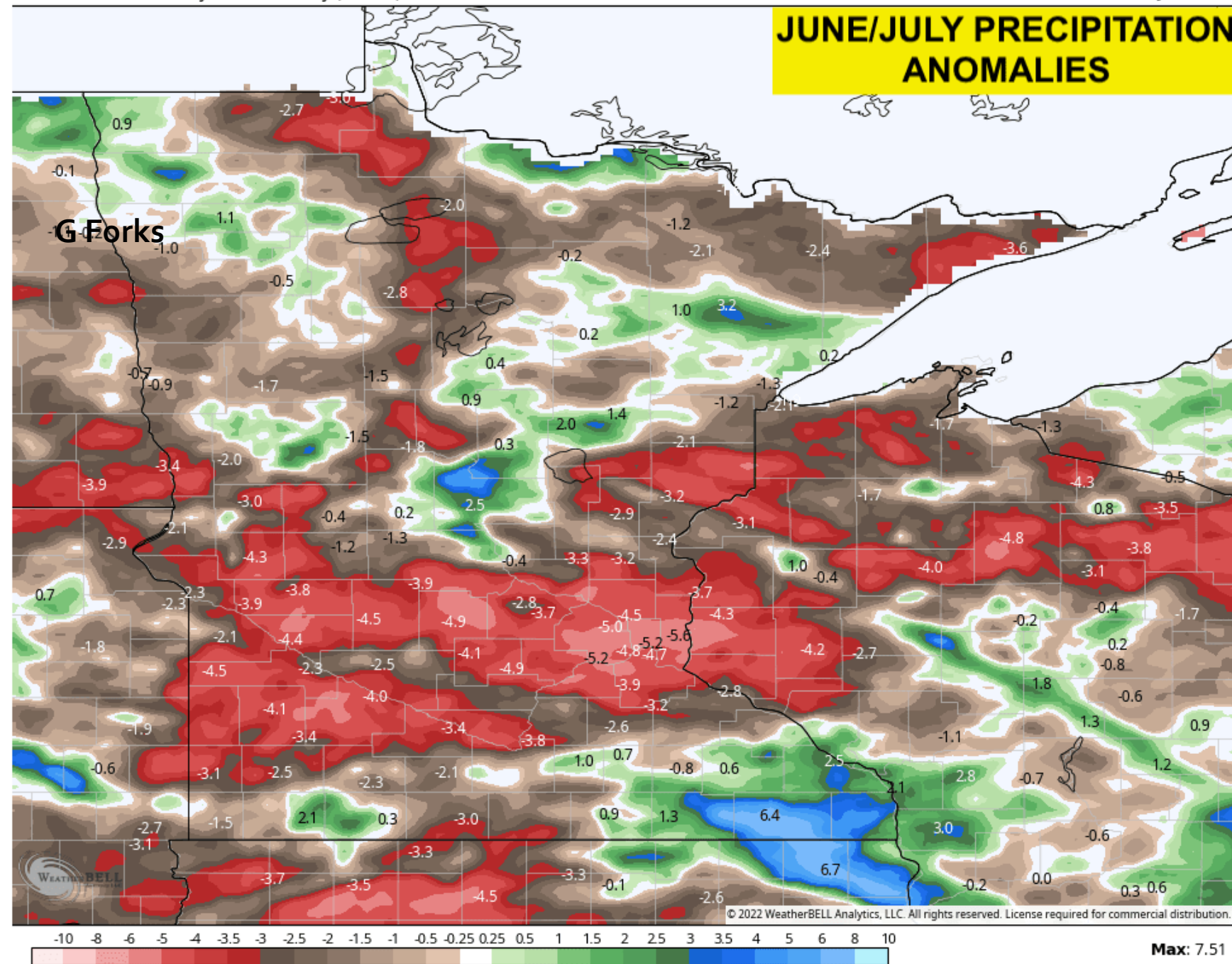


^aGrand Forks Grower Seminar, February 1, 2022

Average sugarbeet plant date, American Crystal Sugar Coop, 2000 to 2022.^a



^aData from Kathy Wang

**JUNE/JULY PRECIPITATION
ANOMALIES**



DRY SOIL AND HIGH WINDS CAUSING FARMING PROBLEMS

10:05
50°

VALLEY NEWS LIVE

Valley News
Live

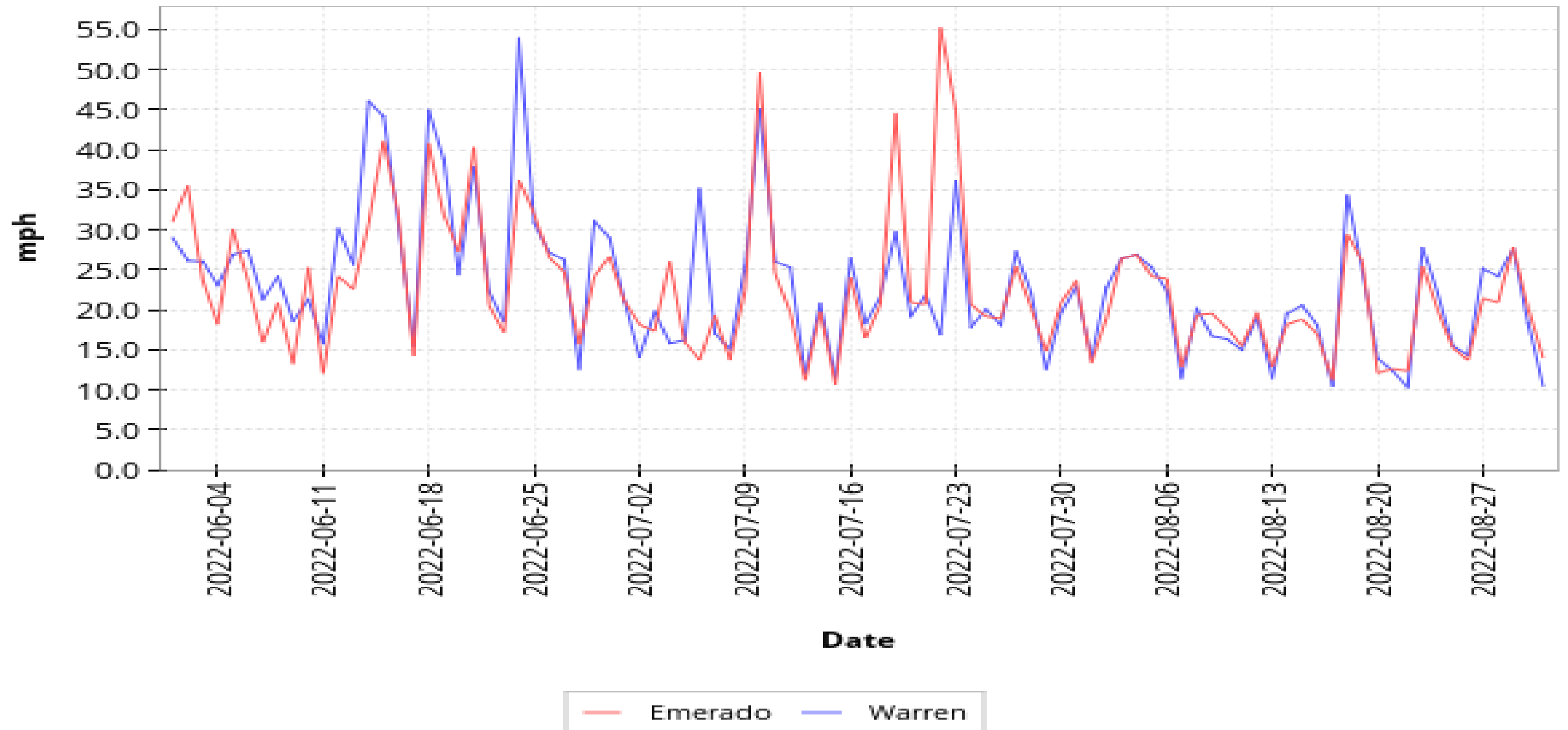
deaths.

VNL Alert | North Dakota: 69 new cases, 2 deaths with a 2.67% daily pos

Daily Maximum Wind Speed

(2022-06-01 - 2022-08-31)

North Dakota Agricultural Weather Network (NDAWN)



Presentation outline

- Nurse and cover crops to protect sugarbeet from wind and blowing soil
- Are PRE herbicides compatible with cover crops
- Common ragweed control
- Waterhemp control

Seeding rate is over the board

Catalogues vs. practical experience

Timing	Species	Purpose	Seeding rate
			lb acre
Spring	Barley	Wind/soil protect	15 (1/3 bu)
Spring	Oat	Wind/soil protect	16 (1/2 bu)
Spring	Wheat	Wind/soil protect	20 (1/3 bu)
Fall broadcast	Rye	Wind/soil protect	10-17
Fall seed in rows	Rye	Wind/soil protect	3-5

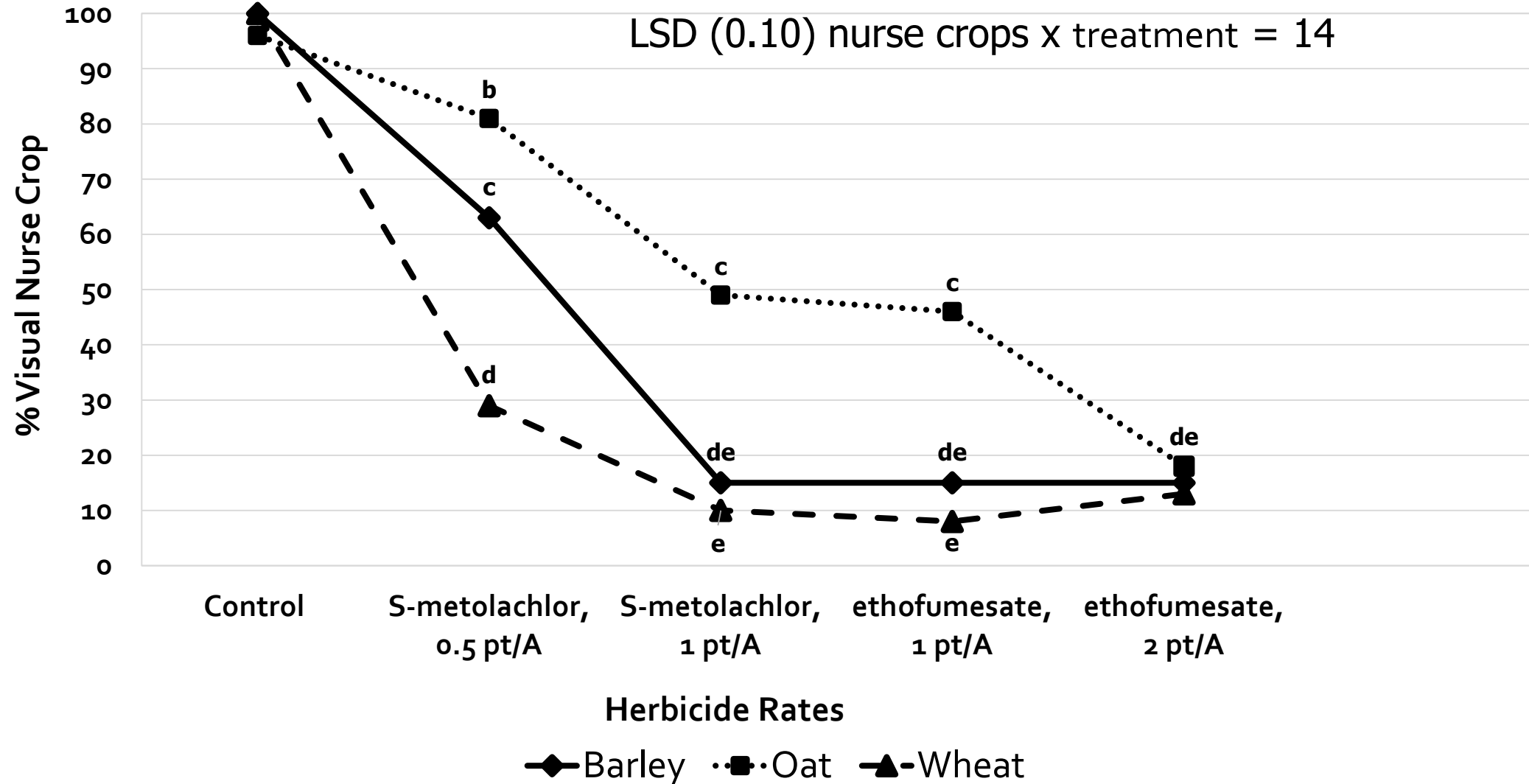
- Nurse crops are broadcast seeded, often with P and K fertilizer and incorporated
- Sugarbeet is often seeded immediately after tillage
- Nurse crops terminated at V₂-V₄ stage



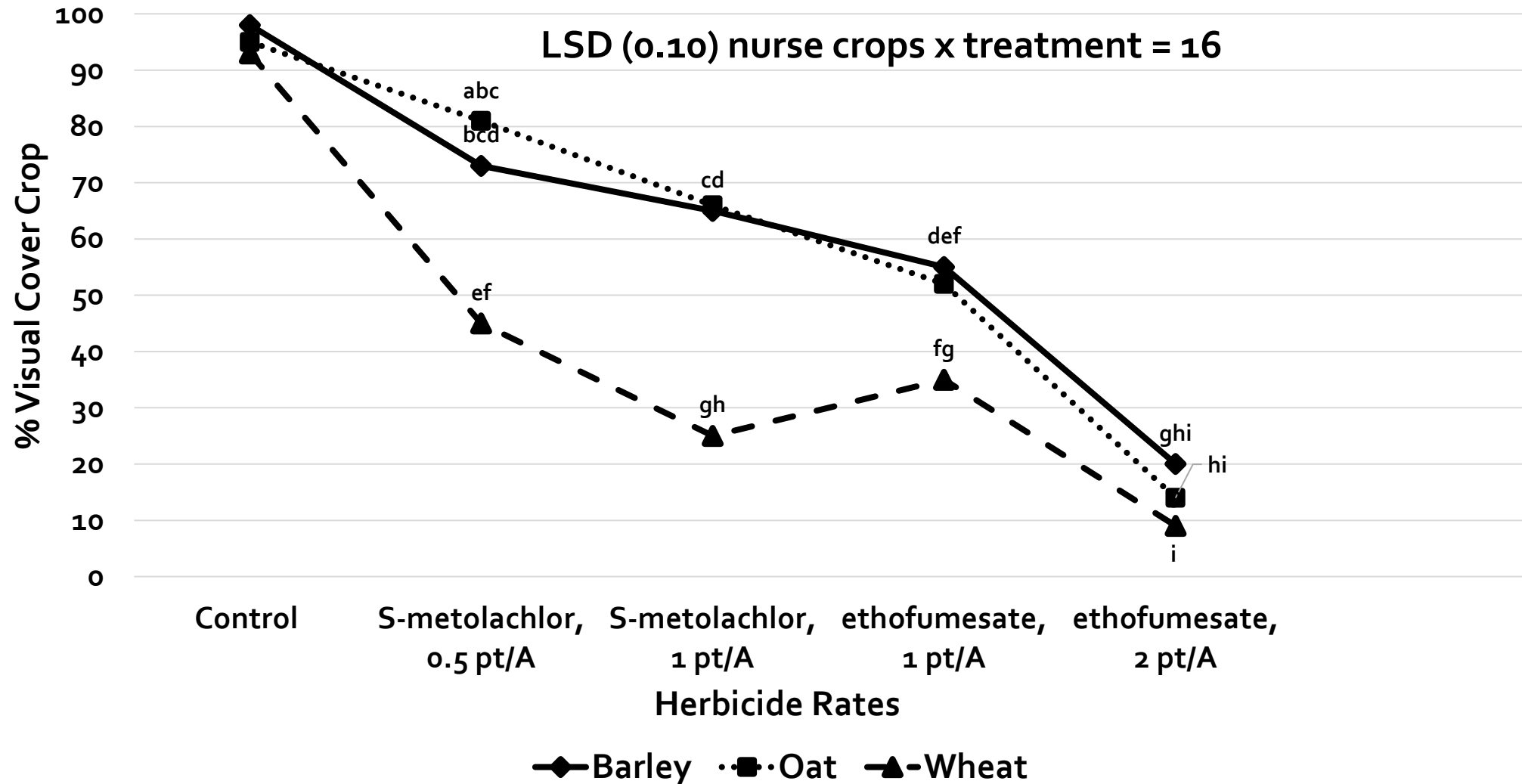
We recommend terminating nurse crops when sugar beet reach 4-lvs, Peters et al., 2015, SBREB 46:34-40

Sugarbeet stage at wheat termination (# of leaves)	Wheat height at termination (inch)	Root Yield (Ton/A)	Recoverable Sucrose (lb/A)
No cover crop	n/a	35.3 ab	11,051 ab
2	2	36.0 a	11,253 a
3	4	36.6 a	11,173 ab
4	6	35.5 ab	10,929 abc
5	8	33.8 b	10,373 c
6	10-12	34.0 b	10,644 bc
LSD (0.10)		1.6	542

Barley, oat, and wheat ground cover in response to soil residual herbicides, 35 days after planting, Foxhome, MN, 2015



Barley, oat, and wheat ground cover in response to soil residual herbicide, 33 days after planting, Foxhome, MN, 2016



Nurse crops or soil residual herbicides?

- Ethofumesate and/or Dual Magnum are our two most common soil residual herbicides applied PRE
 - Dual Magnum is taken up through the shoots of grasses
 - Ethofumesate is taken up through roots and shoots
 - Give nurse crops a head start by delaying PRE application
 - PREs need to rainfall incorporated for them to be activated
-
- Its hard for nurse crops to co-exist for those of you using ethofumesate at 6 pt/A for kochia control

Waterhemp Control Program in Sugarbeet

Planting Date	Recommendation
Sugarbeet plant in April or May	PRE. Dual Magnum at 0.5 to 0.75 pt/A, ethofumesate at 2 to 6 pt/A or Dual Magnum at 0.5 pt/A plus ethofumesate at 2 pt/A
	Split lay-by application (early postemergence / postemergence). Chloroacetamide herbicides applied at 2-lf sugarbeet fb 6- to 8-lf sugarbeet
June	Continue to scout fields for waterhemp. Control escapes with Ultra Blazer (Section 18ee), Liberty with the Redball™ 915 hooded sprayer (24c), or inter-row cultivation
July	Electric Discharge Systems (WeedZapper™)
August / September	Hand remove waterhemp



Fall Seeded Cover Crops

- Seeding in strips configuration to protect against wind exposure and to reduce potential planter 'bounce' during sugarbeet planting
- Managing cover crop seeding rate has mitigated seeding depth issues



Seeding sugarbeet between fall-seeded winter rye

- Tillage and fall applied fertilizer
- Planter is used to seed winter rye at approximately 5 lb/A
- Potentially can cultivate cover crops in rows longer before termination
- Stubble reduces potential for blowing soil

Best Management Practices

- Cover crops need to be actively managed in the spring depending on conditions, especially if broadcast
- Some producers used Gramoxone to slow down growth of winter rye in 2022
- No concerns about using ethofumesate at 5 to 7 pt/A over fall seeded cover crops
- Need to learn more about tillage to incorporate etho / manage cover crop residue





Terminating Cover Crops:

- Use glyphosate at full rates before cover crops reach 8-inch height (6-inch might be even better).
- Might be able to wait longer if cover crops are planted in rows.
- Environmental conditions will determine best timing for termination.

PROs and CONs of fall-seeded cover crops

PROs

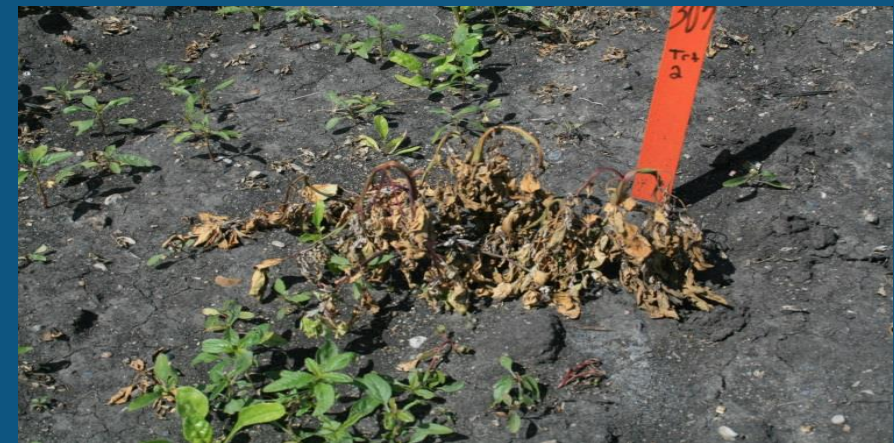
- CCs may allow a grower to use higher ethofumesate rates; incorporate etho.
- Use vertical tillage to incorporate etho?
- CCs may protect longer against blowing soil longer as they have greater C:N ratio and don't degrade as quickly.

CONs

- Nitrogen management issues with CCs.
- Fall field preparation.
- Season may dictate fall field work.
- Fall rainfall will dictate CC development in the fall.
- CCs must be actively managed in the spring.

Waterhemp

Repeat Roundup PM + NIS + AMS applications, Herman MN, 2014



Does PowerMax control waterhemp in Grant and Kandiyohi Counties, MN?

Treatment	Rate	Herman, 2014	Lake Lillian, 2017	Lake Lillian, 2017
	fl oz/A	-----Count/m2-----		
Roundup PowerMax	28	101	192	116
Control	0	432	727	792



Number of waterhemp per meter square, June 6, 2017, Lake Lillian, MN

YES. 77% control at Herman and 76% control at Lake Lillian

Increasing the rate or repeat applications does not improve control

Repeat Roundup PM + NIS + AMS applications, Herman MN, 2014

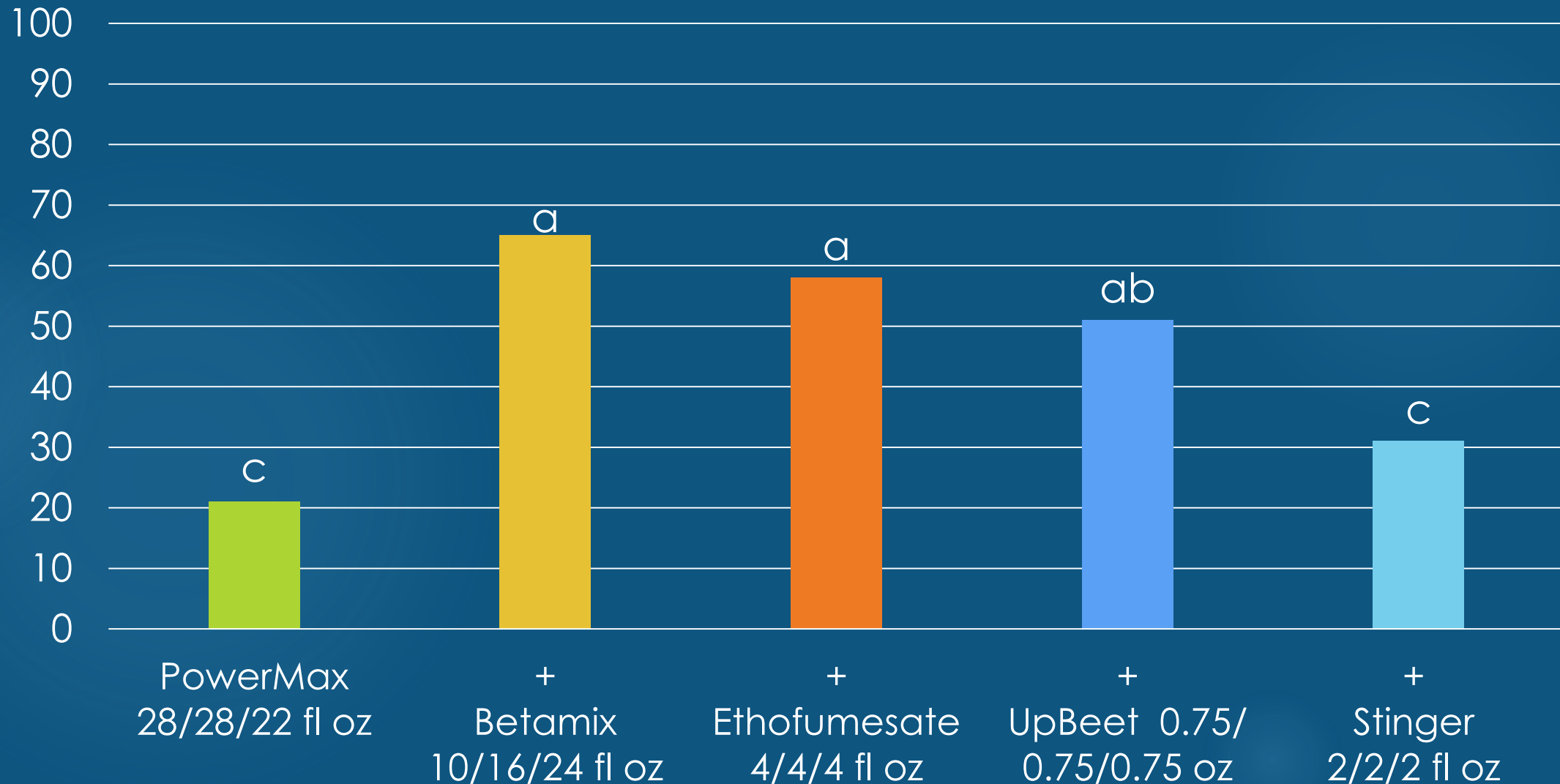


Repeat Roundup PM + NIS + AMS applications, Herman MN, 2014



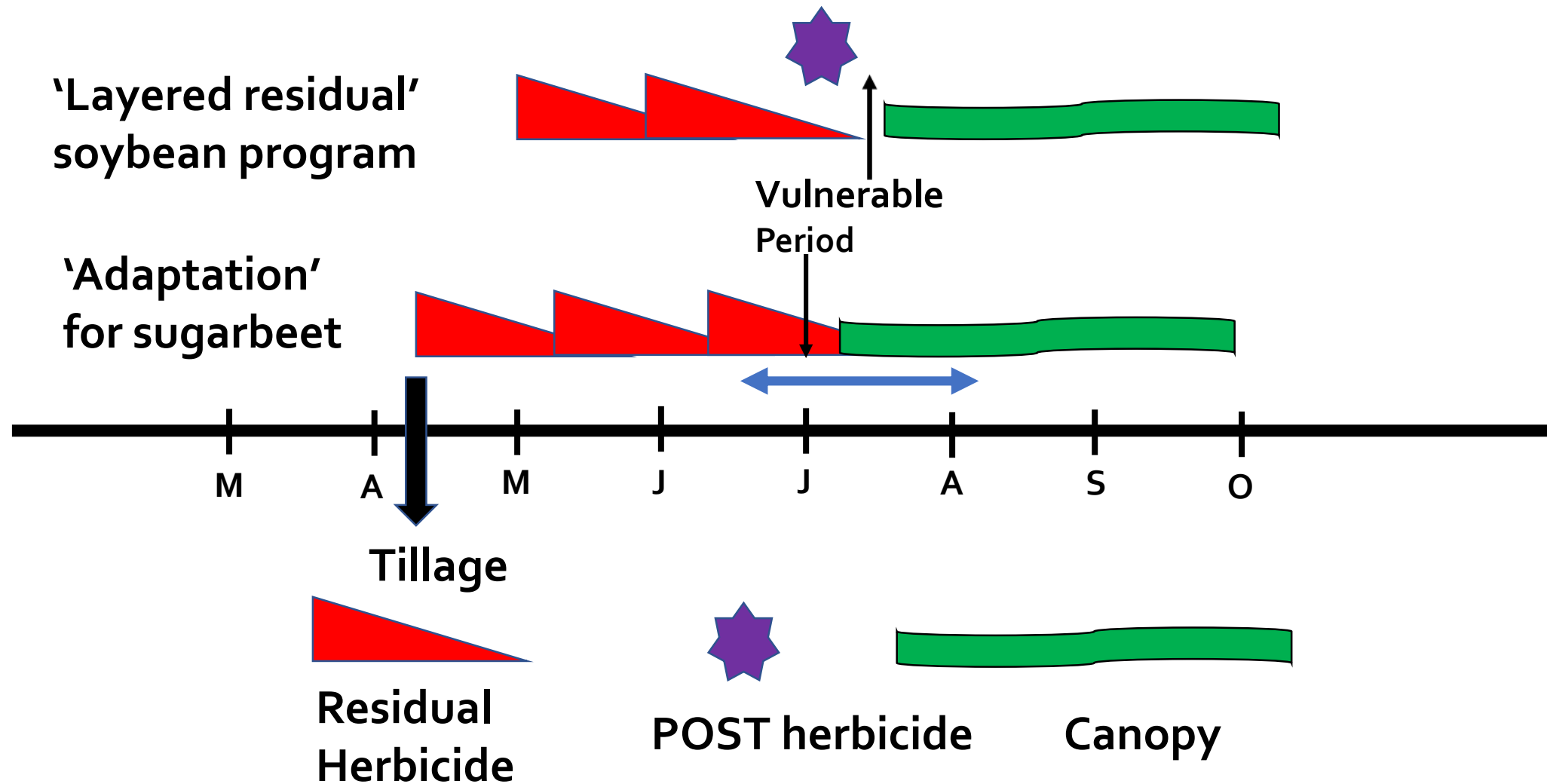
RESULTS - Postemergence

Waterhemp Control – Aug. 27, 2014



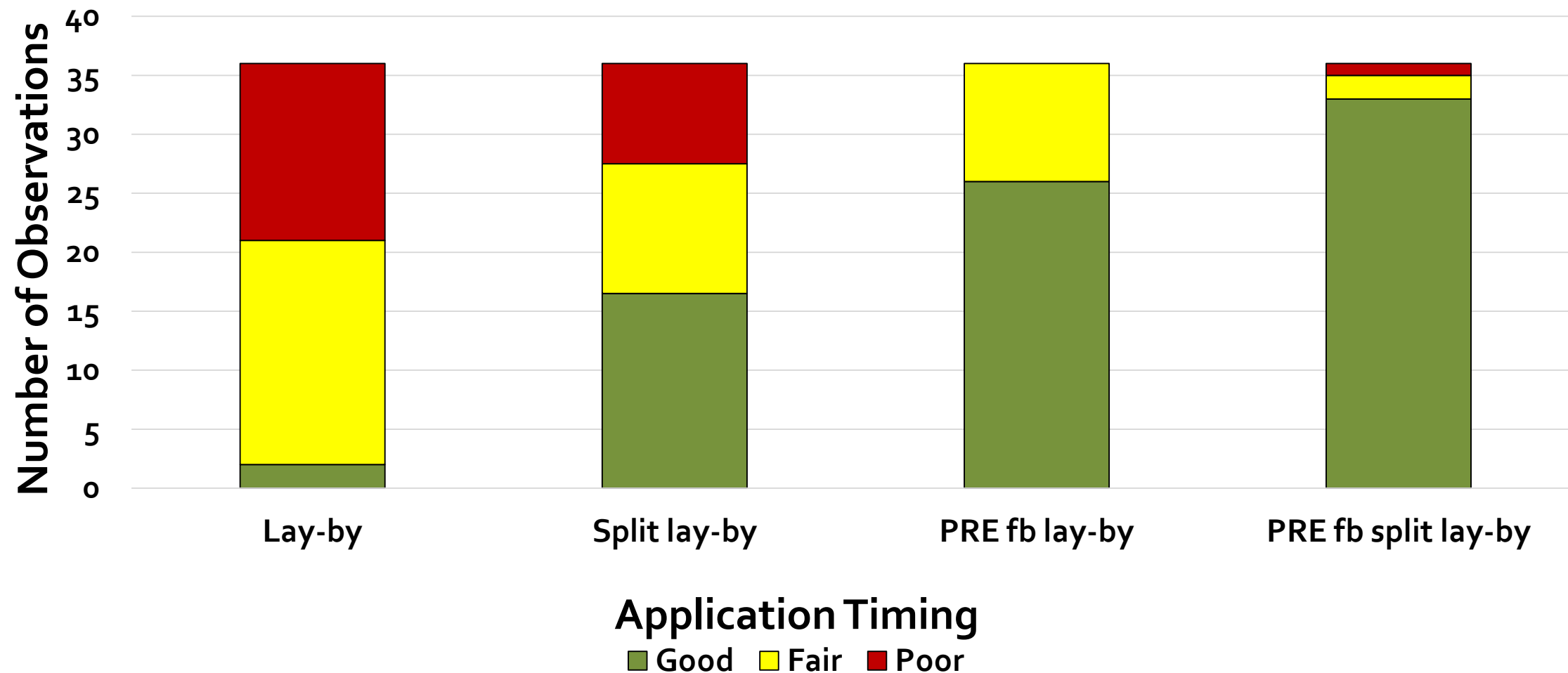
Layered Residual Herbicides

Objective: Prolong PRE activity until canopy fills



Adapted from a slide created by B Hartzler, ISU

Waterhemp control across application timing, summed across herbicides, locations and years^a

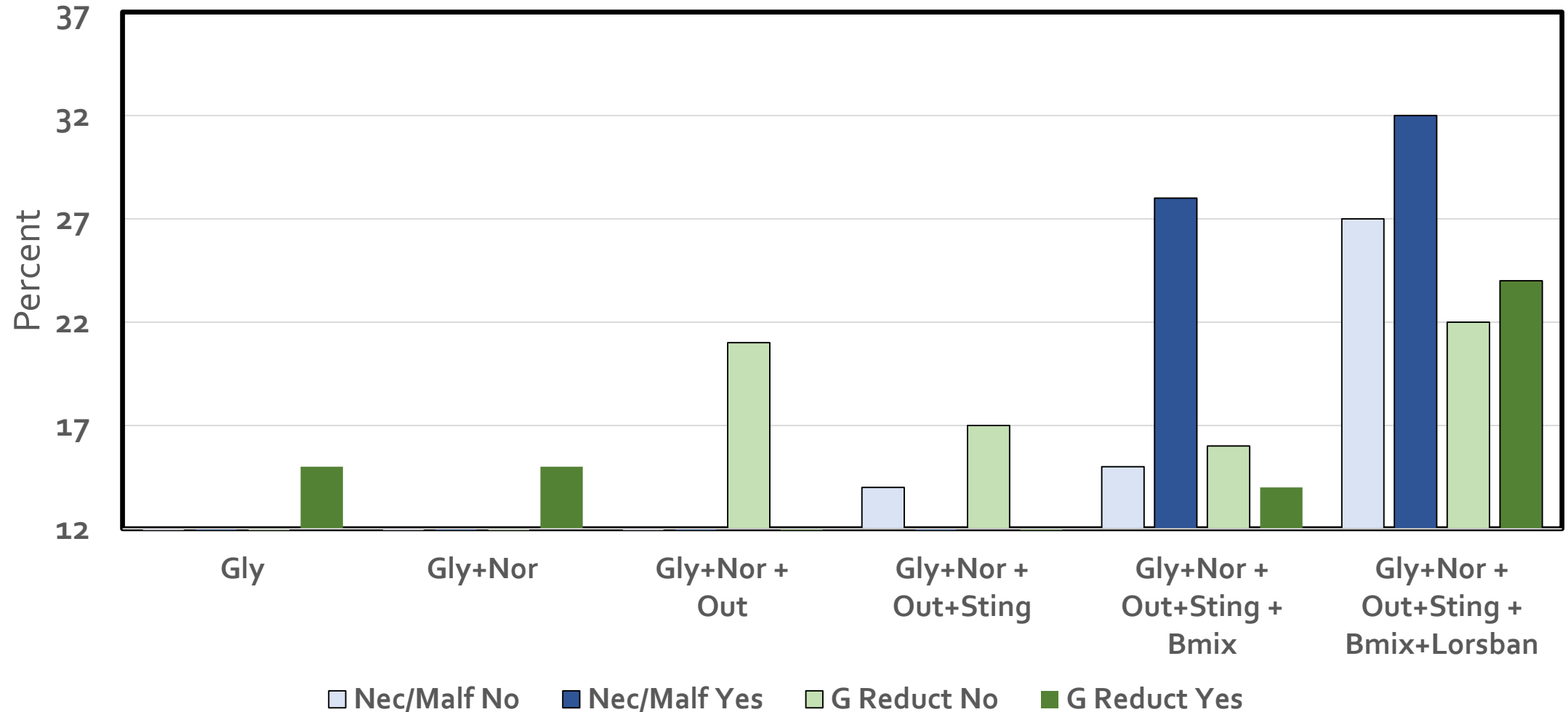


^a2014, 2015 and 2016 field experiments in MN and ND

Question. Can I tank-mix glyphosate + etho and lay-by with.....

- Stinger and Betamix?
- What about Asana or Mustang Max (cutworm?)
- Ethofumesate PRE
- Ethofumesate PRE reduced epicuticular wax (Rubin et al. 1986) and altered structure of cuticular waxes (Leavitt et al. 1979)
- Ethofumesate may increase absorption / efficacy of POST herbicides (Kniss and Odera 2013)

Necrosis/Malformation and G Reduction in response to herbicides, with and without HSMOC, greenhouse 2019/2020



Crop sequence across region and Cooperative

Sugarbeet production in Minnesota and North Dakota

South – Southern Minnesota Beet Sugar Cooperative

- Corn, soybean, corn, sugarbeet – most common
- Soybean, corn, corn, sugarbeet – second most common

Mid – Minn-Dak Farmers Cooperative

- Corn, soybean, corn, sugarbeet

North – American Crystal Sugar Company

- Corn, soybean, wheat, sugarbeet

Corn rotate to Sugarbeet

^a& = premix; + = tank-mix

Products with crop rotation restrictions preventing sugarbeet planting the following year

Premergence	months	Postemergence ^a	months
Verdict (dimethenamid-P & saflufenacil (15&14))	NCS	Acuron GT (meto&meso&bicycle&glyph (15, 27, 27, 9))	18
Anthem Maxx (pyroxasulfone & fluthiacet) (15 & 14)	15	Armezon Pro (topramezone & dimethenamid-P) (27 & 15)	18
Corvus (isoxaflutole, thienencarbazone & safener) (27&2)	17	Halex GT (glyphosate & S-metolachlor & mesiotrione) (9 & 15 & 27)	18
Acuron Flexi (S-metolachlor, mesiotrione, bicyclopyrone & safener) (15 & 27 & 27)	18	Harness Max (acetochlor & mesotrione) (15&27)	18
Balance Flexx (isoxaflutole & safener) (27)	18	Realm Q (rimsulfurone & mesotrione & safener) (2 & 27)	18
Resicore / Resicore XL (acetoachlor, mesotrione & clopyralid) (15 & 27 & 4)	18	Maverick (mesotrione, clopyralid & pyroxasulfone) (27,4,15)	18
Atrazine (5)	2 CS	Sinate (topramezone & glufosinate (27 & 10) + atrazine (need LL Corn))	18
Surestart II (acetochlor, flumetsulam & clopyralid) (15 & 2 & 4)	26		



Soybean rotate to Sugarbeet

Products with crop rotation restrictions

^a& = premix; + = tank-mix
^bwith soil testing



Preemergence	months	Postemergence ^a	months
XtendiMax / Engenia (dicamba) (need XtendiMax soybean	NCS	Flexstar GT fomesafen & glyphosate) (14 & 9)	18
Fierce *pyroxasulfone & flumioxazin) (15 & 14)	12		
Boundary (S-metolachlor & metribuzin) (15 & 5)	18		
Fierce MTZ (pyroxasulfone & flumioxazin & metribuzin	18		
Authority Edge (sulfentrazone & pyroxasulfone) (14 & 15)	24		
Authority First / Sonic (sulfentrazone & chloransulam) (14 & 2)	30		
Sonic (sulfentrazone & chloransulam (14 & 2)	30 ^b		
Surveil (flumioxazin & chloransulam) (14 & 2)	30 ^b		
Authority MTZ (sulfentrazone & metribuzin) (14, 15 & 5)	36/24 ^b		
BroadAxe XC (S-metolachlor & sulfentrazone) (15& 14)	36		
Zidua Pro (pyroxasulfone, saflufenacil & imazethapyr) (15 & 14 & 2)	40		





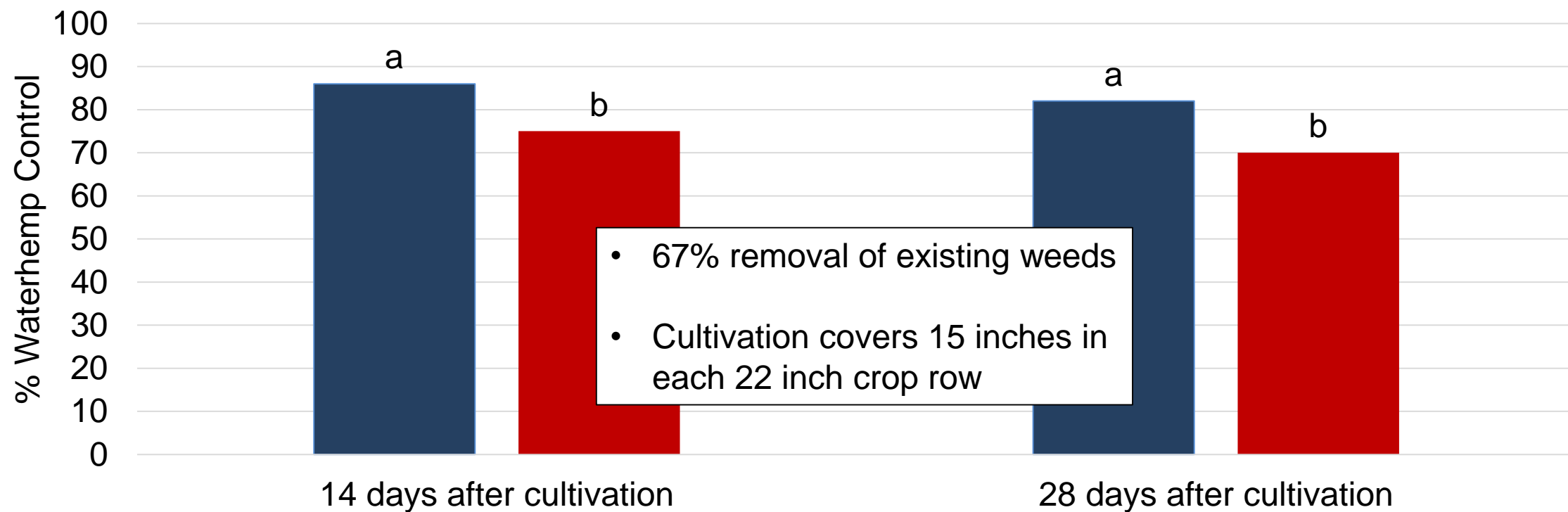
Schmoll Farms
Lake Lillian, MN

When should I cultivate?

- Consider weed size, target waterhemp less than 4-inch, 4 to 6-inch maximum size
- Cultivate before second lay-by application
 - Be proactive and cultivate to remove GR weed escapes
 - Apply second lay-by after cultivation



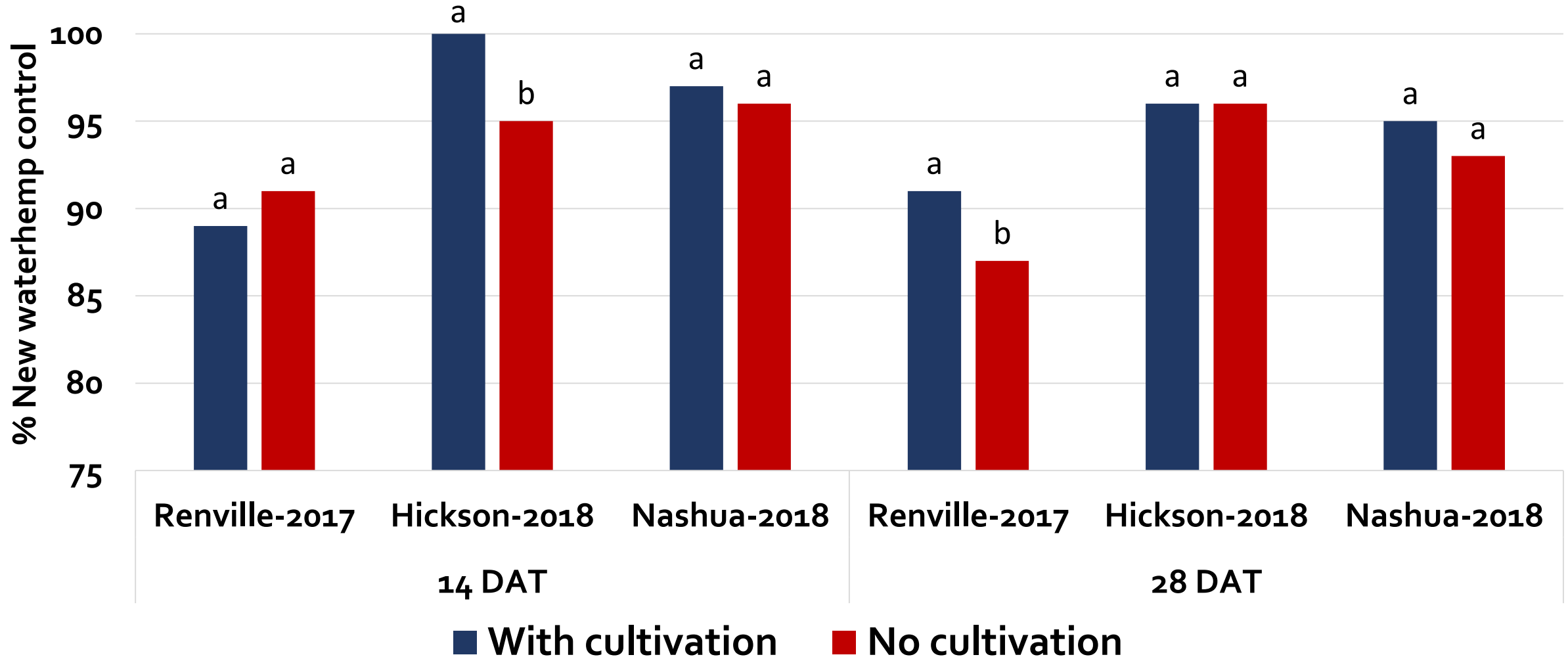
Cultivation two weeks after POST spray improved waterhemp control 11-12% across four environments



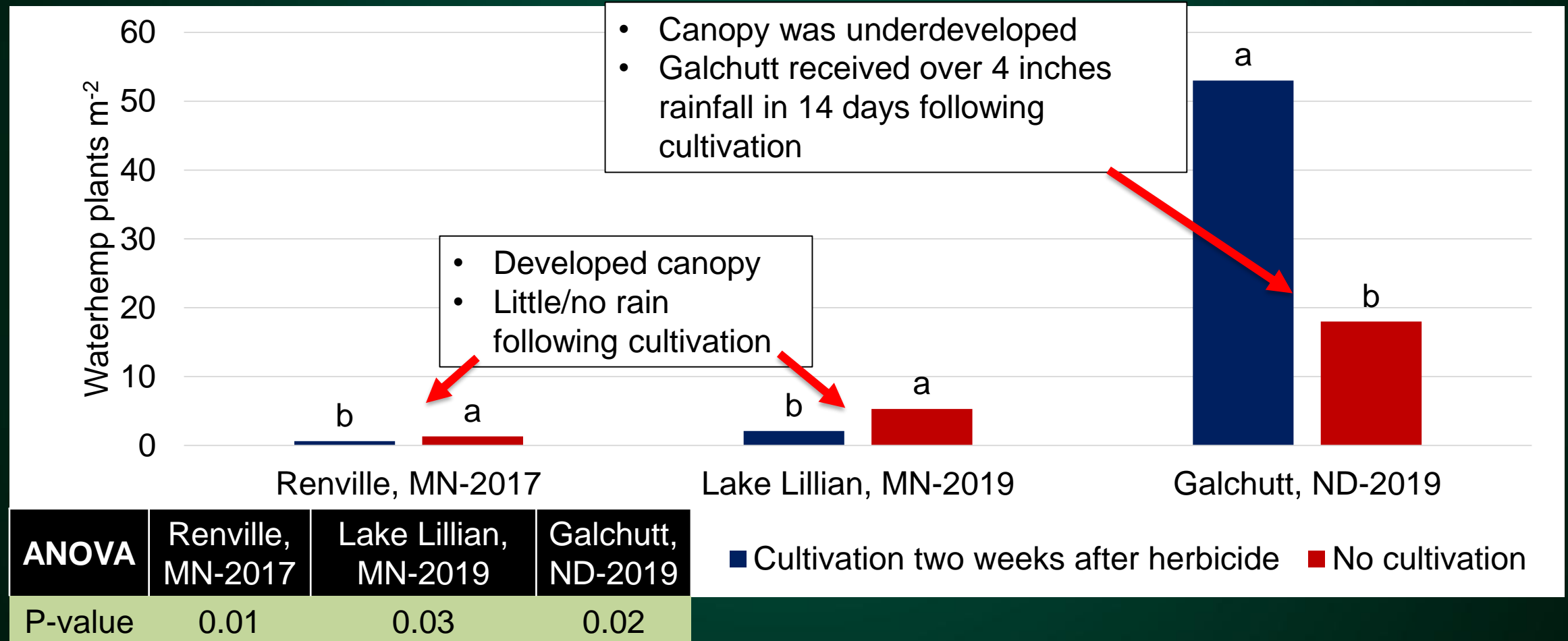
ANOVA	14 DAT	28 DAT
P-value	0.038	0.030

■ Cultivation two weeks after herbicide ■ No cultivation

Early cultivation generally had no effect on new waterhemp emergence control in a dense canopy



Delayed cultivation significantly increased waterhemp density 28 DAT in Galchutt, ND-2019



Ultra Blazer

Acifluorfen was applied on over 65,000 acres following Environmental Protection Agency (EPA) approval of a Section 18 emergency exemption in 2021 and 2022.

- A single Ultra Blazer application at 16 fl oz/A alone or with NIS on greater than 6-leaf sugarbeet stage.
- Ultra Blazer alone or in mixtures with PowerMax(3) and AMS.
- Target waterhemp up to 4-inch.
- Apply Ultra Blazer in afternoon hours on days with maximum day-time air temperatures greater than 85F.
- Application before 6 leaf sugar beet will result in crop injury and potential yield loss.
- 95% of survey respondents (2021) indicated the emergency exemption was beneficial and contributed to overall weed management.



2022 (and 2023) Ultra Blazer program objectives

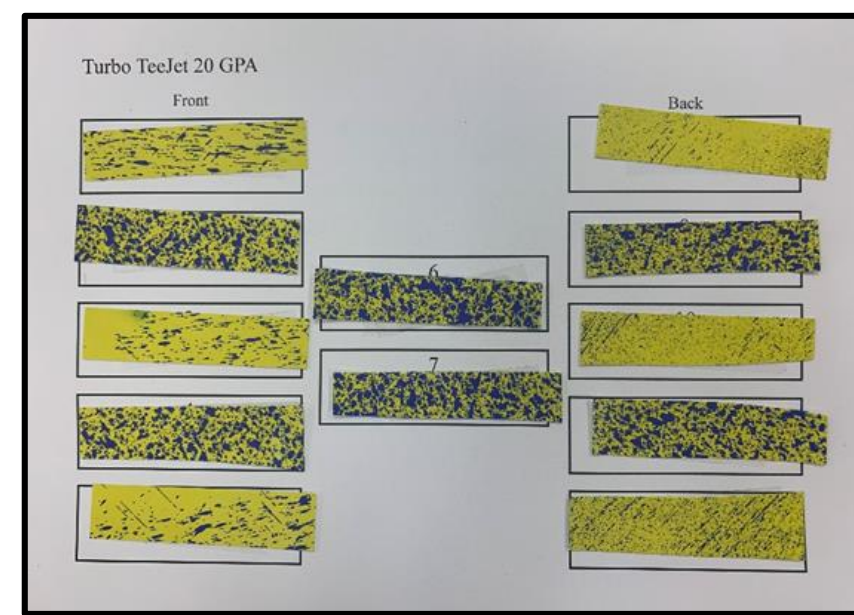
Improve sugarbeet safety; increase waterhemp control.

- Revisit repeat applications (Ultra Blazer fb Ultra Blazer at 12 fb 12 fl oz/A).
- Evaluate crop oil concentrate with Ultra Blazer.
- Nozzles and spray volume to improve coverage and waterhemp control.

Ultra Blazer in 2023

Using our acquired knowledge of spray quality for Cercospora leaf spot control on weed control

- Spray nozzles
- Spray volume



Nozzle	Necrosis ¹		WH Control ²	
	15 gpa	20 gpa	15 gpa	20 gpa
XR TeeJet	33 abc	38 ab	60 c	80 a
AIXR	23 c	23 c	64 c	68 c
Turbo TeeJet	28 bc	30 bc	69 bc	78 ab
Turbo TwinJet	26 c	43a	83 a	81 a

¹Necrosis sugarbeet injury 13 DAT

²Waterhemp control 41 DAT
Moorhead MN, 2022



Common Ragweed Control

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



Stinger HL 'Higher Load' is approved for corn, cereals, canola, and sugarbeet in MN and ND.

Product	Loading	Labeled rate	Sugarbeet rate
Stinger	3 lb/gal	4 – 10.7 fl oz/A	2 – 6 fl oz/A
Stinger HL	5 lb/gal	2.4 – 6.4 fl oz/A	1.8 – 3.6 fl oz/A

	Converting Stinger rate to Stinger HL rate			
	fl oz/A	fl oz/A	fl oz/A	fl oz/A
Stinger	2	3	4	6
Stinger HL	1.2	1.8	2.4	3.6

Common ragweed control, Ada, MN, 2022

			Common ragweed control		
Treatment	Rate	Common Ragweed	July 8	July 16	July 26
	fl oz/A	inch	%	%	%
Stinger HL + PowerMax3	1.2 + 25	<2	75 b	61 cd	60 cd
Stinger HL + PowerMax3	1.8 + 25	<2	91 a	83 b	80 b
Stinger HL + PowerMax3	2.4 + 25	<2	91 a	87 ab	88 a
Stinger HL + PM ₃ / Stinger HL + PM ₃	1.5 + 25 / 1.5 + 25	<2 / 10 day	91 a	91 ab	89 a
Stinger HL + PM ₃ / Stinger HL + PM ₃	1.8 + 25 / 1.8 + 25	<2 / 10 day	95 a	92 a	94 a
LSD (0.05)			6	8	6

Common ragweed control, Ada, MN, 2022

			Common ragweed control		
Treatment	Rate	Common Ragweed	July 8	July 16	July 26
	fl oz/A	inch	%	%	%
Stinger HL + PowerMax3	1.2 + 25	2-4	65 c	59 d	54 d
Stinger HL + PowerMax3	1.8 + 25	2-4	68 c	61 cd	63 c
Stinger HL + PowerMax3	2.4 + 25	2-4	71 bc	67 cd	65 c
Stinger HL + PM ₃ / Stinger HL + PM ₃	1.5 + 25 / 1.5 + 25	2-4 / 10 day	69 c	69 c	77 b
Stinger HL + PM ₃ / Stinger HL + PM ₃	1.8 + 25 / 1.8 + 25	2-4 / 10 day	70 bc	69 c	79 b
LSD (0.05)			6	8	6

Best Management Practices for Stinger HL application and ragweed control

- Stinger HL at 1.8 fl oz/A must be our lowest rate; 2.4 fl oz is preferred.
- Stinger at 1.8 fl oz/A fb Stinger HL at 1.8 fl oz/A for repeat applications.
- Time Stinger HL application to ragweed size rather than sugarbeet stage.
- May need to separate glyphosate and Stinger HL application if using nurse crops and want to delay termination to 4-lf sugarbeet.
- Tank-mix Stinger HL with glyphosate, ethofumesate, and a chloroacetamide.
- Complex mixtures? Adding Mustang Max, Asana or Betamix?
- Carryover.

Thank you for your attention and your continued support

Tom Peters

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