Weed Control in Sugarbeet

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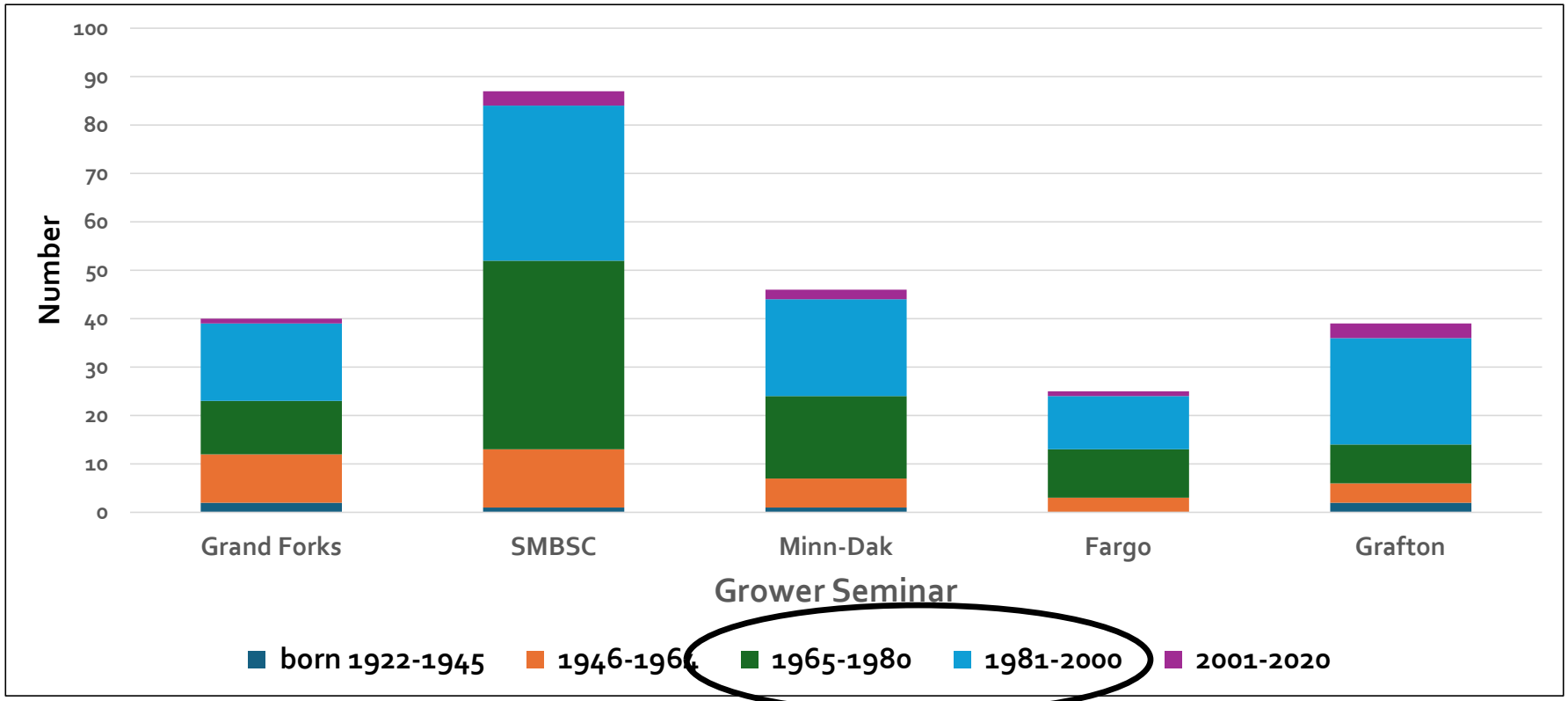
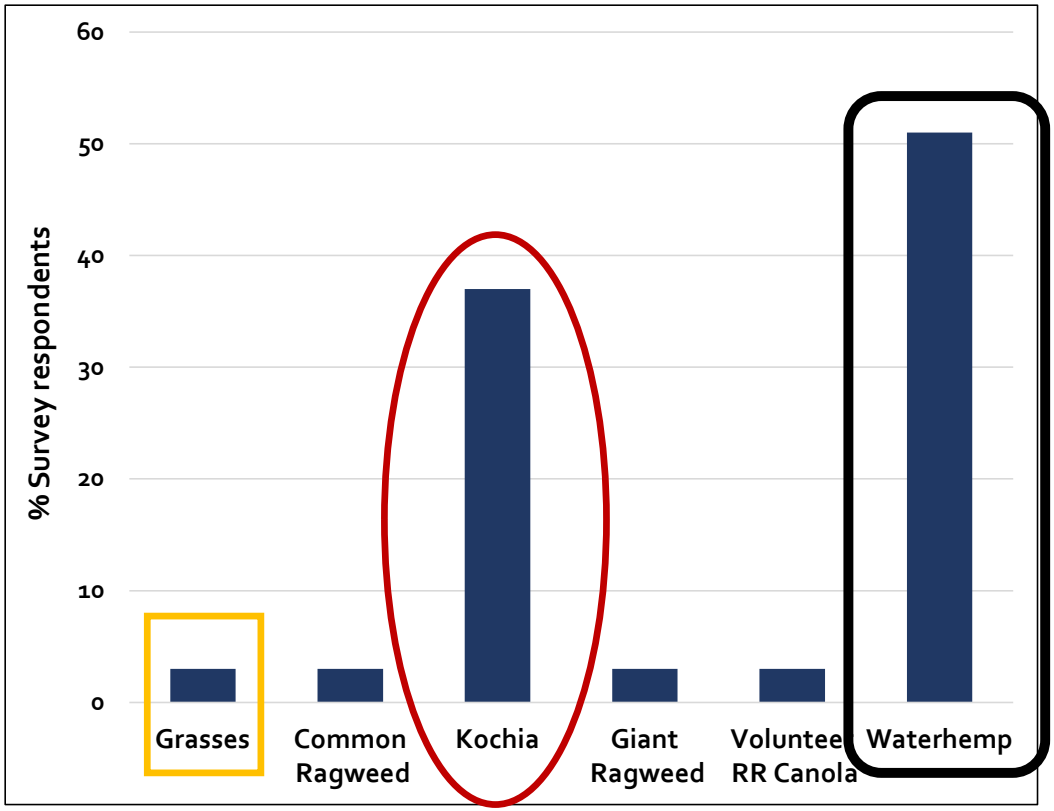
North Dakota State University and University of Minnesota, Fargo, ND

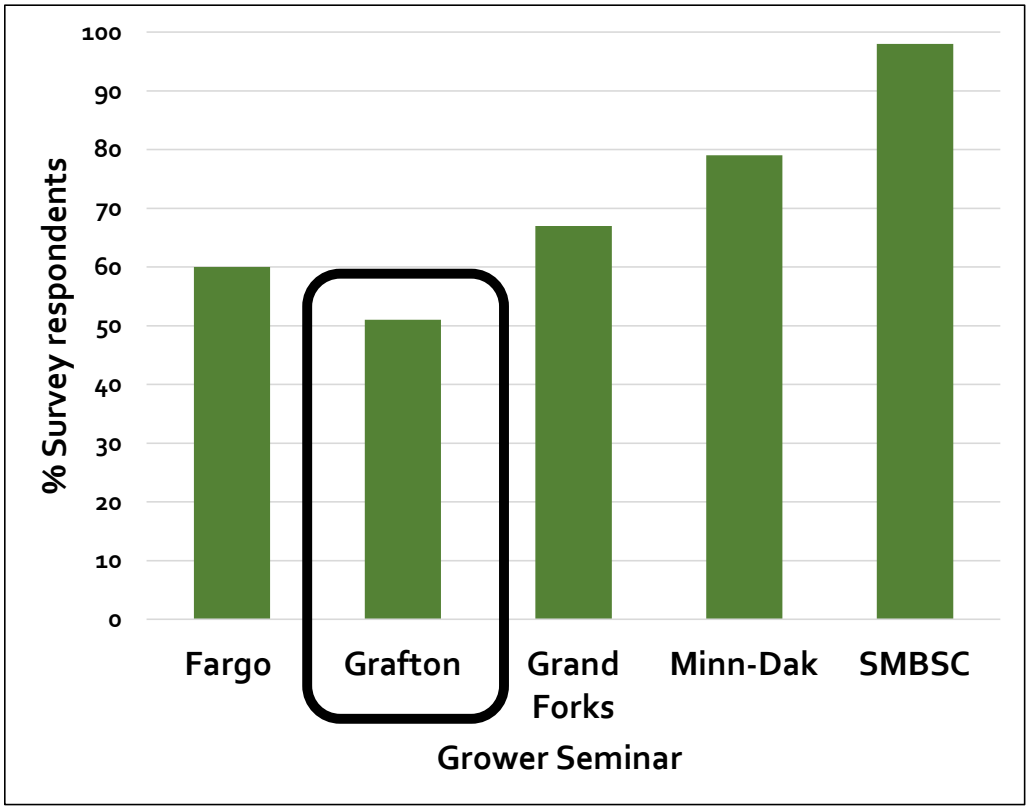
Who are you? What age group best describes you[a]?



[a]Turning Point Survey, 2025 Sugarbeet Growers Seminars

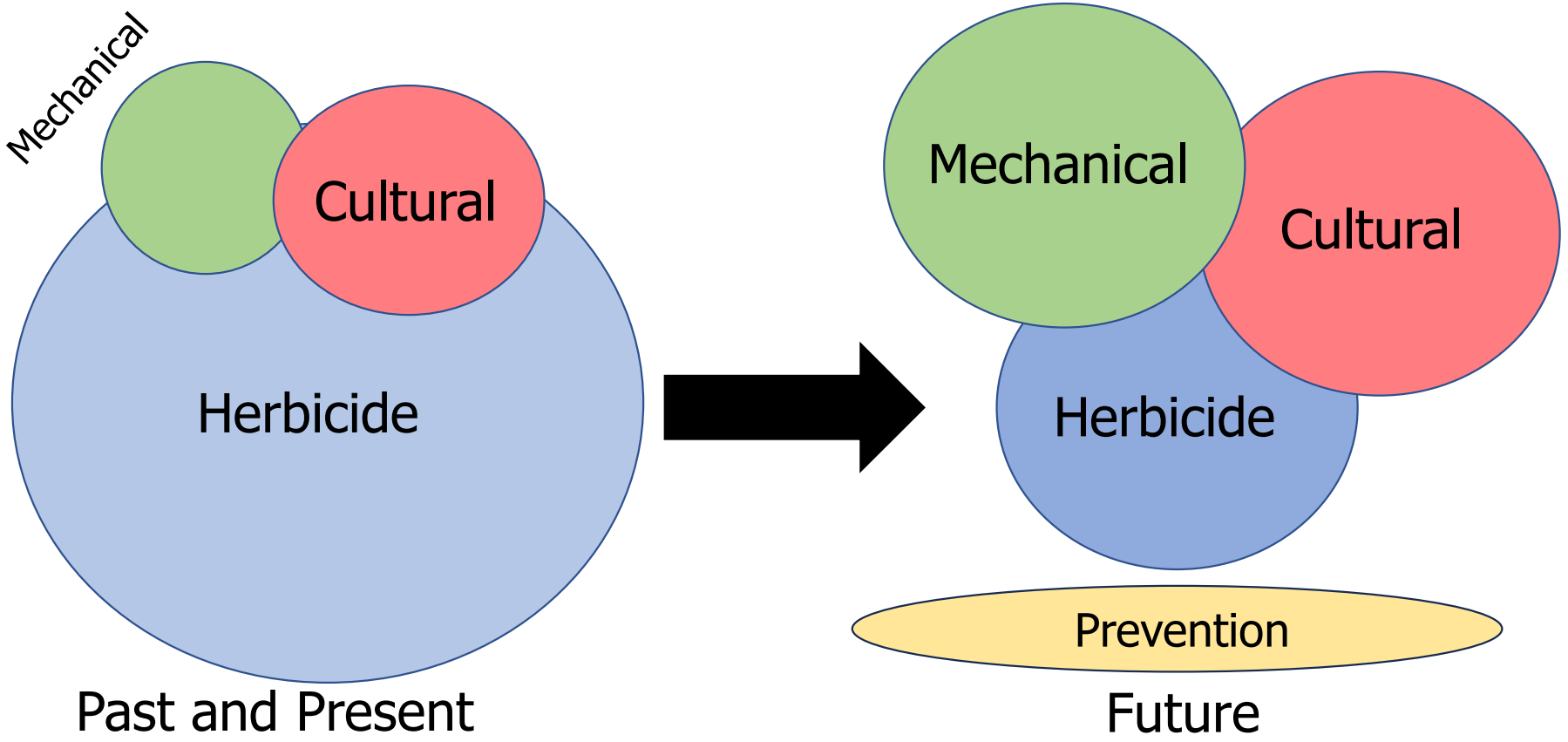
What was your worst weed control challenge in 2024? How do you compare to other regions[a]?





[a]Turning Point Survey, 2025 Sugarbeet Growers Seminars

Integrated Weed Management



Slide adapted from Bob Hartzler, Iowa State University

March 26. The surface 1-inch was thawed and below that it was frozen.
Photo credit, Lee Briese

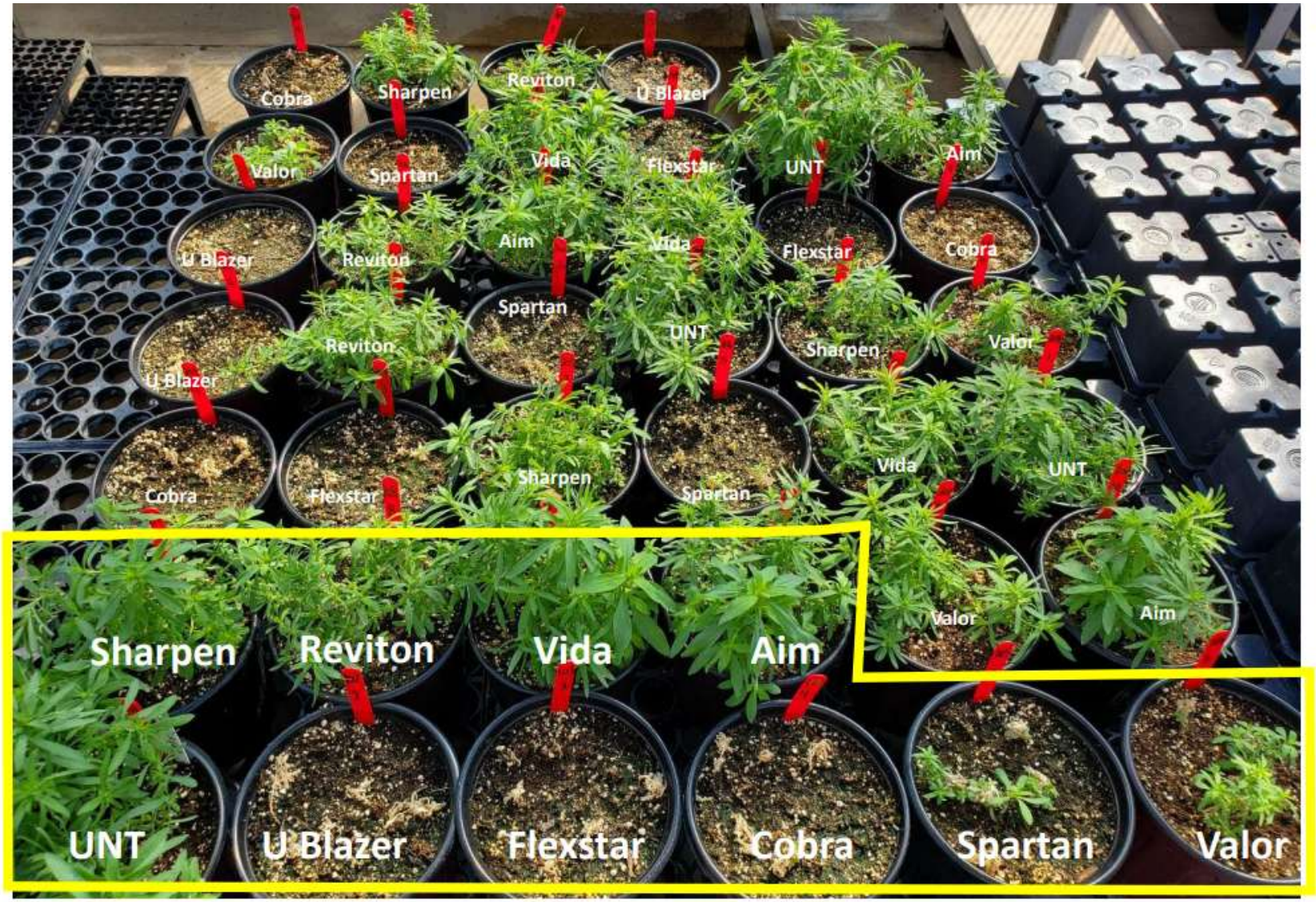
Best practices for kochia control

1. Control kochia in the crop sequence, especially spring wheat before sugarbeet
2. Ethofumesate at 6 to 7.5 pints per acre PRE
3. Paraquat after kochia emergence but before sugarbeet emergence

- Gramoxone SL 3.0 at 1.3 pt/A with non-ionic surfactant at 1 qt/100G in 15 to 20 gpa water carrier
- What about when its cold? <55F?
- Jason Hanson, Rock and Roll Agronomy, says increase the rate to 2 pt/A and mix MSO (1G/100G) with NIS and AMS and use 20 gpa water carrier

Group 14 Resistance

- Kochia remains sensitive to the diphenyl ethers
- This story is changing fast!



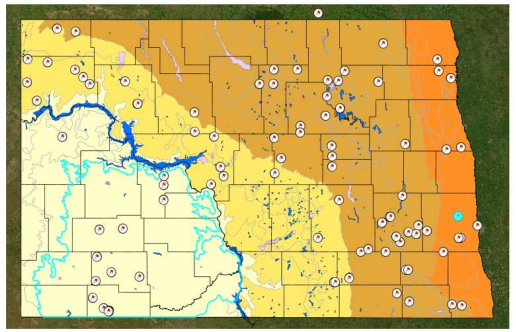
Slide courtesy of Brian Jenks, NDSU

Ikley & Lim, Semi-Random Kochia Sampling

- 100 samples collected from a survey of ND fields
- Drive around and sample kochia escapes
- No knowledge of field or field history

Results – North Dakota

- Greenhouse assay 2025: 100 samples
  - Mixture of submissions and random survey

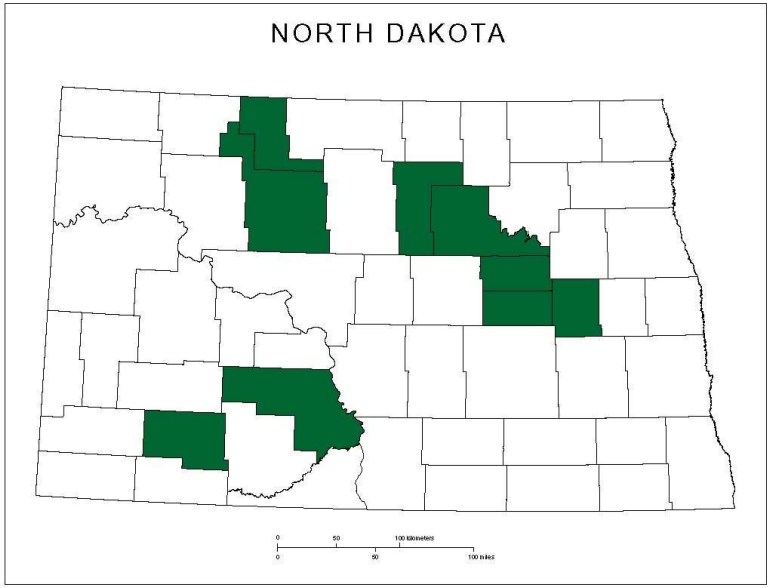


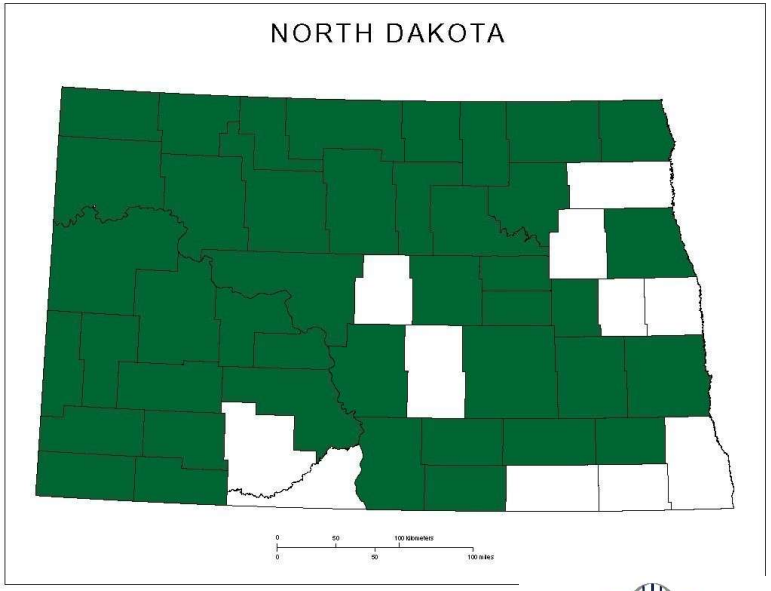
49/93 (53%) resistant

NDSU WEED SCIENCE | Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada | NAGC NATIONAL AGRICULTURAL GENOTYPING CENTER

- 53% of samples positive for Group 14, PPO Inhibitor resistance
- 100% of samples positive for Group 9, glyphosate resistance
- 20% of the samples positive for dicamba resistance

ND 2023 vs 2026





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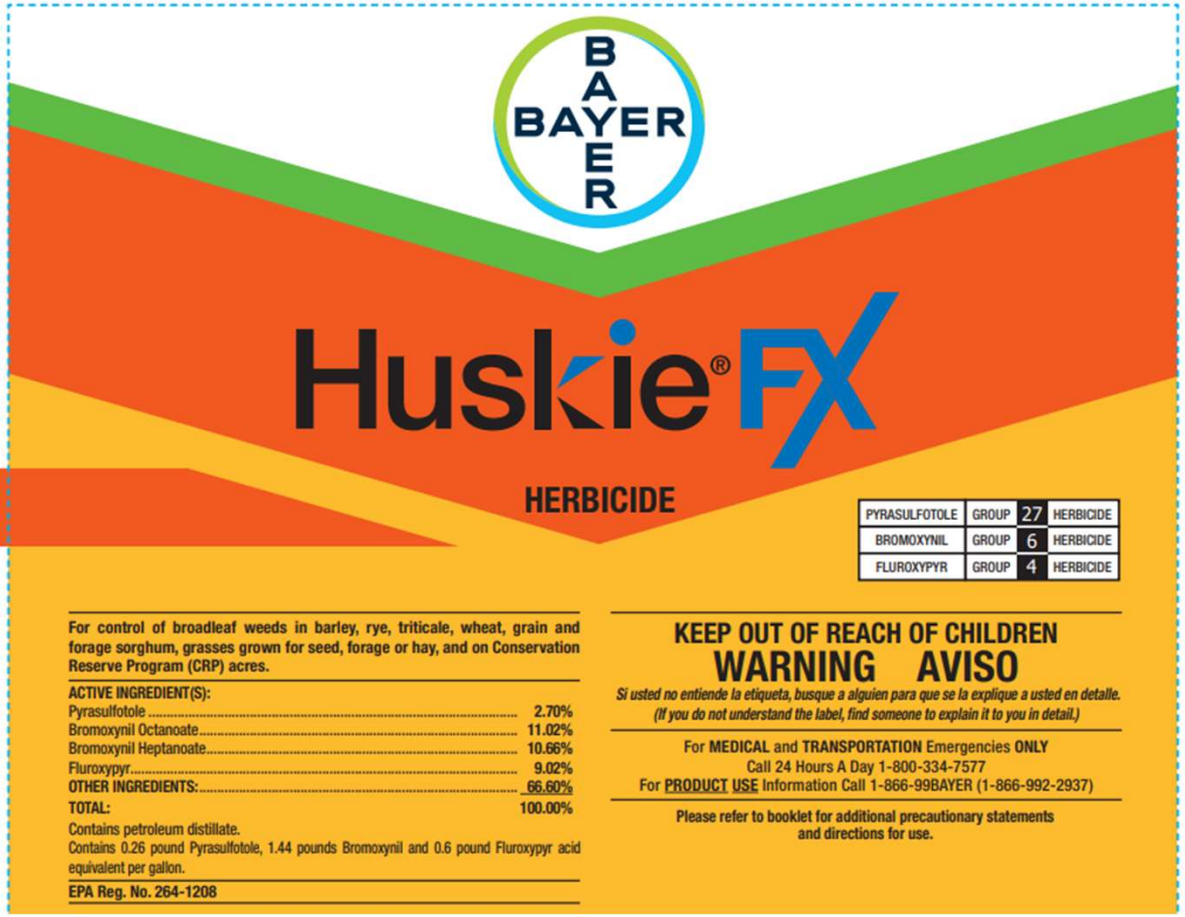
Get back to herbicide basics GROW, https://growiwm.org

- What are the most important weeds on your farm?
- Are they herbicide resistant? Which herbicides?
- What herbicides are in the PREMIX?
- What site-of-action group?
- Are the herbicides effective (95% control) against the weeds in your field.
- What is the labeled rate for control? Is the labeled rate the same as the PREMIX rate?
- https://www.cdms.net/
- Use the 2026 North Dakota Weed Control Guide to determine rates, % control, rotation restriction for crops in your sequence.

Huskie FX Herbicide



- POST
- Apply maximum rate of 18 fl oz/A
- Controls numerous important MN and ND weeds including waterhemp and kochia (< 2")
- Starane Ultra label says to apply 0.4 pt/A (0.14 lb/A) if herbicide-resistant kochia is present

What rate of Starane Ultra should be added to reach 0.14 lb ai/A of fluroxypyr?

2.6 fl oz/A of Starane Ultra

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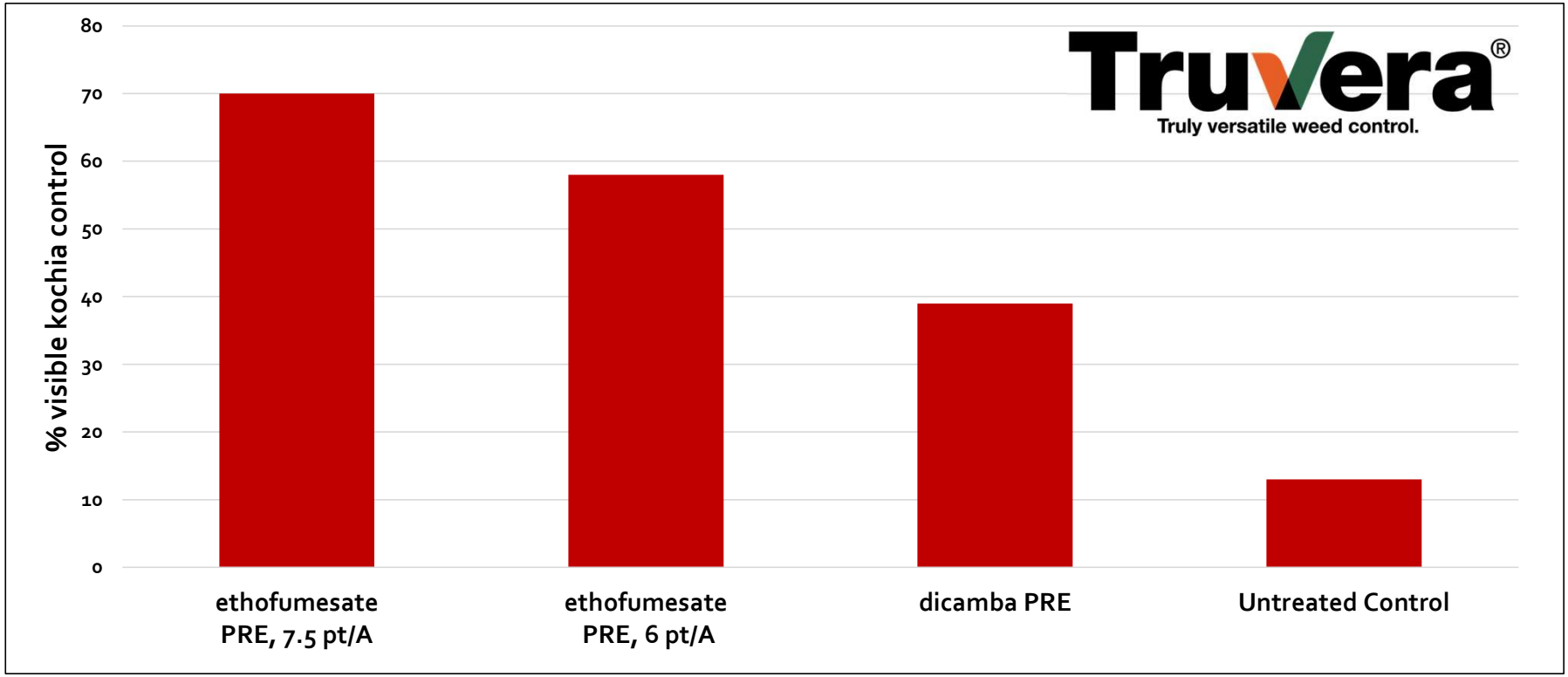
Kochia control in response to PRE treatment, 20 DAP, Felton, MN 2025



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Best practices for kochia control

4. Glyphosate on sensitive kochia (fence-line kochia). Roundup PowerMax3 (full rates) mixed with a high quality adjuvant and ammonium sulfate. Kochia up to 3-inch tall.

- How much kochia is glyphosate sensitive?
- Joe Ikley (NDSU) randomly sampled 100 kochia escapes and has found that the first 60 tested are glyphosate resistant

MESSAGE: Test your kochia for herbicide tolerance

Best practices for kochia control

5. Spin-Aid mixed with ethofumesate or Spin-Aid mixed with ethofumesate, Roundup PowerMax3 and Stinger HL on GR kochia (railroad tracks kochia)
   - Start early on small kochia and spray on 7-day intervals
   - Spin-Aid rates increase as sugarbeet stage increases
   - Two or three applications

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

Kochia control with Spin-Aid

		Kochia Control		
Herbicide Treatment	Rate	June 3 12 DAAD	June 19 28 DAAD	June 26 35 DAAD
	fl oz/A	----------(% visible control)----------		
Spin-Aid (SA)	12	50 d	25 d	15 d
SA / SA	12 / 24	68 c	50 c	30 c
SA / SA / SA	12 / 24 / 32	78 b	65 b	39 bc
Etho / SA / SA	6 p / 12 / 16	80 ab	65 b	41 b
Etho / SA / SA / SA	6 p / 12/ 16/ 24	89 a	79 a	59 a
LSD (0.10)		10	7	9

[a]Spin-Aid mixed with ethofumesate at 4 fl oz per acre with MSO or HSMOC at 1 pt/A
[b]Spin-Aid applied on 7 day intervals


B
Spin-Aid, 12/24 fl oz/A


C
Spin-Aid, 12/24/32 fl oz/A


A
Spin-Aid, 12 fl oz/A


D
Etho, PRE /Spin-Aid, 12/16 fl oz/A

Kochia control with Spin-Aid

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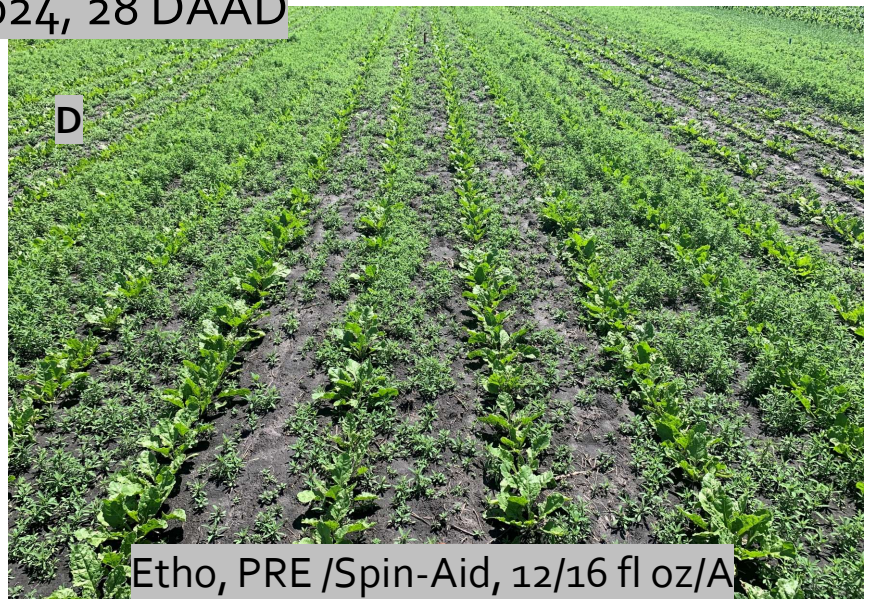
[a]Spin-Aid mixed with ethofumesate at 4 fl oz per acre with MSO or HSMOC at 1 pt/A
[b]Spin-Aid applied on 7 day intervals

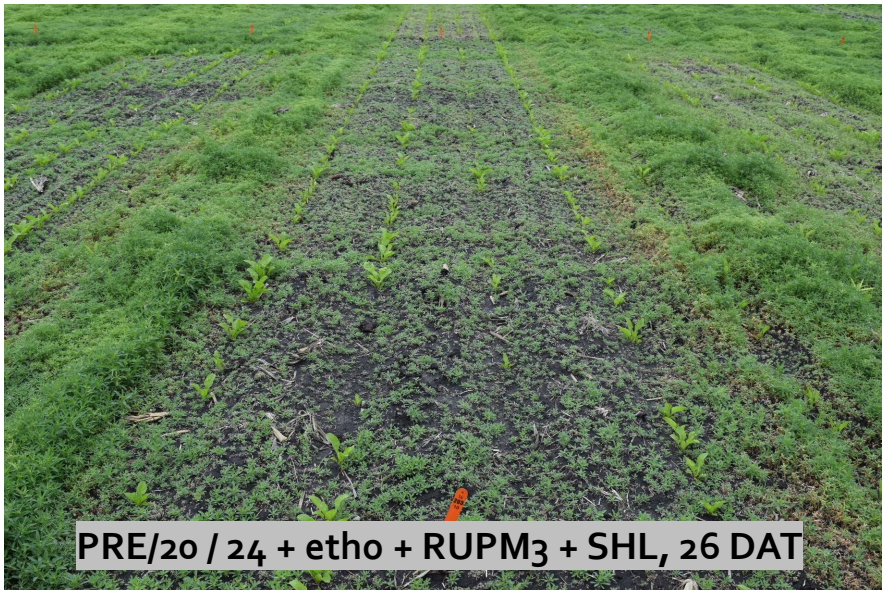
Image: June 19, 2024, 28 DAAD



Kochia control, Felton (F) and Felton-Hagen (FH), 2025

Spin-Aid	SHL	Etho PRE	F 47 DAP	F 57 DAP	FH 57 DAP	FH 63 DAP
Number	Y/N		----------(% Control)----------			
3	N	N	59 CD	49 e	44 D	51 cd
3	Y	N	66 C	50 e	65 C	50 cde
2	Y	Y	**84 AB**	**65 bc**	**79 A**	61 bc

Control, June 9, 2025, Felton, MN



PRE/20 / 24 + etho + RUPM3 + SHL, 26 DAT

Summary from field experiments in 2024 and 2025

1. Stinger HL and Roundup PowerMax3 mixed with Spin-Aid and etho improved kochia control as compared to Spin-Aid and etho alone.
2. Micro-rate program/concept suppressed kochia size but didn't always reduce kochia number.
3. Focus has been on kochia first and the Spin-Aid rate to tolerate sugarbeet. What if we focus on the Spin-Aid rate to kill kochia and time to sugarbeet growth stage?


Image 14 DAAC
105
5
308
7
204
8
407
9
Spin-Aid+etho+MSO
32 / 32 fl oz
Spin-Aid+etho+MSO
16 / 32 / 48 fl oz
Spin-Aid+etho+MSO
24 / 32 / 48 fl oz
Control
105
107
108
109
Image 3 DAAC

For waterhemp control: need 3-4 effective active ingredients in a program. POST when weeds are less than 3-inch. PRE mandatory for time management constraints and overall effectiveness.

	Wheat	Sugarbeet	Corn	Soybean
PRE	14	15	15 27	3 4 5 14 15
POST/PRE	15	15	15	15
POST	27 6 4		4 5 27	4 10

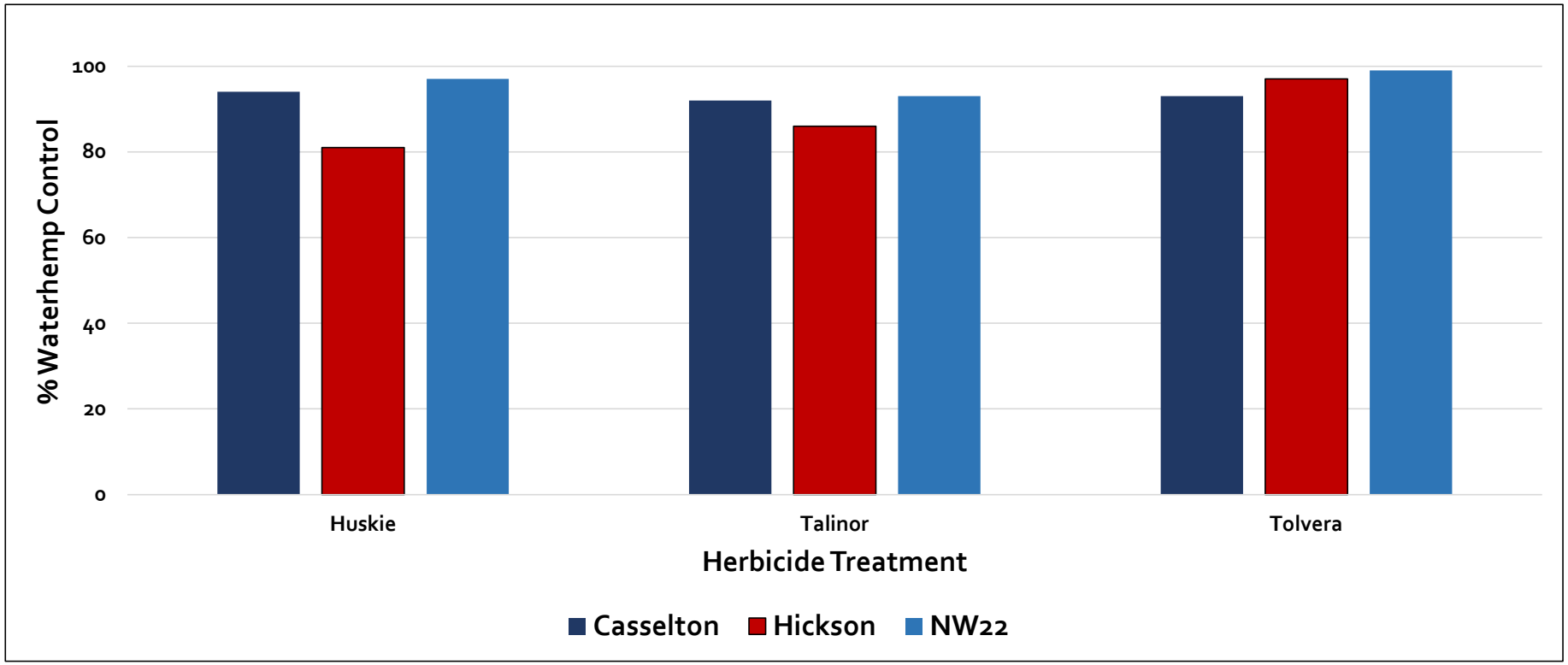
- Lots of 15s
- Not much for waterhemp control in sugarbeet
- Lots of options in soybean; I'm not saying waterhemp control in soybean is easy

Create the best herbicide trait/herbicide program for your farm

Wheat

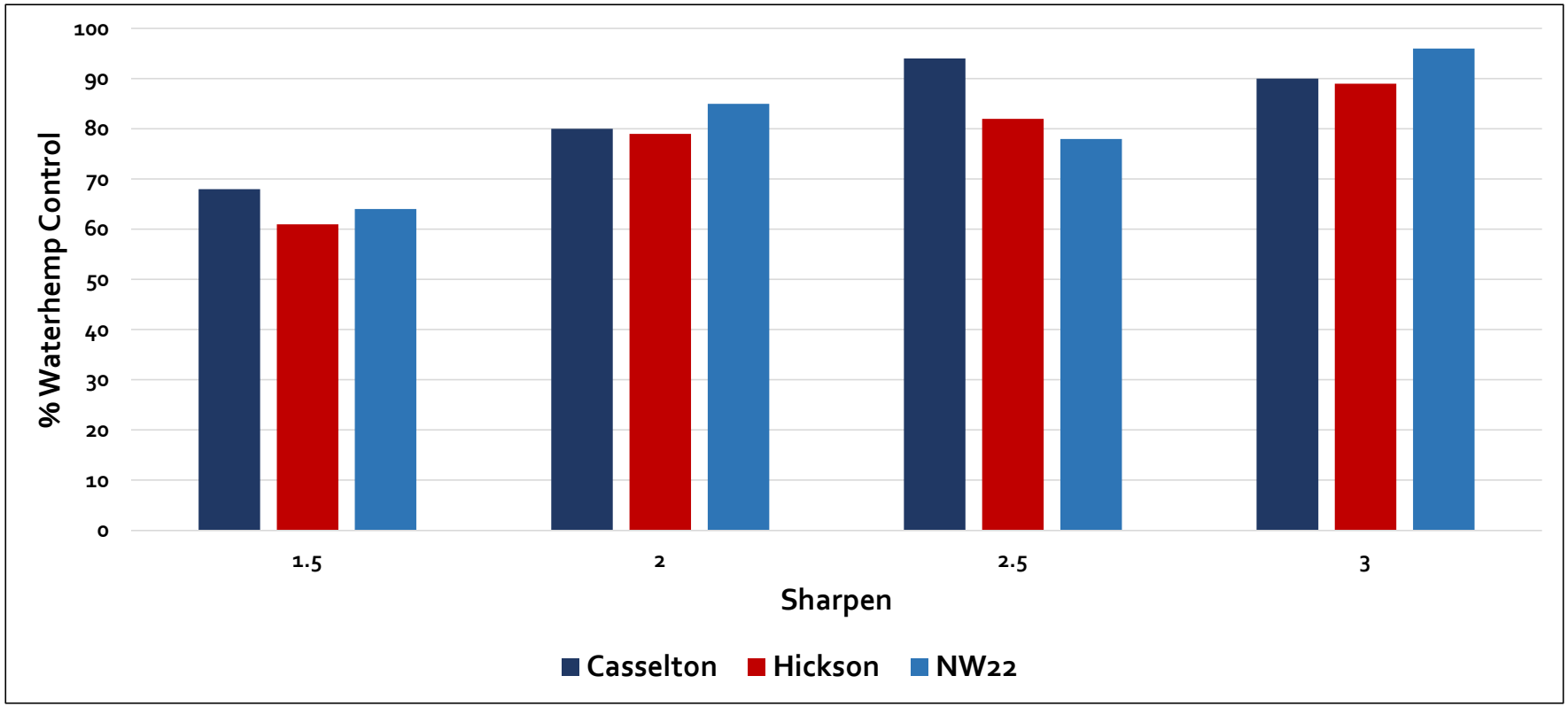
- Group 27 + bromoxynil (premix)
  - Huskie, 9 m CRR to sugarbeet
  - Talinor, 15 m
  - Tolvera, 9 m
- Tank-mix with a Group 4
- True PRE – Sharpen at 2-4 oz (higher = better)
- Delayed PRE of Zidua beneficial as long as it rains

Waterhemp control from group 27 herbicides in response to treatment, 28 to 36 DAT, 2025.



Data curiosity of Kirk Howatt, ND

Waterhemp control from Sharpen, 28 to 35 days after treatment, 2025



Data curiosity of Kirk Howatt, ND

Visited with Kirk Howatt, NDSU Small Grains Weed Control Research….

- Delayed PRE of Zidua beneficial as long as it rains
- Zidua runs out as the canopy begins to senescence even if it rains
- Preharvest options? Postharvest options?
- Don't forget about 75% of the wheat is rotated to sugarbeet

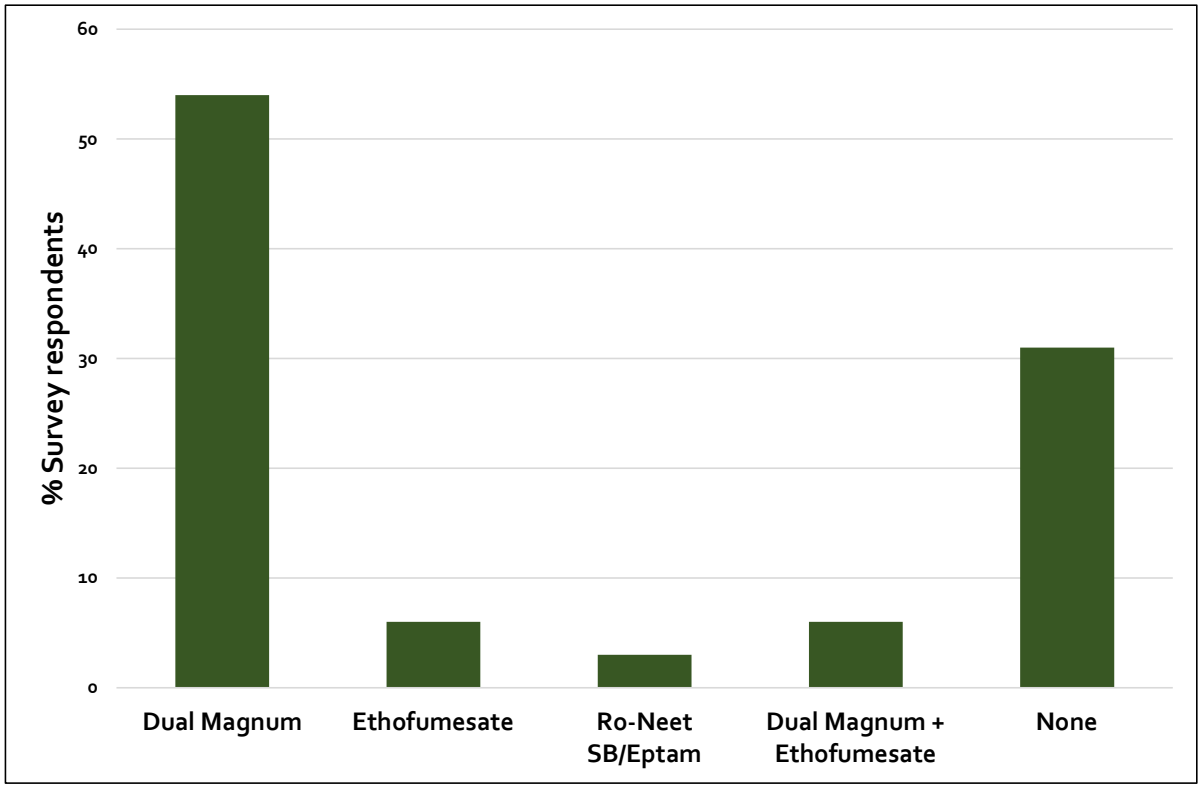
- 4 inch waterhemp found in wheat stubble in Sept/Oct
- Joe counted approximately 88 seeds per plant
- Roughly 7 plant per foot squared
- Half the plants are female
- 13.5M seeds
- 5.4M if 40% germinate and emerge the following spring

Image credit : Joe Ikley, NDSU Weed Science

Waterhemp Control Program in Sugarbeet

Planting Date	Recommendation
Sugarbeet plant in April or May	Dual Magnum at 0.5 to 1.0 pt/A, ethofumesate at 3 to 7.5 pt/A or Dual Magnum at 0.5 to 0.75 pt/A plus ethofumesate at 2 to 3 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) or inter-row cultivation
July	Electric Discharge Systems (WeedZapper™)
August / September	Hand remove waterhemp

Which soil-applied herbicide (PPI or PRE) did you use at planting?[a]



[a]Turning Point Survey, 2025 Grafton Sugarbeet Growers Seminar

What should we use for waterhemp control in 2026?

- Ethofumesate, 5 to 7.5 pt/A
- Dual Magnum at 8 to 12 fl oz/A
- Dual Magnum at 16 lf oz/A after May 1
- Etho + Dual Magnum at 3 pt + 12 fl oz/A

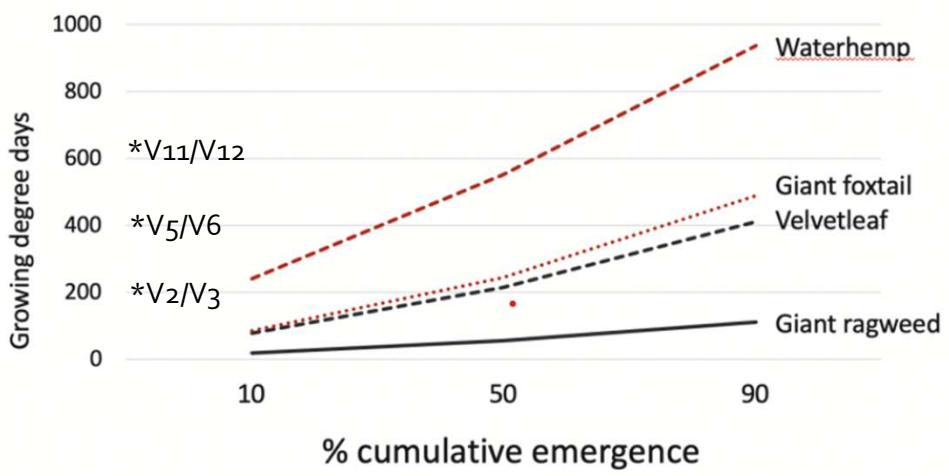


Figure 1. Relationship between growing degree days and emergence of four weeds. Werle, Sandell, Buhler, Hartzler and Lindquist. 2014. Weed Sci. 62:267-279.

The layered residual is strongly contributing to season-long waterhemp control

I think it is time to revisit our layby approach

*According to Holen and Dexter

Peters is proposing

Herbicide	Previous Rate	Suggestion for 2026	Maximum use rate	Application timing
	fl oz/A	fl oz/A	fl oz or pt/A	Sgbt stage
Outlook / Outlook	12/12	16 to 21	24	12-lf
S-meto / S-meto	16 / 16	20 to 24	2.6[a]	60d PHI
Acetochlor/ acetochlor [b]	40 to 48 / 40 to 48	48 to 64	8	8-lf

[a]POST maximum use rate. Dual Magnum applied in the fall or PRE is incremental
[b] Warrant or Enversa

I also am **Research only!** in sugarbeet) and Treflan layby in sugarbeet

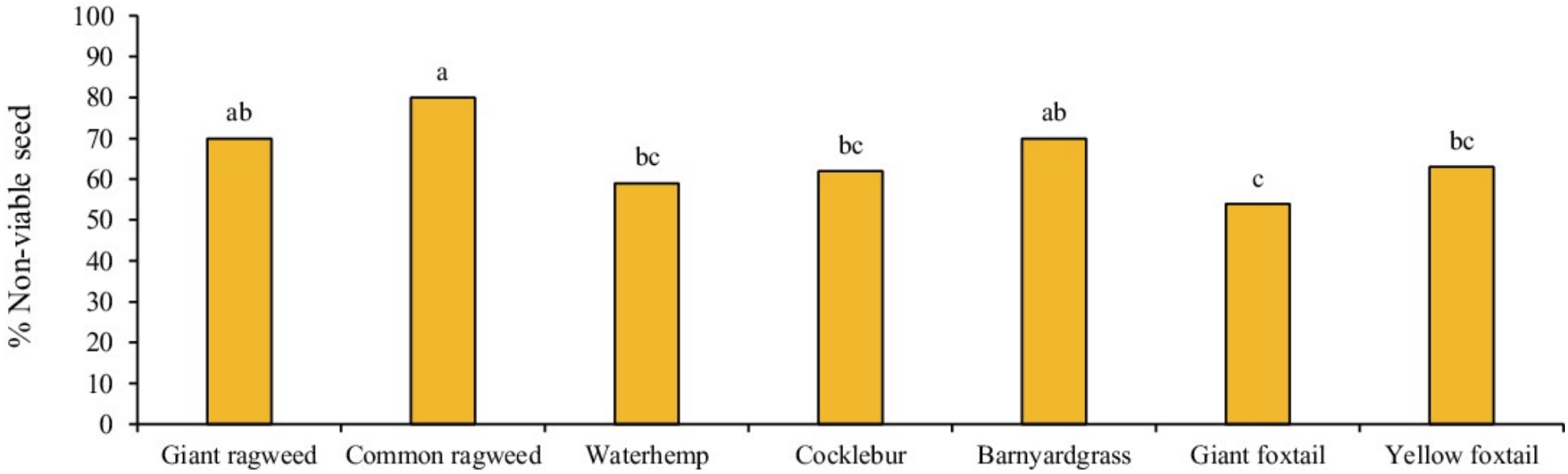
What about etho POST with Roundup PowerMax3? You have 12 fl oz/A to use POST. Use it.

Waterhemp control from postemergence herbicides, across locations and years

Herbicides[1]	Herman 2014	Moorhead 2015	Herman 2015	Lake Lillian 2015	Average
	----------% visual control[2]----------				
glyphosate	36	66	20	61	46
glyphosate + ethofumesate	58	81	40	66	61
glyphosate + Betamix	65	86	40	68	65
gly + etho + Betamix	69	88	73	78	78

[1]Roundup alone with Prefer 90 NIS at 0.25% v/v and N-Pak AMS at 2.5% v/v. Roundup tank-mixes with Destiny HC at 1.5 pt/A and N-Pak AMS at 2.5% v/v.
[2]Visual percent waterhemp control at preharvest evaluation

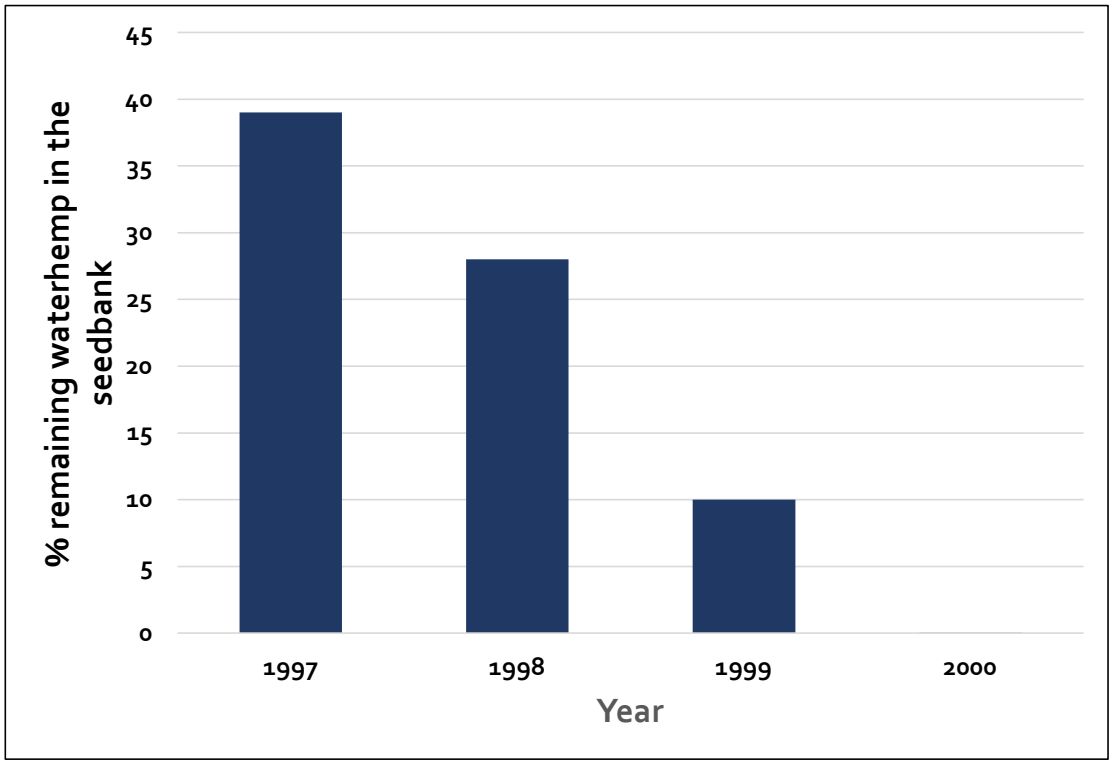
Electrocution reduces the number of viable seed that are returned to the soil seedbank



Schreier et al. 2022
Univ. of Missouri

PREVENTION: The best way to get rid of waterhemp is not to allow new seed production

- Steckel et al., Weed Science 2007, 55: 235-239
- Soybean field allowed to make seed in 1996
- Field not allowed to go to seed after 1996
- Percent of the original common waterhemp seed bank remaining in 1997, 1998, 1999 and 2000



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
- Wheat, soybean, wheat, sugarbeet
- Wheat, wheat, sugarbeet

Conversations with Mark Ramsey

Wild oat remains one tough grassy weed

- 100s of seed per plant
- 3 to 6 years seed viability
- Group 1 and Group 2 resistance

- Two Roundup-Ready crops in the sequence holds them but doesn't eradicate
- Corn in the rotation

Images curiosity of Jason Hanson, Rock and Roll Agronomy

Technical help from Mark Ramsey, MR Ag Consulting and Kirk Howatt, NDSU

Using Group 1 and Group 2 for grass and broadleaf control in wheat

- Splitting grass and broadleaf control products has worked better than tankmix.
- Puma and Everest according to Mark Ramsey
- We started with Group 2 (broadleaf) because they need to be on early to work well.
- Followed with Group 1, 7-10 days later.
- Starting with Group 2 gives more time before sugarbeet as well, still pretty tight on rotation interval.
- Others do the opposite and were happy. All depends on if the Group 1 and 2 resistance mechanisms are in the same plant.
- That will eventually happen if it hasn't already. Have not documented yet.

Incorporated Group 15s, Kirk Howatt, NDSU

- Far-Go spring with appropriate incorporation more effective than Avadex in fall
- Far-Go in the spring more effective than Far-Go in fall.
- Effective incorporation implement seems to be a big question. Wet soil works chunky – not good for incorporation.
- Soil tilth condition for incorporation should be considered.

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- Far-Go in the spring more effective than Far-Go in fall.
- Effective incorporation implement seems to be a big question. Wet soil works chunky – not good for incorporation.
- Soil tilth condition for incorporation should be considered.
- Zidua similar control to Avadex in the fall. The 3.25 oz rate can work well, especially on lighter soils, but the 4 oz rate has been better and more consistent.
- 12 months rotation to sugarbeet with Zidua at 4 oz in the fall
- Minimum tillage after Zidua application.
- Zidua applied in spring gave range of 30% to 80% control of wild oat across several experiments. Needed 3-inch soaker to reach 70s.

Summary

- Take advantage of genetic testing
- Develop a strategy; a plan A and a backup plan before planting
- Compliment herbicides with other weed management techniques
- Don’t make short term decisions that may have longer term consequences

Thank you for your continued support

Tom Peters

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