How will we Control Weeds in 2030?

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Will we be able to control weeds in the future?

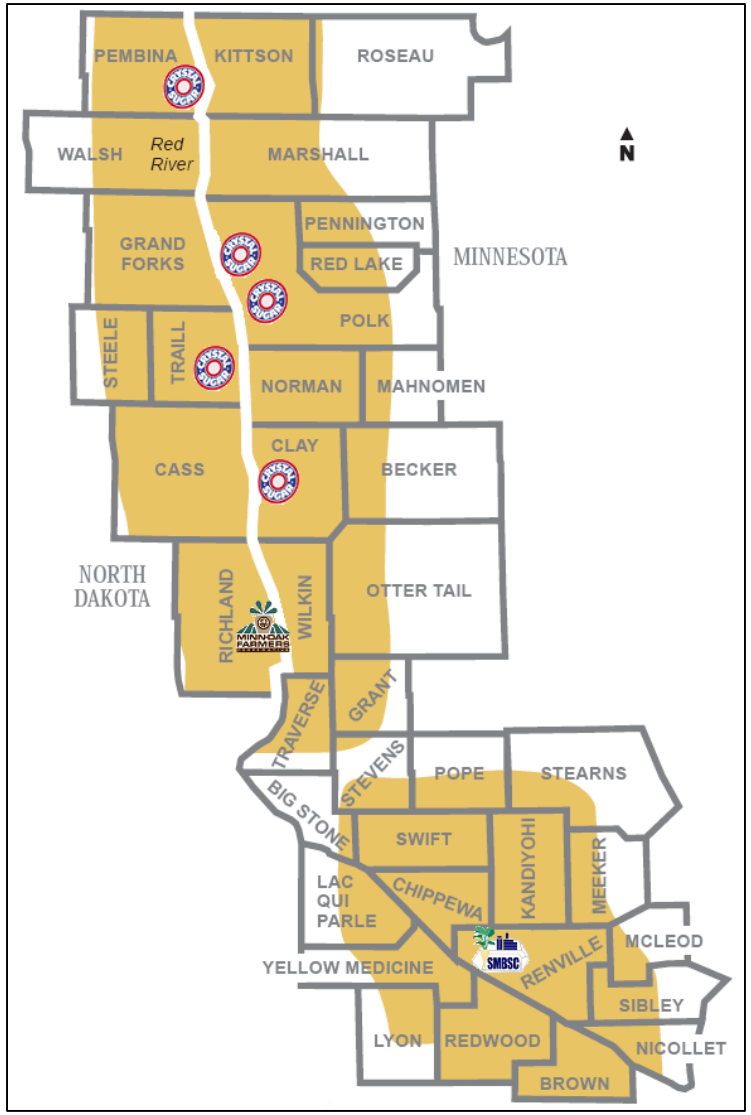
- I'm at the point in my career where I'm beginning to reflect
- On the past and on the future
- My father controlled weeds with 2,4-D and atrazine in corn
- And lots of inter-row cultivation
- I remember the billboards introducing Lasso® in 1968
- I am grateful for the opportunity to collaborated with Fraley, Padgette, Brown and Delaney on development of RR® crops
- Sugarbeet is my favorite crop (although hosta is my favorite plant)


Wilkin County MN, 2022

Sidney Sugars, 2021

GR weeds dominate the landscape in MN, ND, and eastern MT

- GR waterhemp was the most troublesome weed control challenge on 429,820 acres or 64% of acreage according to 2021 survey.
- GR common ragweed was 9% overall but 26% in Crookston and EGF factory districts.
- GR kochia was 22% overall but 57% in Drayton factory district.
- Mixed population of susceptible and resistant kochia are estimated on 70% of Sidney Sugars acres.



Sugarbeet injury and kochia control from herbicide treatments, Barney, ND, 2015

		Sgbt injury		Kochia control		
Treatment[1]	Rate	12 DAC	20 DAC	12 DAC	41 DAC	69 DAC
	pt or fl oz/A	------(%)------		----------(%)----------		
PMax[2] / PMax / PMax	28 / 28 / 22	9	0	65 cd	78 bcd	75 bc
PMax+Etho / PMax+Etho / PMax+Etho	28+4 / 28+4 / 22+4	3	10	58 d	75 cd	70 c
Etho / PMax+Etho / PMax+Etho / PMax+Etho	7 pt/28+4 / 28+4 /22+4	9	5	85 ab	73 cd	70 c
Etho / Etho+Bmix+UpB / PMax/ PMax /PMax	7 pt/12+10+1 / 28 / 28 / 22	11	10	91 a	88 ab	85 ab
	LSD (0.10)	NS	NS	9	11	10

[1]Roundup PowerMax only treatments contained Prefer 90 NIS at 0.25% v/v plus N-Pak AMS at 2.5% v/v. All other treatments contained Destiny HC at 1.5 pt/A plus N-Pak AMS at 2.5% v/v.
2PMax = Roundup PowerMax, etho = ethofumesate, Bmix = Betamix, and UpB = UpBeet

Kochia control in the cropping sequence

corn/wheat>soybean/dry bean>wheat>sugarbeet rotation

Soybean

- Flumioxazin/metribuzin combination, e.g. Valor/Panther + metribuzin, Fierce MTZ, etc.
- POST application of Liberty, dicamba, or Flexstar (1 or 2 apps as needed/appropriate) depending on the soybean trait.
- Dicamba PRE.

Soybean Postharvest

- Flumioxazin 3 oz late fall prior to freeze-up. Advise not to till after Valor application.
- Seed wheat direct in the spring.

Wheat

- 2 oz ai fluroxypyr where possible. 1.5 oz ai is cut rate, less than 4” kochia.
- Kochiavore or Cleansweep D (products with at least 2 modes of action).
- Check the 2023 ND Weed Control Guide for additional products.

Postharvest wheat

- Tillage or Gramoxone to control kochia escapes.

Group 14 resistant kochia biotypes collected from multiple western ND locations

- Sharpen at 1 and 2 fl oz/A with AMS and MSO
- 13 DAT
- Kochia at 2 to 2.5-inch

Courtesy of Dr. Brian Jenks, North Central REC, Minot, ND

Kochia control herbicide from potential candidates in sugarbeet

- Ultra Blazer
- Phenmedipham (Spin-Aid, Betanal, 'Blue Can')
- Rinskor
- Glufosinate and dicamba applied over Truvera™ sugarbeet

Kochia control from Ultra Blazer, 42 DAP and 18 DAAC, greenhouse, 2022

Treatment	Rate	1-inch	2-inch	4-inch
	fl oz/A	%	%	%
Ultra Blazer	16	73 b	59 cd	28 e
Ultra Blazer + NIS	16 + 0.25%	92 a	89 a	30 e
PowerMax + NIS +AMS	28 + 0.25% + 2.5%	99 a	99 a	68 bc
Ultra Blazer + PowerMax + NIS +AMS	16 + 28 + 0.25% + 2.5%	99 a	99 a	53 d
	LSD (0.10)	----------13----------		


2-inch kochia
control
Ultra Blazer
UB + NIS
PM+NIS+AMS
UB+PM+NIS+AMS


4-inch kochia

Belchim Crop Protection recently purchased phenmedipham (Spin-Aid) from Bayer

- 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.
- Intend to evaluate Spin-Aid alone, repeat applications and Spin-Aid following ethofumesate.
- Possible Section 18 exemption in 2024 for control of kochia.

Dicamba and glufosinate compliment sugarbeet herbicides

- Ethofumesate PRE requires significant rainfall to activate
  - Our producers are incorporating etho to improve early season waterhemp control
  - Sometimes they incorporate etho too deep
  - We certainly don't need the extra tillage
  - Cover and nurse crops potentially are in conflict with PRE herbicides
- Glufosinate provides consistent waterhemp control
  - Spray weeds less than 3-inch tall
  - Spray when sunny, humid, and two hours after sunrise
  - Concerns over 30 fl oz/A Liberty rate use rate

KWS


Images: July 20, 2021
Manvel, ND
STD
Nortron 6 pt/A / PM / PM

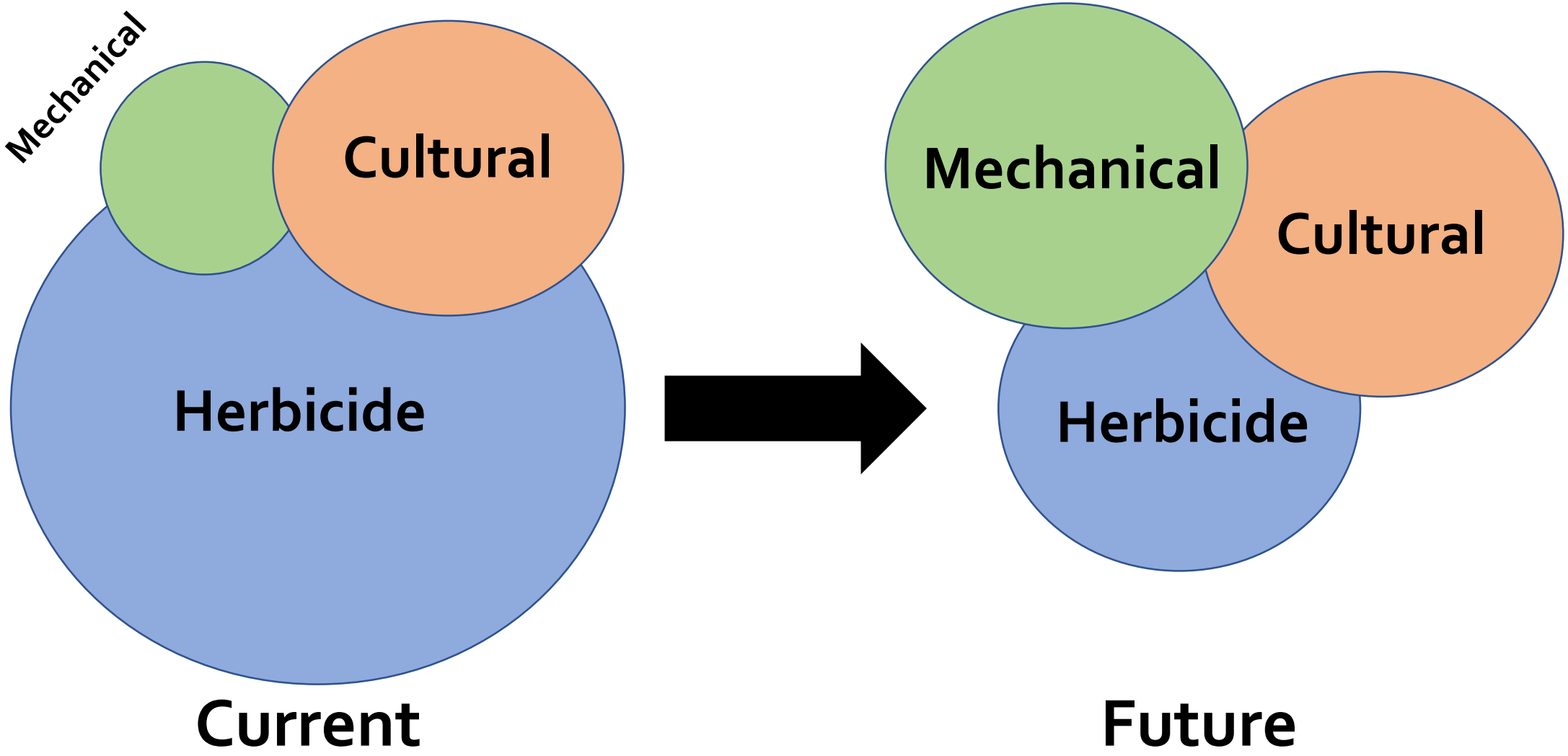

STD
PowerMax / PowerMax


6
EM + PM / EM + PM


8
ExtendiMax / Liberty

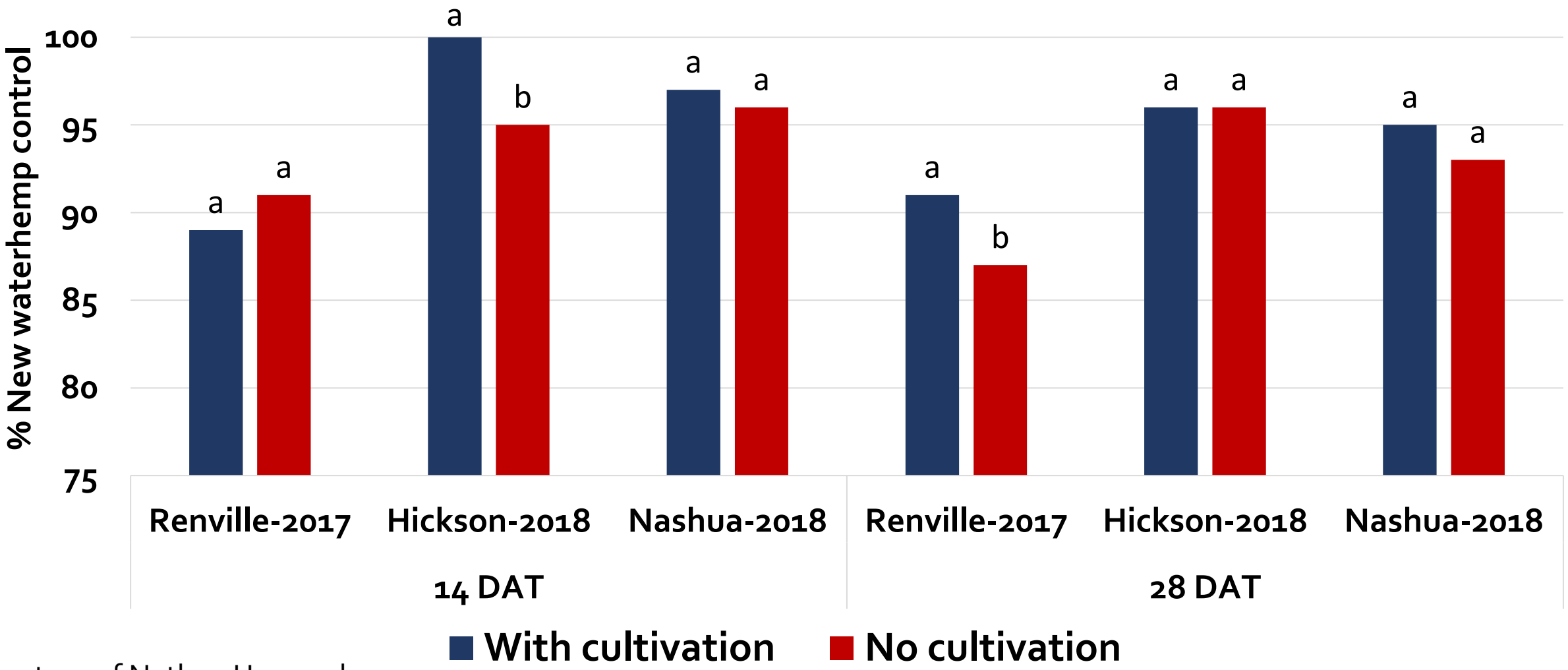
We will have to work at it if we want Dicamba and Liberty integrated with soil residual and POST herbicides for control of GR weeds in sugarbeet to be relevant at launch

Integrated Weed Management



Slide adapted from Bob Hartzler, Iowa State University

Early cultivation generally had no effect on new waterhemp emergence control



Courtesy of Nathan Haugrud

Cover Crops

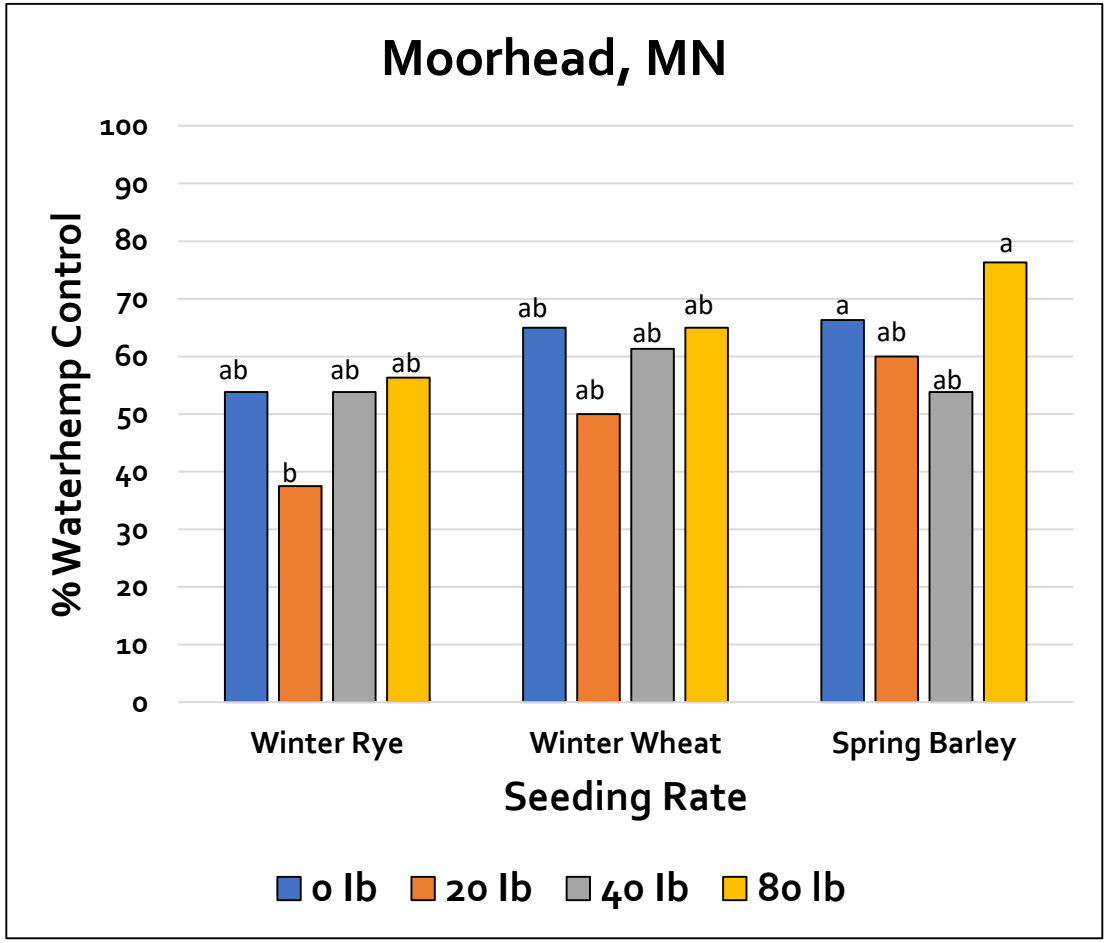
Materials and Methods:

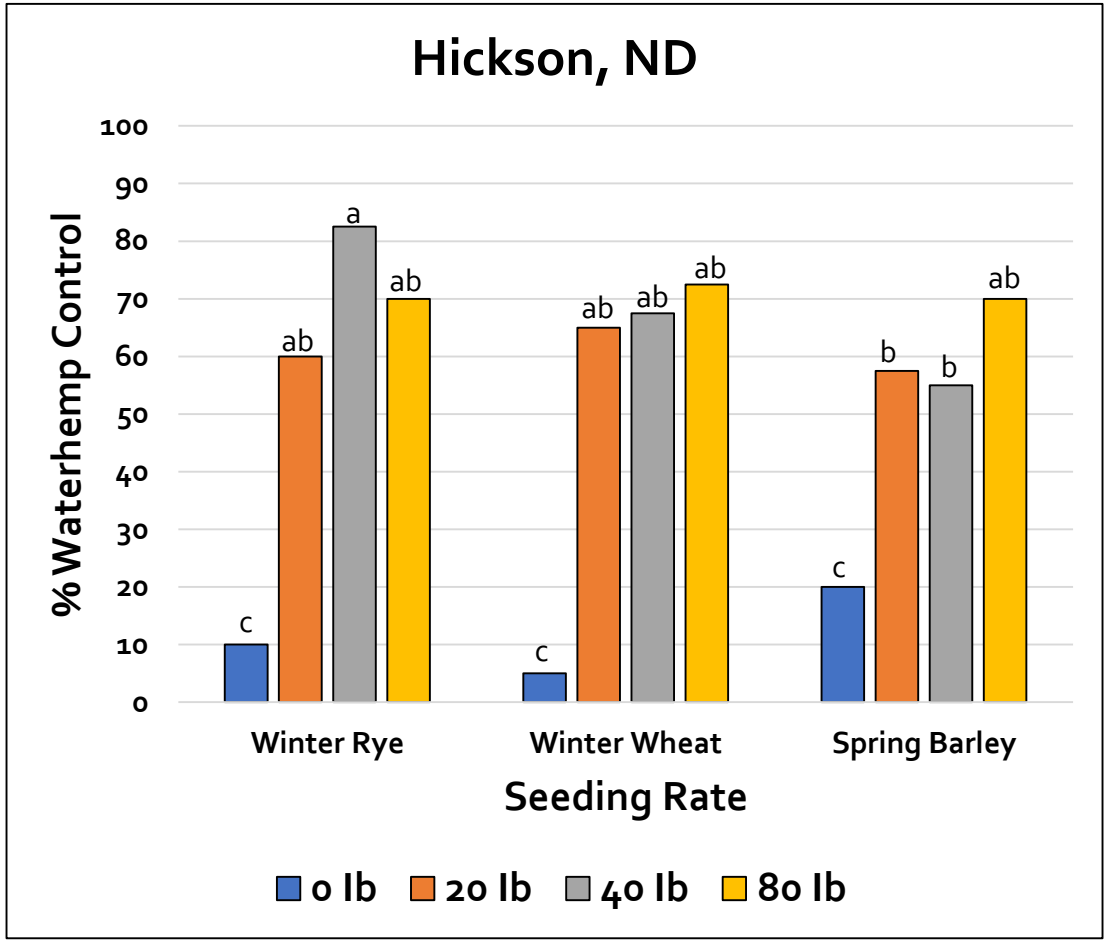
- Two locations: Hickson, ND and Moorhead, MN in 2021
- Randomized complete block design with 4 replications
- Factorial Treatment Arrangement
- Factor A = Cereal Grain (Winter Wheat, Winter Rye, Barley)
- Factor B = Seeding Rate (0, 20, 40, 80 lb)
- Sugarbeet planting in April/May

Courtesy of Aaron Hoppe

Courtesy of Aaron Hoppe

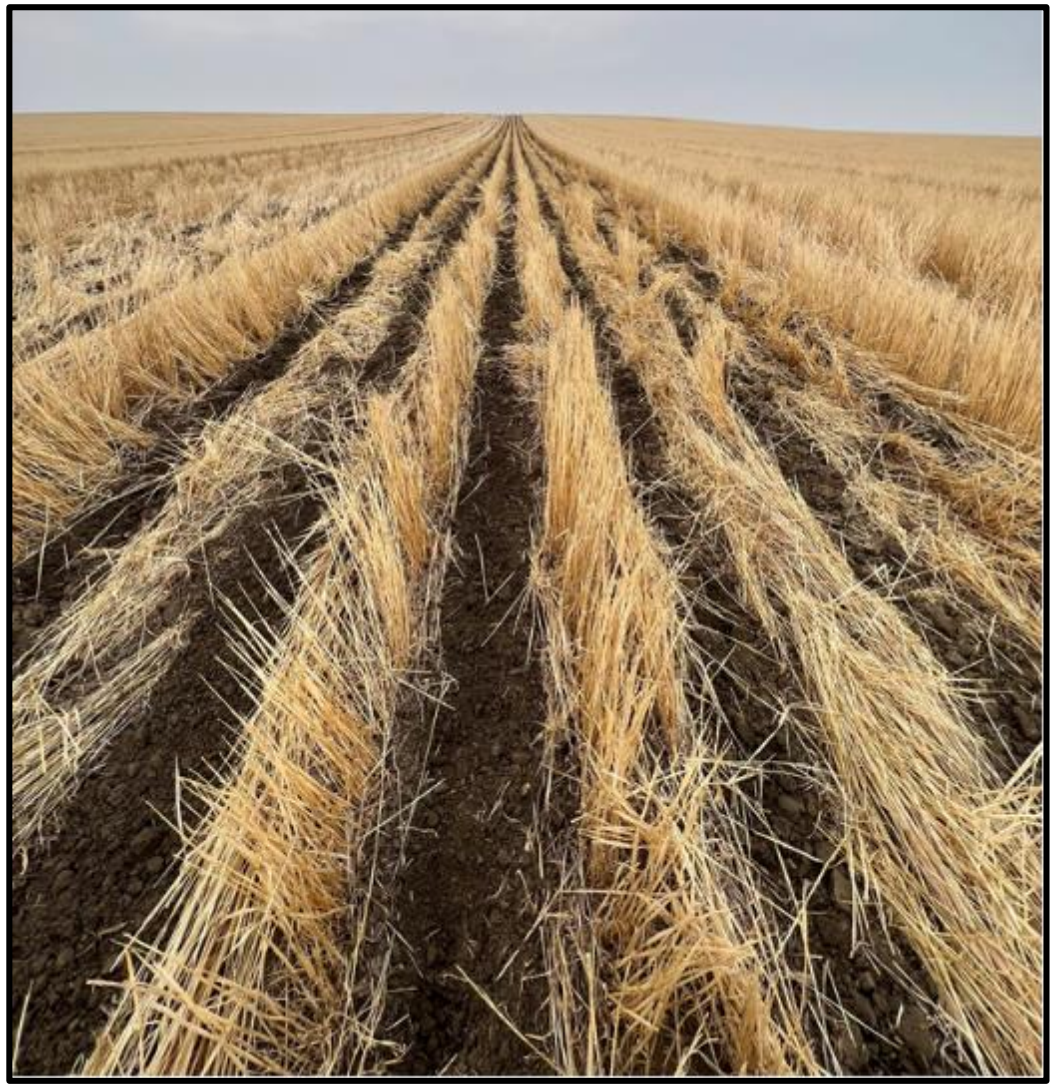
Visual Percent Waterhemp Control, Moorhead, MN and Hickson, ND, July 2021.[a]





[a]cover crops were terminated with PowerMax mixed with ethofumesate and *S*-metolachlor at 32+6+16 fl oz/A

Some growers have purchased strip-tillers



Strip-Tillage may create weed shifts

- Strips are made in the fall and freshened in the spring before plant.
- Weather conditions will dictate if one plants before or after tillage to 'freshen' strips.
- We observed winter annual and early emerging summer annual weed escapes in 2022.
- Weeds (kochia) were not controlled by tillage and got too big before glyphosate application.
- Strongly recommend Gramoxone after planting and before sugarbeet emergence to control early-emerging weeds.

Courtesy of Aaron Hoppe

Prevention and management strategies

1991 The North Central Weed Science Society (NCWSS) Herbicide Resistance Committee

1. Apply herbicides that include multiple sites of action.
2. Rotate crops, particularly those with different life cycles.
3. Avoid more than two consecutive herbicide applications with herbicide-resistant crops.
4. Include mechanical weed control practices.
5. Regularly scout fields to identify the weeds present.
6. Encourage others to adopt prevention management strategies.

Dr. Gordon Harvey, Univ. of Wisconsin, Committee Chair

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Thank you for your continued support

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