

Torrential experiences in a drought season

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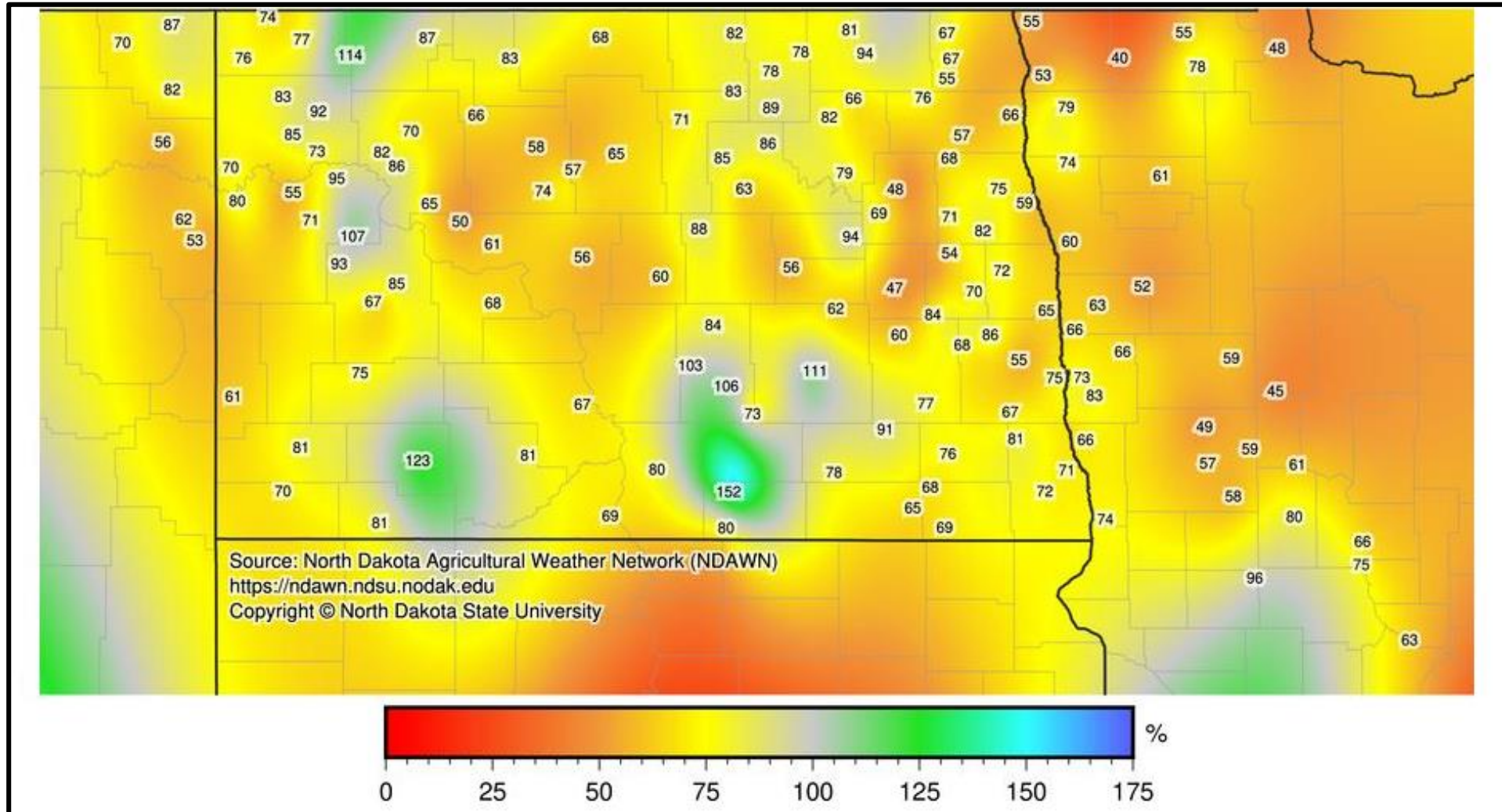
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Presentation Outline

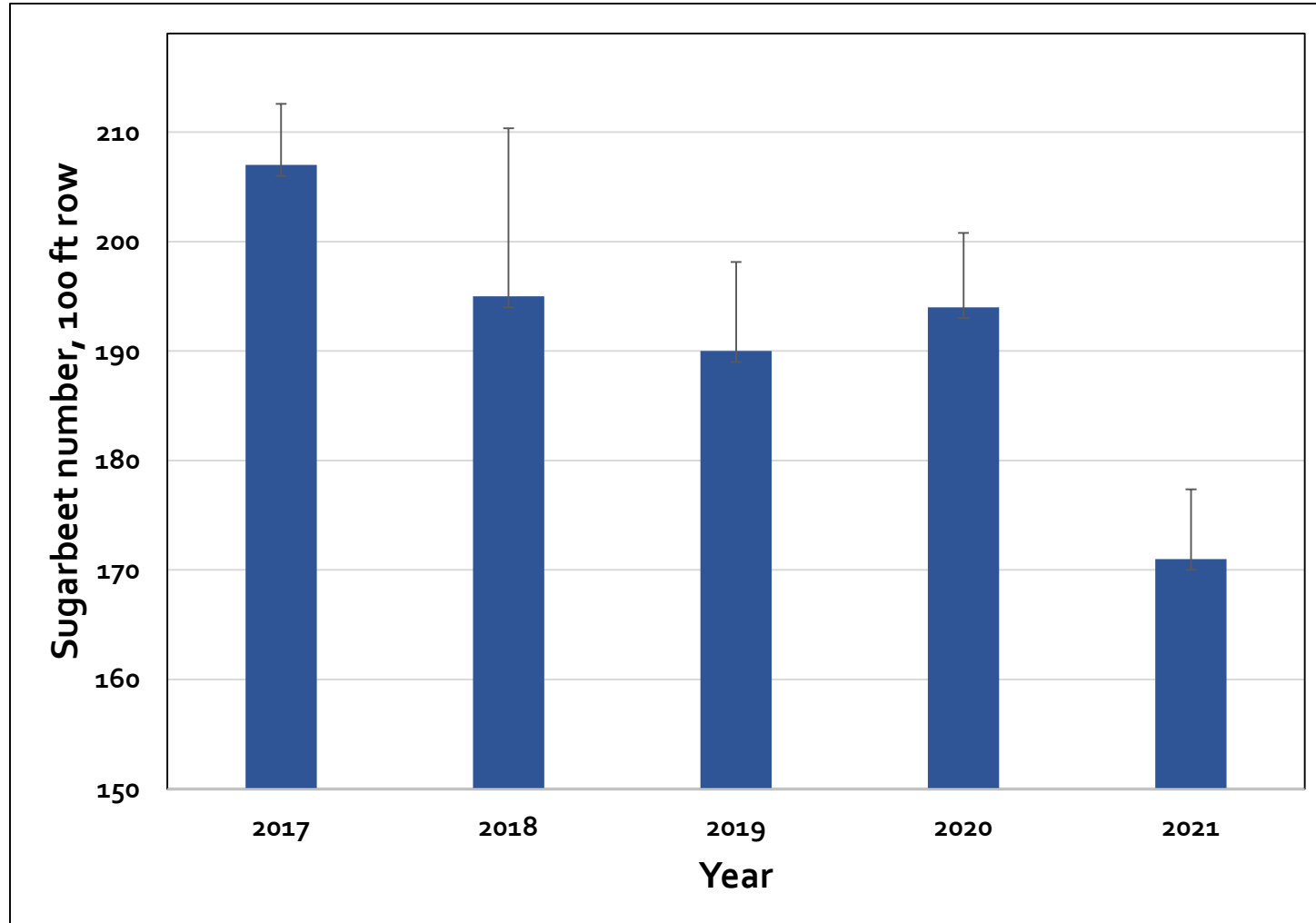
Weather effects on sugarbeet growth and development in 2021

- Sugarbeet stands measured as number per 100 ft row
 - 2021 as compared to previous years
- Soil residual herbicides incorporation into soil
 - Affect of rainfall (or lack there of) on availability of ethofumesate
- Ultra Blazer Section 18 Emergency Exemption
 - Air temperature; affect of temperature change

Percent of normal rainfall, May 1 to October 1, 2021, NDAWN



Sugarbeet harvest stands and standard deviation per 100 ft of row , averaged across ACS factories, 2017 to 2021



- Sugarbeet stands are challenging every year due to plant 1.25 inch.
- Germination and emergence losses average 27% annually.
- Losses are dependent on moisture at plant; seed imbibing water and germination terminated.
- Sugarbeet stands were uniformly low across factories in 2021.
- Low stands provided spaces for waterhemp and other glyphosate resistant weeds to germination and emerge.

Waterhemp control in response to ethofumate PPI and PRE, Fargo airport, 2021

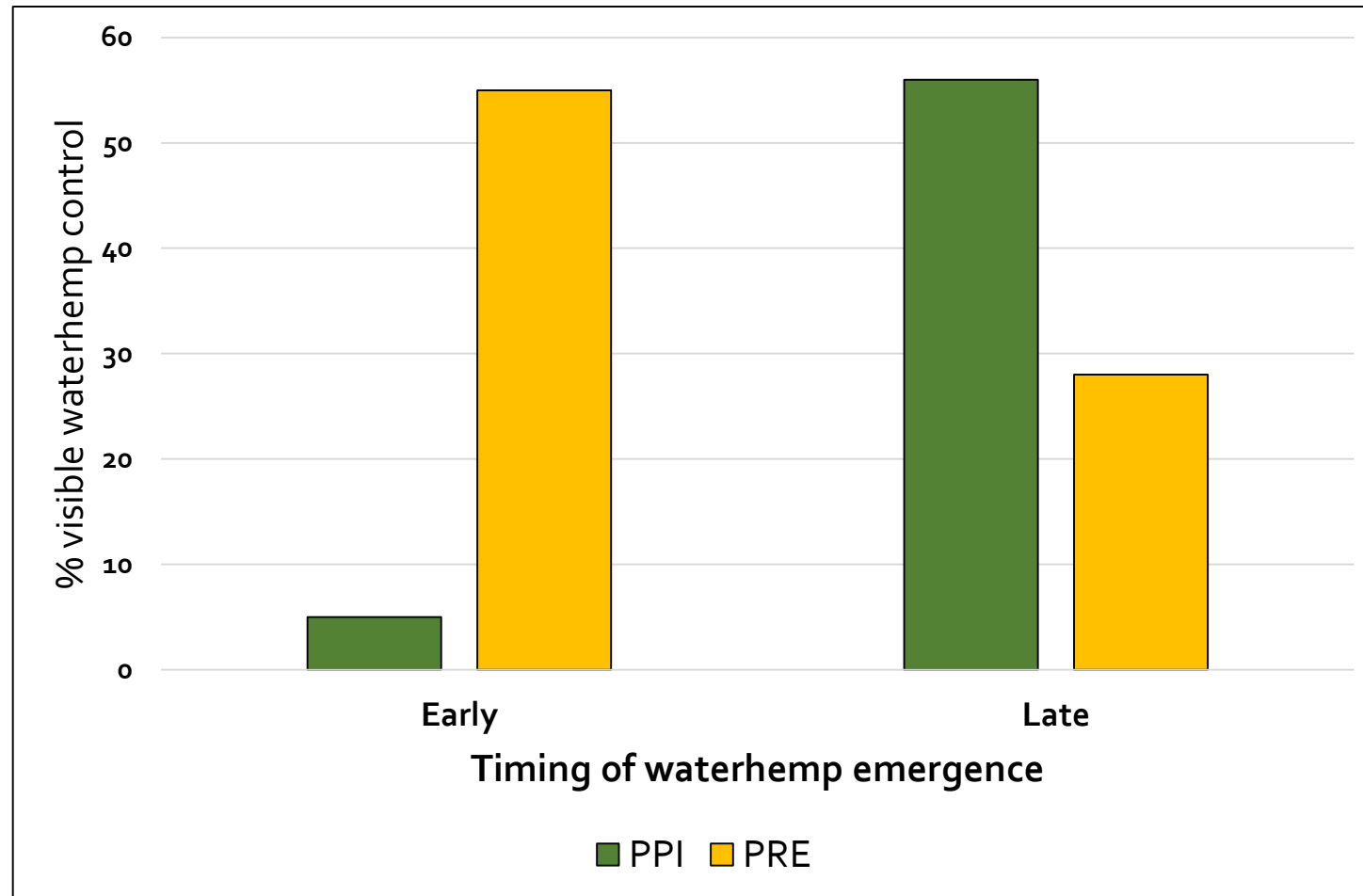


Control of EARLY and LATE emerging waterhemp with ethofumesate at various rates, Jul 9, Fargo 2021

Herbicide (pt/A)	PPI Application		Preemergence Application	
	(Early)	(Late)	(Early)	(Late)
2	0	15	5	10
4	0	50	45	20
6	10	65	63	15
8	20	65	65	45
10	10	63	75	43
12	10	75	78	40

- May 10 plant (bone dry), 0.4-inch on May 20, 1- and 1.1-inch on June 7 and June 10

Early and late emerging waterhemp control in response to ethofumesate PPI or PRE, 2021

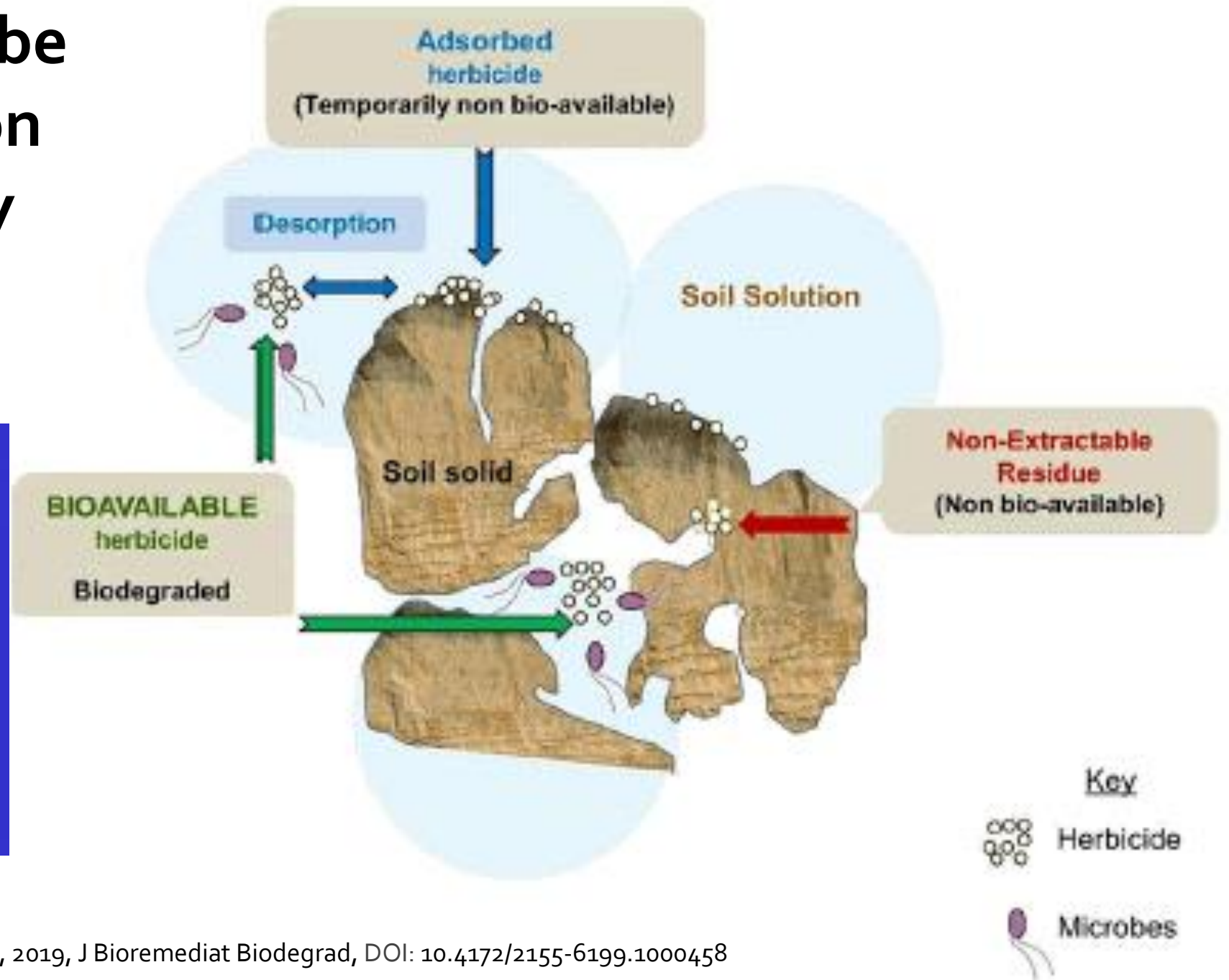
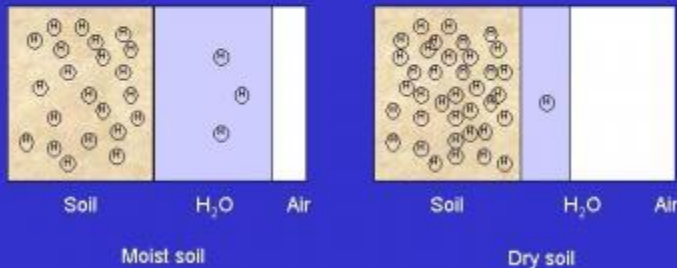


Soil residual herbicides kill weeds as seed or seedlings imbibe water

- Herbicide must be localized in the upper inch of soil or zone where small seeded broadleaves germinate.
- Efficacy may be reduced when there is limited rain in the weeks following application even if a herbicide is activated in a timely fashion.
- Soil residual herbicides move from soil water to adsorption sites on soil colloids as soil dries, reducing herbicide available to germinating weed seeds.
- Absorptive (K_{OC}) is the ratio of herbicide bound to soil colloids versus herbicide in the soil solution.

Herbicides must be in the soil solution to be taken up by seeds, roots, or shoots

Figure 2. Soil moisture effect on herbicide availability.



Hartzler, Professor Emeritus, ISU

Chemical characteristics affecting availability

Three properties that can help predict availability and mobility are:

- Absorptivity
- Water solubility
- Herbicide half-life

The first two properties determine how much of the herbicide will be bound versus free.

Half-life relates to the persistence of the herbicide.

I am frequently asked to compare and contrast chloroacetamide herbicides

Herbicide	Absorptivity	Water Solubility	Half-life**
	^a K _{OC}	(ppm)	(days)
Acetochlor	200	233	NA
Outlook	155	1,174	20
S-metolachlor	200	488	124
Ethofumesate	340	110	98
Treflan	7,000	0.3	60
Dicamba	2	4,500	10

^a The K value represents the ratio of herbicide bound to soil collides versus what is free in the water. Thus, the higher the K value the greater the adsorption to soil colloids.

**Depends on how the manufacturer conducts the experiment. Half-life varies with soil characteristics and environment.

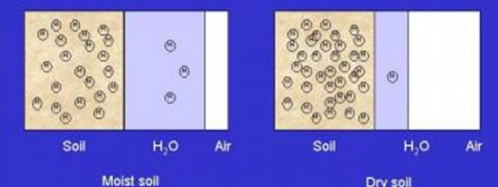
Control of EARLY and LATE emerging waterhemp with ethofumesate at various rates, Fargo 2021

Herbicide (pt/A)	PPI Application		Preemergence Application	
	(Early)	(Late)	(Early)	(Late)
2	0	15	5	10
4	0	50	45	20
6	10	65	63	15
8	20	65	65	45
10	10	63	75	43
12	10	75	78	40
Average	8	56	55	28

- May 10 plant (bone dry), 0.4-inch on May 20, 1- and 1.1-inch on June 7 and June 10

- PPI etho was adsorbed to colloids and diluted by incorporation, not available for waterhemp control
- PRE partially incorporated into soil and available after the May 10th rain
- PPI etho in the soil solution and available for late emerging waterhemp following June rains
- PRE etho likely degraded/lost for late emerging waterhemp

Figure 2. Soil moisture effect on herbicide availability.



Summary

ethofumesate, S-metolachlor, dimethenamid-P and acetochlor

- Soil residual herbicides are our best strategy for waterhemp control in sugarbeet.
- Follow the program and do not try to time to rainfall events (same story your financial advisor says about investing money).
- Shallow incorporate ethofumesate; tillage is to incorporate herbicide into the soil and not to prepare seedbed.
- McAuliffe and Appleby (Weed Sci) reported ethofumesate adsorption and degradation in ultra dry soils.
- Waterhemp germinates and emerges from surface to 1-inch in soil.

EPA approved Ultra Blazer for waterhemp control in sugarbeet on June 1, 2021

- Use UPL Ultra Blazer only
- Apply at 16 fl oz/A alone or with glyphosate
- One Ultra Blazer application can be made per season
- Can only be applied by ground equipment. Aerial application is prohibited.
- Target waterhemp less than 4" tall, control is reduced as waterhemp becomes larger
- Pre-Harvest Interval (PHI) = 45 days
- Do not apply Ultra Blazer after August 1st

NORTH DAKOTA DEPARTMENT OF AGRICULTURE

June 2, 2021
For immediate release

EPA approves herbicide for resistant waterhemp in sugarbeets

BISMARCK – The Environmental Protection Agency (EPA) has approved a request for a Section 18 emergency exemption for Ultra Blazer®, enabling North Dakota growers a new tool to combat glyphosate-resistant waterhemp in sugarbeets.

“With the discontinuance of Betamix, there are currently no registered postemergence products available to control waterhemp that survives preemergence treatments,” Agriculture Commissioner Doug Goehring said. “This exemption gives growers a new product when early treatments are ineffective.”

The exemption allows application of Ultra Blazer on sugarbeet fields in Barnes, Cass, Cavalier, Grand Forks, Pembina, Ransom, Richland, Sargent, Steele, Trail and Walsh counties. Ultra Blazer is to be applied one time at 16 fluid ounces per acre per year.

Users must follow all applicable directions, restrictions and precautions on the container label, as well as the Section 18 use directions.

A Section 18 exemption under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) authorizes EPA to allow an unregistered use of a pesticide for a limited time if EPA determines that an emergency condition exists.

MEDIA: For more information, please contact Michelle Mielke at (701) 328-2233 or mmielke@nd.gov.

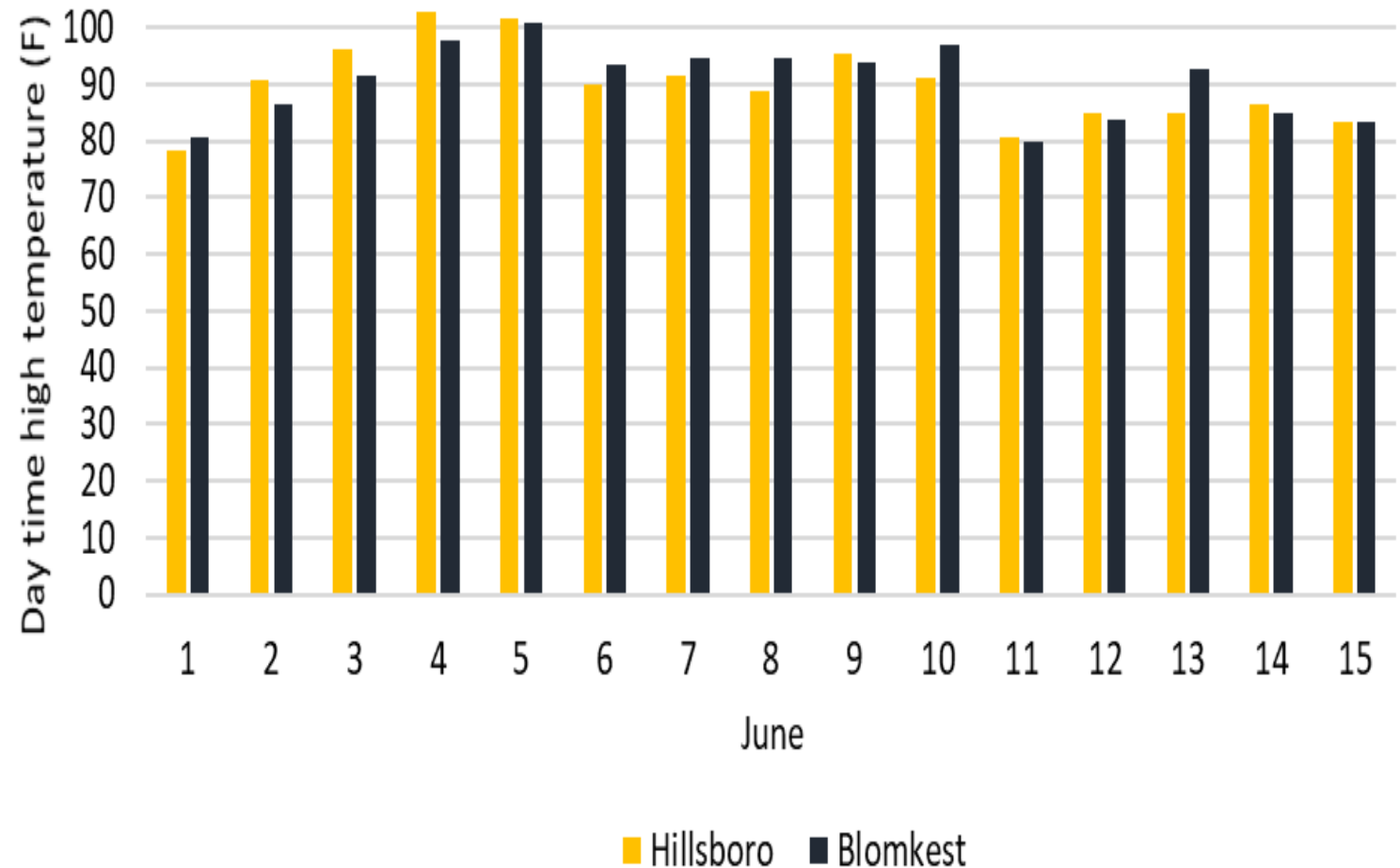


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Disclaimer: This email and any attachments may be subject to disclosure to a third party upon request under North Dakota open records laws.

Ultra Blazer Section 18 was approved on June 1, 2021

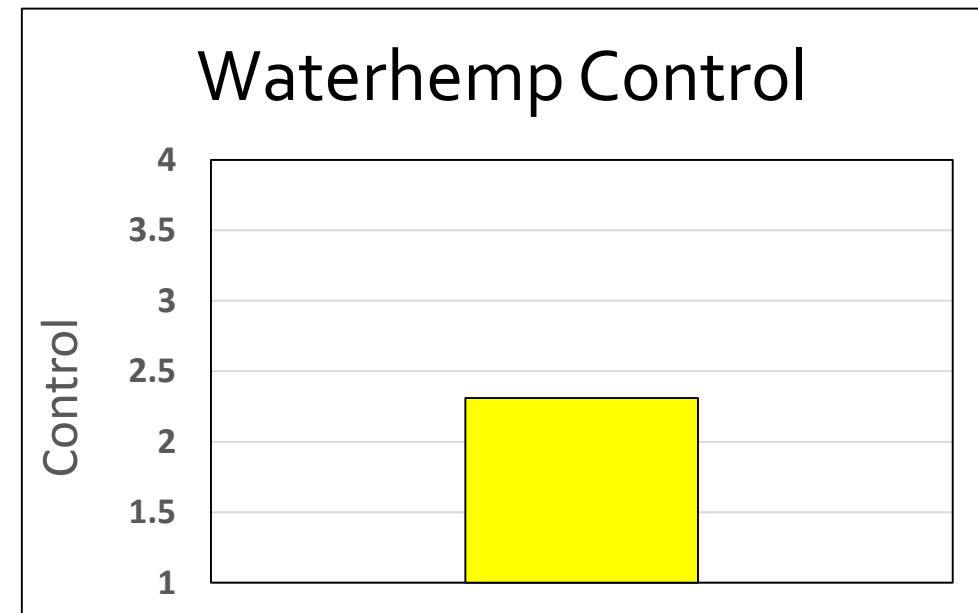
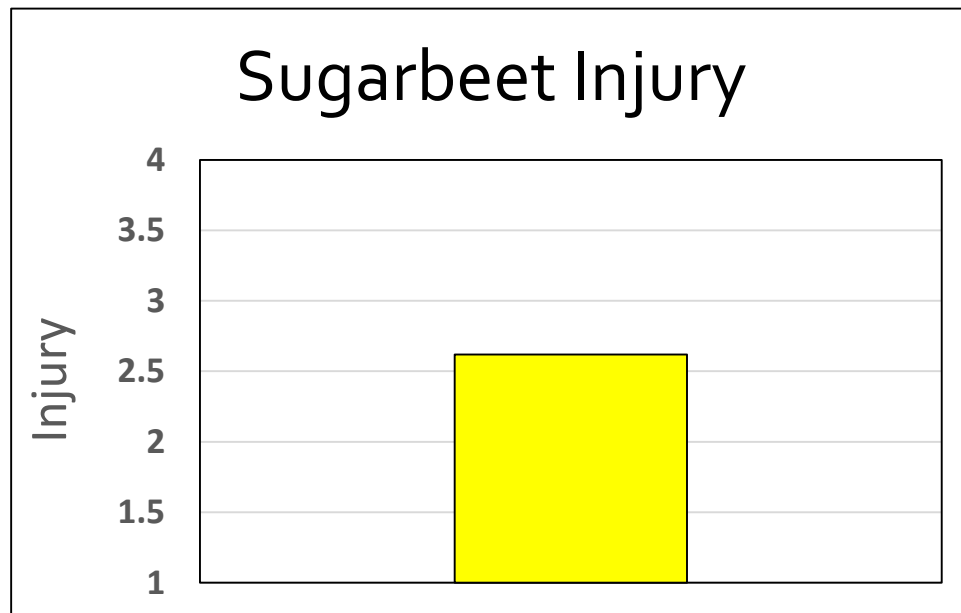
- 32,005 acres or 4,001 gallon Ultra Blazer
 - Minnesota, 28,711 acres
 - North Dakota, 3,294 acres
- Air temperatures 90F or greater, 8 consecutive days after approval
- Sugarbeet growth stage ranging from cotyledon to 8-lvs complicated application timing



Sugarbeet injury and waterhemp control ratings, 2021 Ultra Blazer Section 18 emergency exemption

Injury Scale:	
1	None
2	Slight
3	Moderate
4	Severe

Weed Control Scale:	
1	Excellent
2	Good
3	Fair
4	Poor





Recommendation was based on Producer and Agriculturalist tolerance to sugarbeet injury

Trt Num	Treatment	Rate (fl oz/A or v/v)
1	Ultra Blazer	16
2	Ultra Blazer + Prefer 90 NIS	16 + 0.125%
3	Ultra Blazer + Prefer 90 NIS	16 + 0.25%
4	Roundup PowerMax + Ultra Blazer + Amsol Liquid AMS	28 + 16 + 2.5% v/v
5	Roundup PowerMax + Ultra Blazer + Prefer 90 NIS + Amsol Liquid AMS	28 + 16 + 0.25% + 2.5% v/v

- We conducted demonstration plots at Benson, Crookston, MN, Hendrum, and Foxhome, MN and Casselton, ND.
- We collected yield parameters from the Hendrum, MN experiment.

Percent visible sugarbeet injury, 3 to 16 days following Ultra Blazer application, 2021

Treatment	Rate	Casselton	Crookston	Foxhome	Hendrum	Benson ^a
	pt/100 G	%	%	%	%	%
Ultra Blazer (UB)	-	9 d	9 c	10 c	8 d	-
UB + Prefer 90	1	14 c	10 bc	11 bc	10 cd	-
UB + Prefer 90	2	15 bc	15 ab	18 b	15 c	-
UB + Prefer 90 + Amsol liquid AMS	2 + 20 (2.5 G)	-	-	-	-	35 a
PM + UB + Amsol liquid AMS	20	19 b	20 a	25 a	21 b	-
PM + UB + Prefer 90 + Amsol liquid AMS	2 + 20	28 a	-	26 a	30 a	40 a

^aAir temperature was 95F at application

Sugarbeet injury from Ultra Blazer, Benson, MN, 2021



Ultra Blazer, 8 DAT



Ultra Blazer + PowerMax, 8 DAT

Other Ultra Blazer Section 18 Emergency Exemption gleanings

- Ninety-five percent of respondents indicated the emergency exemption was beneficial for sugarbeet producers in Minnesota and North Dakota and contributed to overall weed management in 2021
- Ninety-two percent of respondents indicated they willingly would support application for a 2022 emergency exemption in sugarbeet in 2022.
- Spray volume and waterhemp size influenced control and regrowth.
- Some fields were bronzed more than others and for longer duration of time. Speed of recovery was dictated by soil moisture conditions.
- Some tried to correlate bronzing from Ultra Blazer to CLS. Heard both; less and more CLS following Ultra Blazer

Section 18 emergency exemption for 2022; possible modifications and research ideas

- MN, ND (east and west) and eastern Montana
- Waterhemp and kochia control in sugarbeet
- Sugarbeet greater than 6-leaf stage
- Waterhemp less than 4-inch; kochia less than 3-inch
- Ultra Blazer alone or Ultra Blazer with glyphosate
 - Ultra Blazer alone at 16 fl oz/A followed by 16 fl oz/A
 - Revisit Ms. Emma Burt's thesis adjuvant data
- Investigate spray volume and spray coverage

Sugarbeet injury was advanced by air temperature at Glyndon, MN

- May 31 and June 1 highs were 75°F and 82°F
- Ultra Blazer applications made on June 3
- Highs were above 90°F through June 10
 - Two days were over 100°F
- Alternatively, Blomkest, MN application was made June 9
 - Average highs were under 90°F following Ultra Blazer application



Ultra blazer increased injury in waterhemp control program approaches tank mixtures, 2021

Factor A PRE Herbicide	Factor B Postemergence Herbicide ^a	Sugarbeet Injury		Waterhemp Control
		Glyndon Site	Blomkest Site	
		7 DAT		
		-----%-----		
PRE	etho ^b / etho	10 a	0 a	88 a
PRE	etho + S-meto ^b / etho + S-meto	30 b	0 a	81 b
PRE	etho / Ultra Blazer ^c	74 c	35 b	96 a
PRE	etho + S-meto / S-meto + Ultra Blazer	94 d	40 bc	98 a
PRE	etho + S-meto + clopyralid / S-meto + Ultra Blazer + clopyralid	91 d	51 d	99 a
LSD (0.10)		15	10	7

^aApplied glyphosate at 28 fl oz/A with all treatments; glyphosate + etho with Destiny HC HSMOC at 1.5 pt/A and Amsol Liquid AMS at 2.5 % v/v with all treatments.

^betho = ethofumesate; S-meto = S-metolachlor.

^cApplied Ultra Blazer with non-ionic surfactant at 0.125% v/v.

Thank you for your continued support

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