

# **Pre-emerge and layby herbicides in a dry season.....and other topics**

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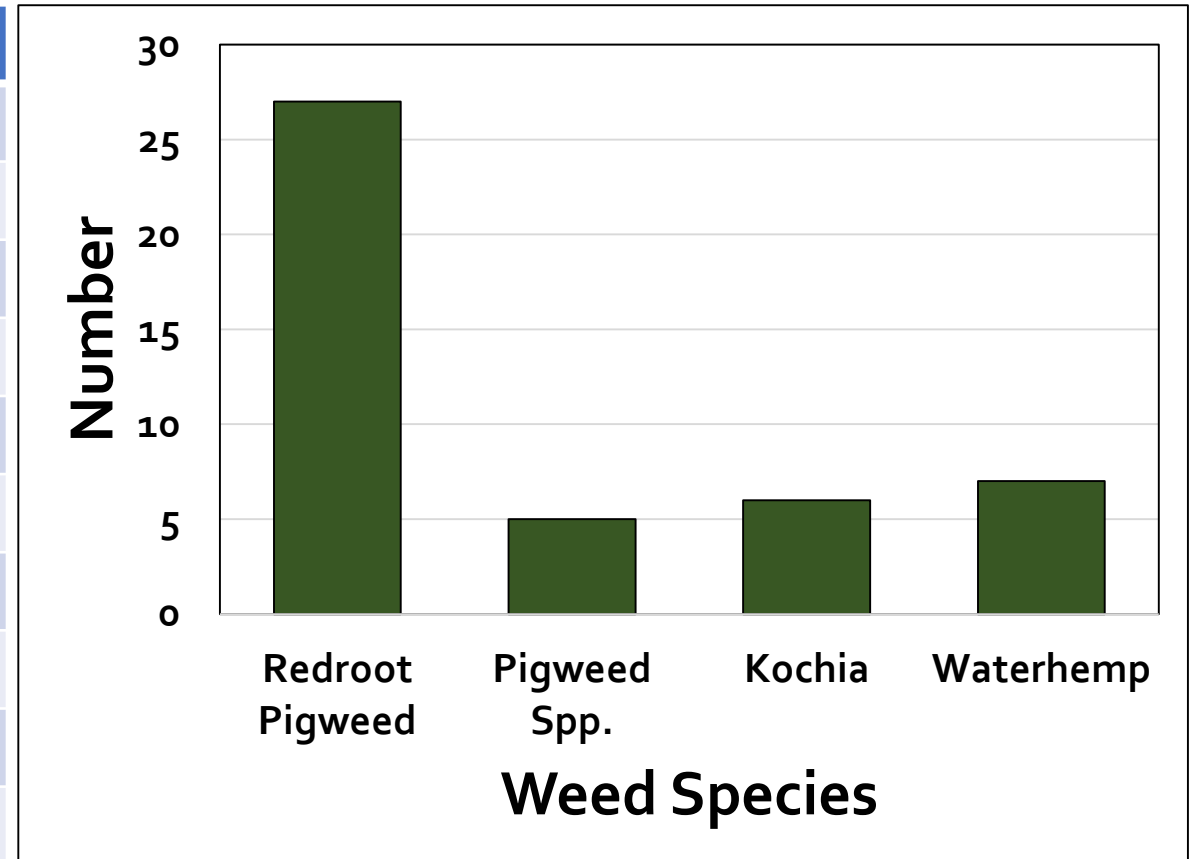
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# Most important weed problem in sugarbeet, 1975 to 2020, annual survey.<sup>a</sup>

Year	Most important weed
1975	Redroot pigweed
1980	Redroot pigweed
1985	Redroot pigweed
1990	Redroot pigweed
1995	Redroot pigweed
2000	Kochia
2005	Pigweed spp.
2010	Kochia
2015	Waterhemp
2020	Waterhemp



<sup>a</sup>Annual herbicide use survey was mailed to sugarbeet producers (farm units) in eastern ND and MN from 1968 to 2016. Survey has been conducted at Grower Seminars since 2017.

# Waterhemp Control Program in Sugarbeet

Planting Date	Recommendation
<b>Sugarbeet plant in April or May</b>	PRE. Dual Magnum at 0.5 to 0.75 pt/A, ethofumesate at 2 to 5 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
<b>June</b>	Continue to scout fields for waterhemp. Control escapes with Ultra Blazer (Section 18), Liberty with the Redball™ 915 hooded sprayer (24c), or inter-row cultivation
<b>July</b>	Electric Discharge Systems (WeedZapper™)
<b>August / September</b>	Hand remove waterhemp

# Presentation Outline

- Do soil residual herbicides control weeds when its dry?
- Controlling waterhemp escapes in sugarbeet
- Controlling volunteer corn control in 2022
- Palmer amaranth update

# Rainfall (inch) at Blomkest and Moorhead, MN in 2021 compared to 30-year averages.<sup>a</sup>

Month	Blomkest, MN			Moorhead, MN		
	2020	2021	30-yr Ave	2020	2021	30-yr Ave
	Inch	Inch	Inch	Inch	Inch	inch
April	<b>1.6</b>	1.9	2.6	5.4	2.3	1.6
May	<b>2.1</b>	<b>1.4</b>	3.1	<b>1.6</b>	<b>0.7</b>	3.2
June	4.9	<b>1.4</b>	4.8	3.8	4.6	4.1
July	3.9	<b>1.9</b>	3.7	5.3	<b>1.1</b>	3.2
August	4.5	5.2	3.8	5.8	3.7	2.7

<sup>a</sup>30-yr averages from usclimatedata.com; 2020 and 2021 data from Climate FieldView



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



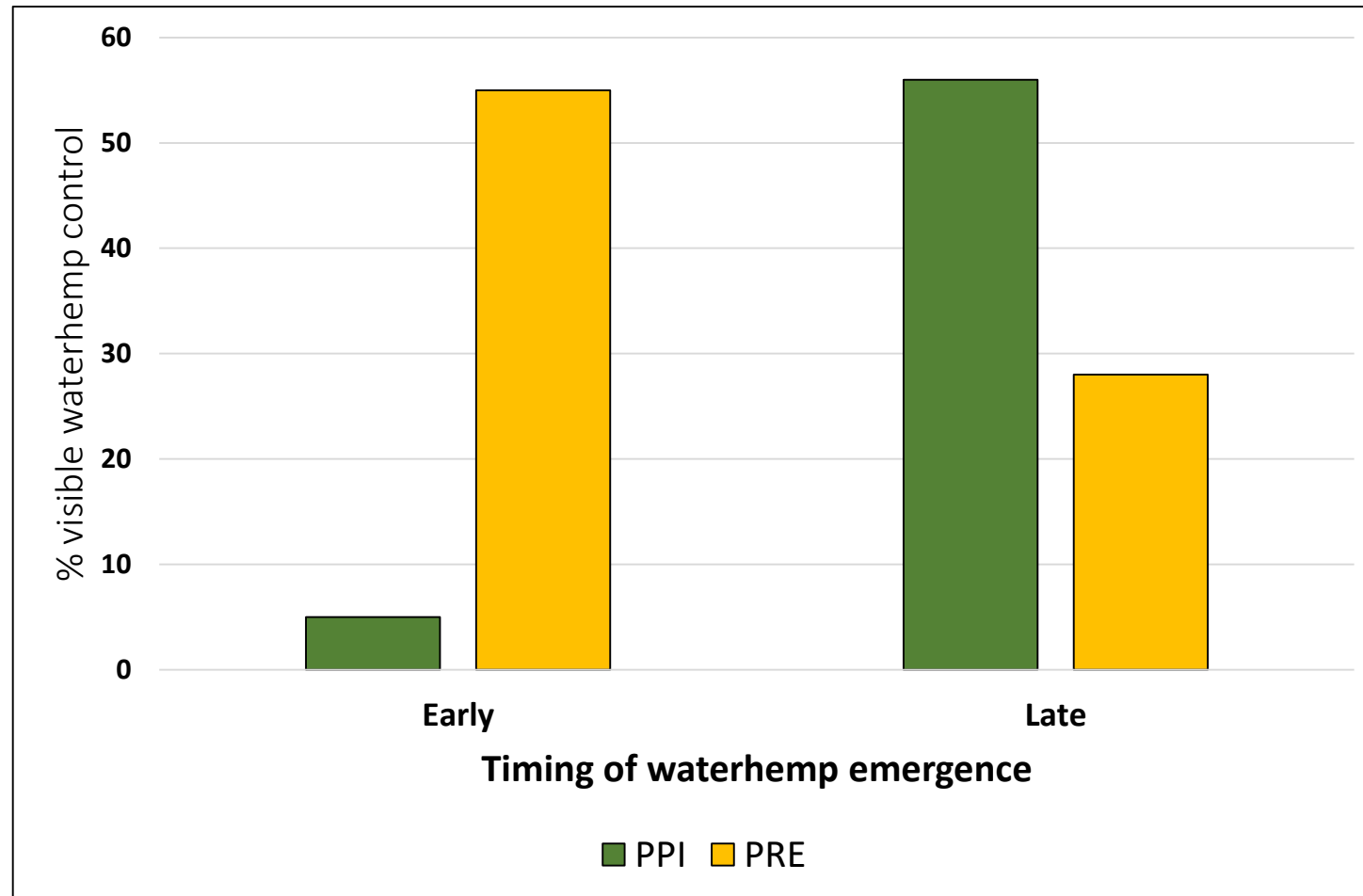


# Control of EARLY and LATE emerging waterhemp with ethofumesate at various rates, Jul 9, Fargo 2021

Herbicide	PPI Application		Preemergence Application	
(pt/A)	(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, 1.0- and 1.1-inch on June 7 and June 10

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



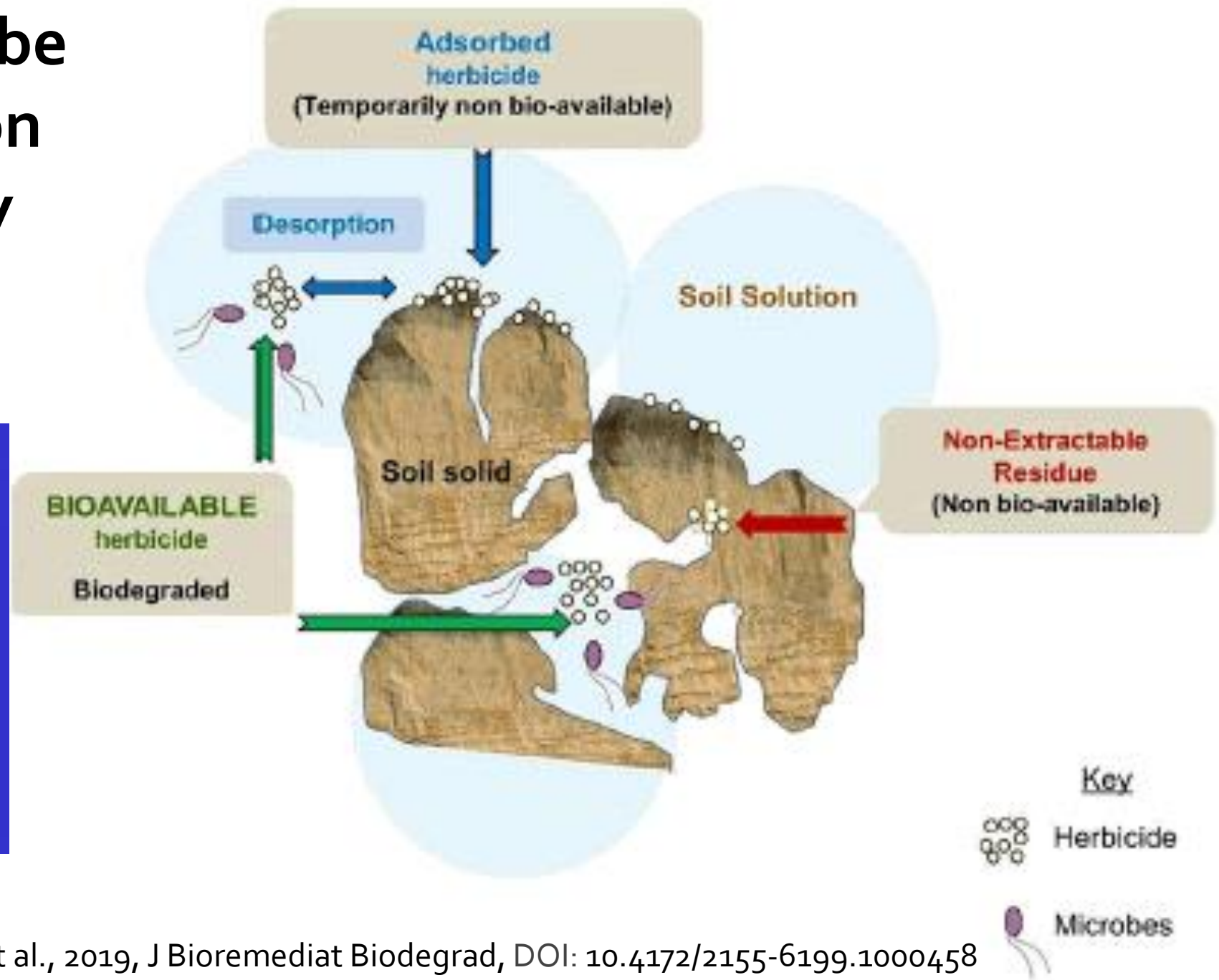
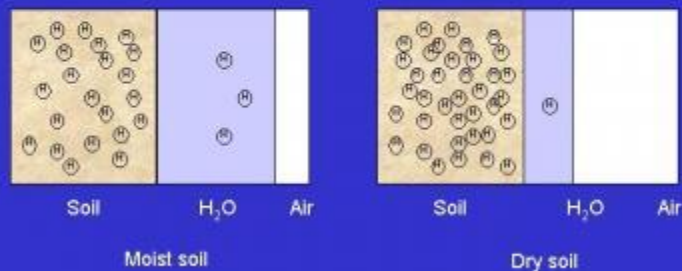


# Soil residual herbicides kill weeds as seed or seedlings imbibe water

- 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

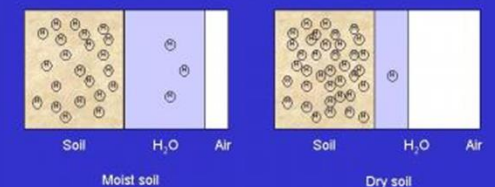
Kanissery, et al., 2019, J Bioremediat Biodegrad, DOI: 10.4172/2155-6199.1000458

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

Herbicide	PPI Application		Preemergence Application	
(pt/A)	(Early)	(Late)	(Early)	(Late)
2	0	15	5	10
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6	10	65	63	15
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10	10	63	75	43
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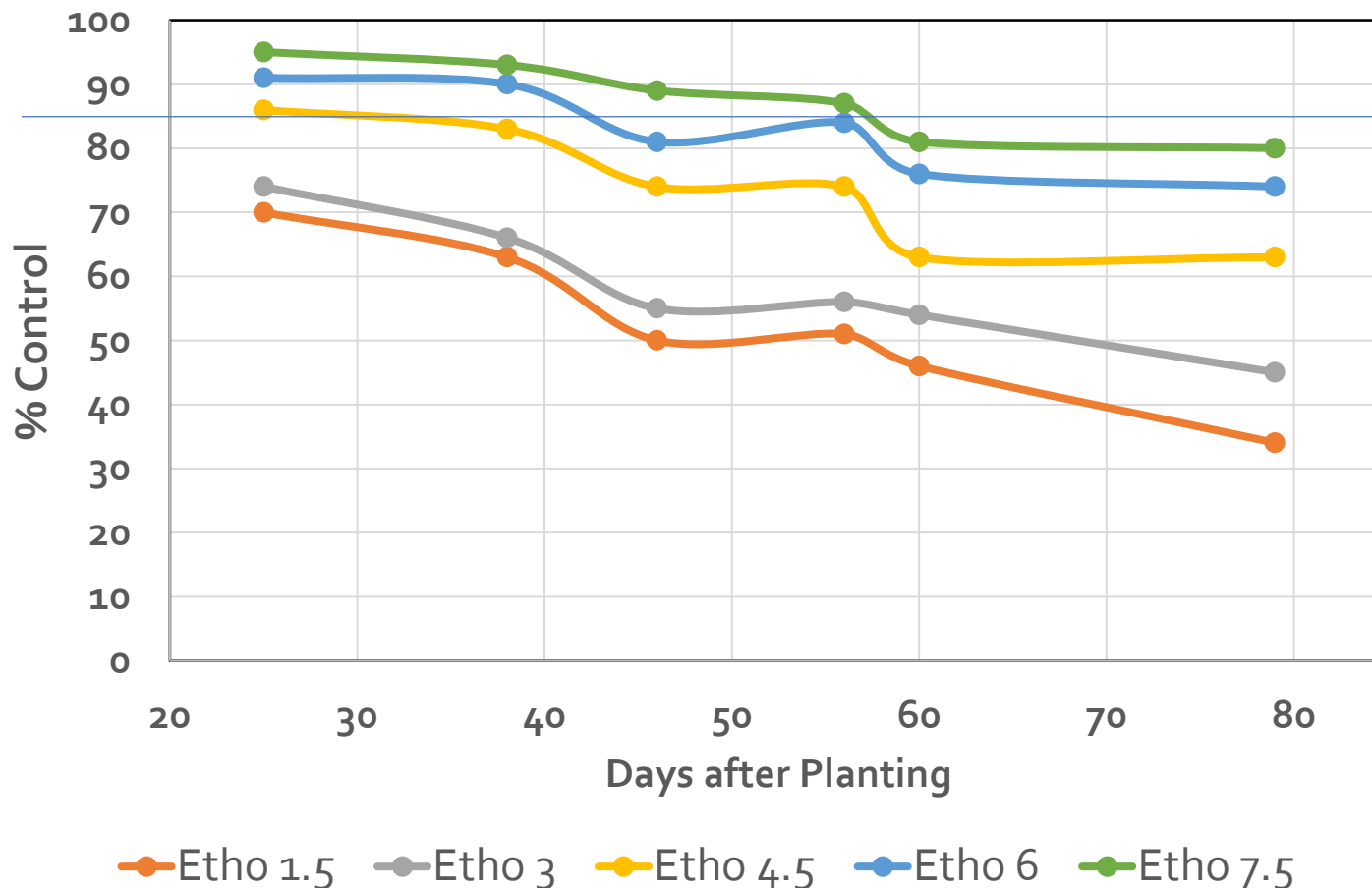
- May 10 plant (bone dry), 0.4-inch on May 20, 1- and 1.1-inch on June 7 and June 10
- PPI etho was adsorbed to colloids and diluted by incorporation, not available for waterhemp control
- PRE partially incorporated into soil and available after the May 10<sup>th</sup> rain
- PPI etho in the soil solution 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.

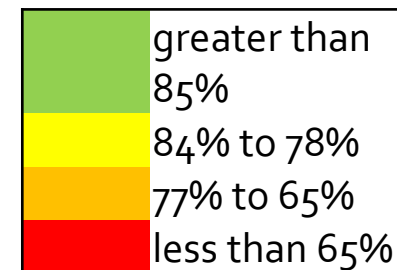


# Waterhemp control in response to ethofumesate PRE, Blomkest MN, 2020

Sublethal rates: full control for less time or less than full control?



Days after planting						
	25	38	46	56	60	79
Etho 1.5	70	63	50	51	46	34
Etho 3	74	66	55	56	54	45
Etho 4.5	86	83	74	74	63	63
Etho 6	91	90	81	84	76	74
Etho 7.5	95	93	89	87	81	80





# 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.

# Stalk quality creates dropped ears and volunteer corn







**Clethodim + HSOC**



**Clethodim + 2,4-D**



**Clethodim + HSOC**



**Clethodim + Dicamba**



**The group 1 herbicides are effective herbicides for volunteer corn control, Axial XL on wild oat**





# Adjuvant matters. Clethodim needs oil (HSOC, COC, MSO, etc.) to maximize performance.

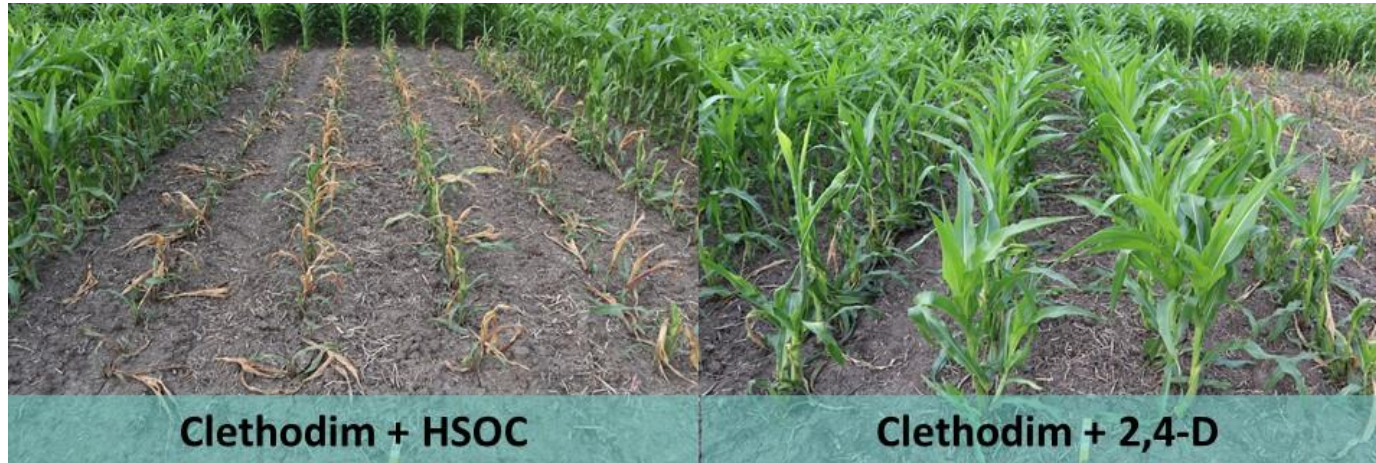


- Dead corn is good in this example
- Clethodim at the same rate in both plots
- HSOC (SuperB HC) mixed with Clethodim on the right
- Note: Plots have identical Section Three rates, difference is the adjuvant package





# Tank mixing clethodim (or other group 1 herbicides) with group 4's antagonizes grass performance





## **Increase Herbicide Efficacy with the right nozzle and dropet size**

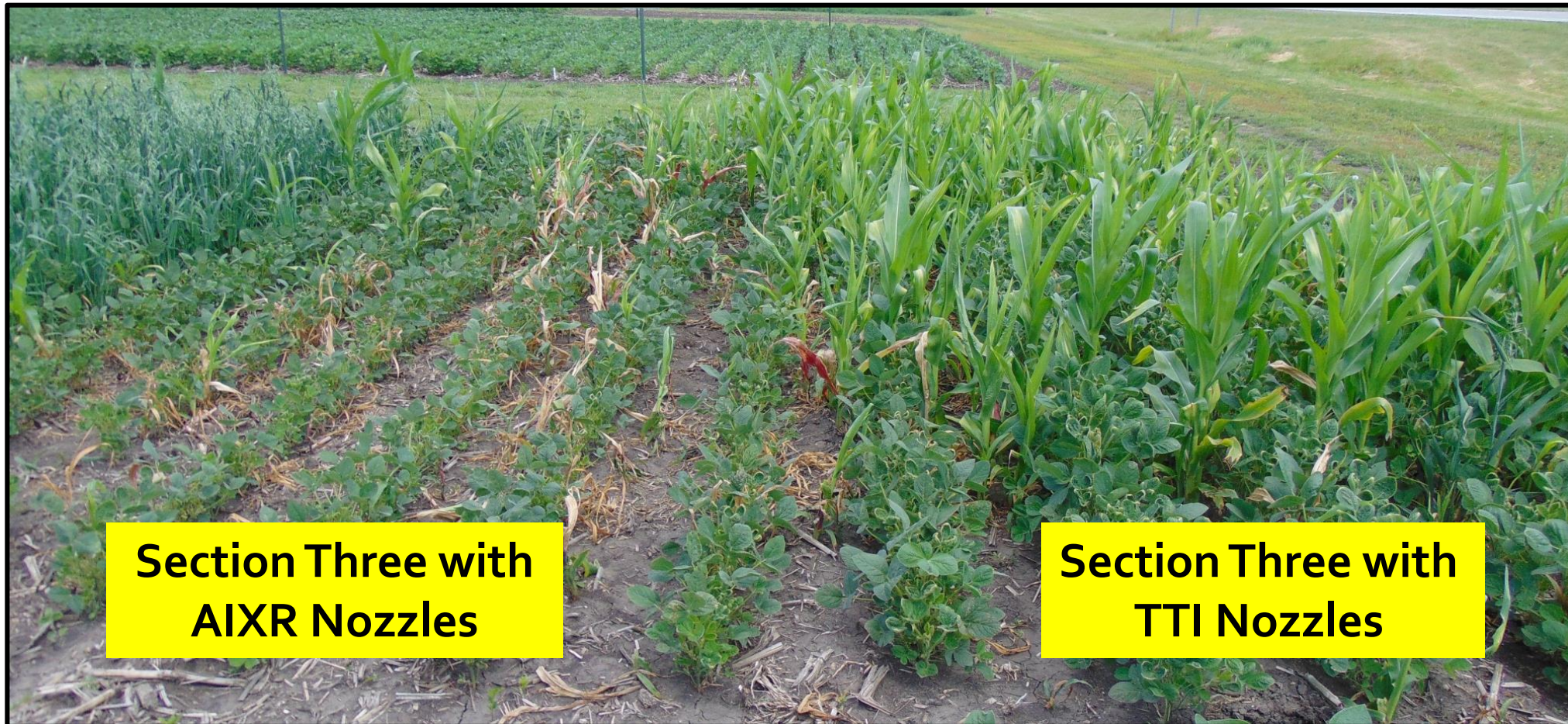


**Section Three with  
AIXR Nozzles**

**Section Three with  
TTI Nozzles**



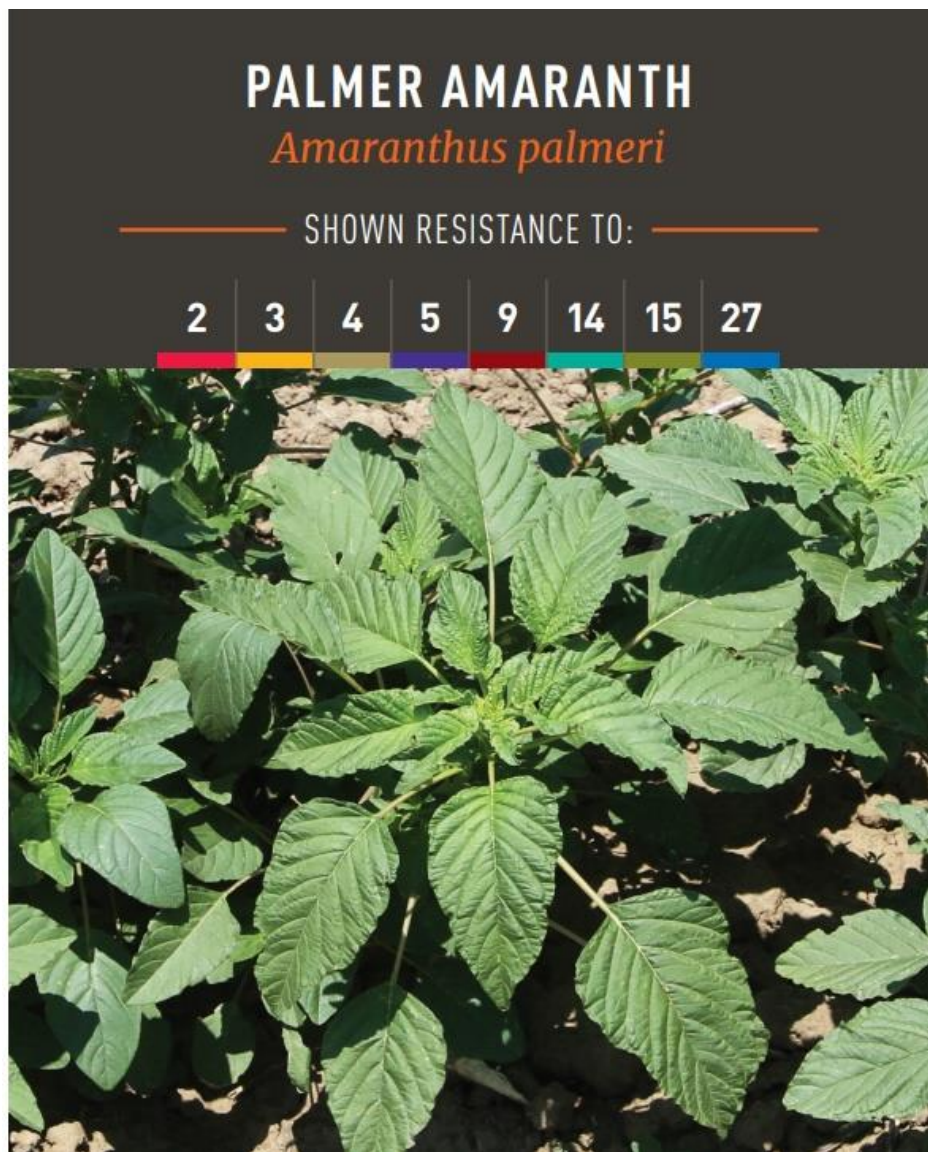
**Increasing water volume to 15 to 20 GPA will maximize performance when using nozzles producing very course-ultra course droplets (or in heavy volunteer corn pressure)**



**Section Three with  
AIXR Nozzles**

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TTI Nozzles**



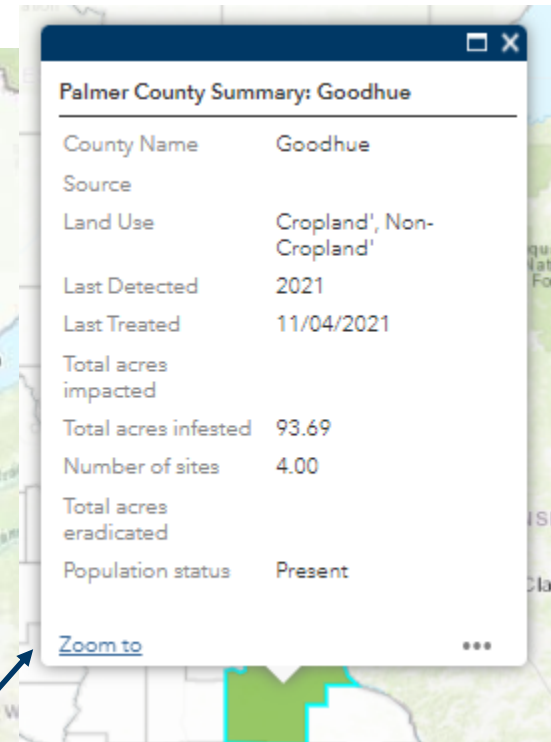
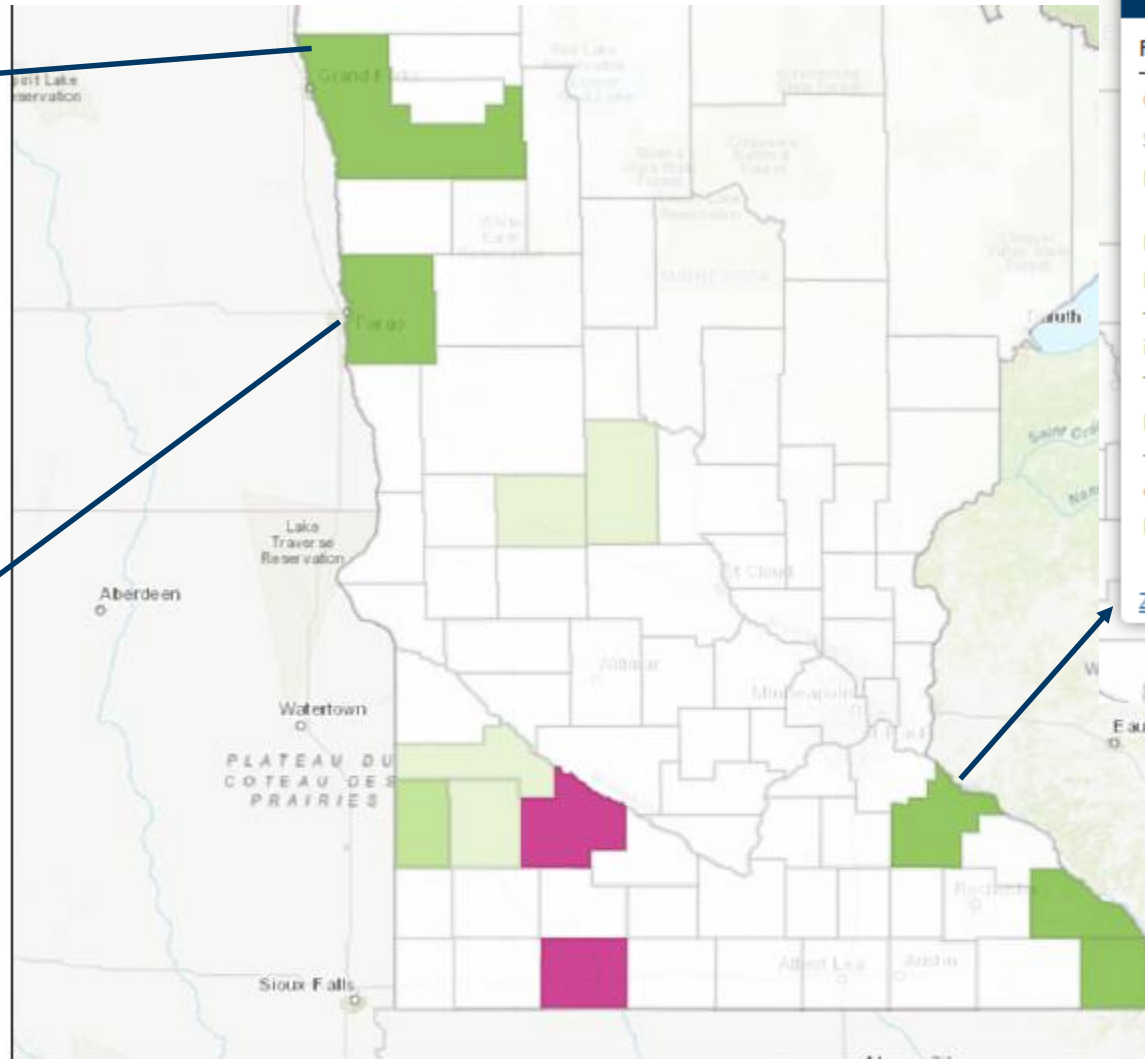
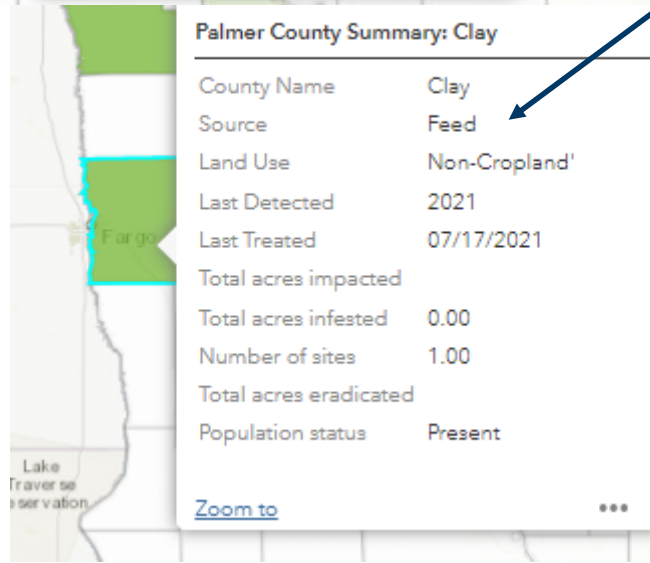
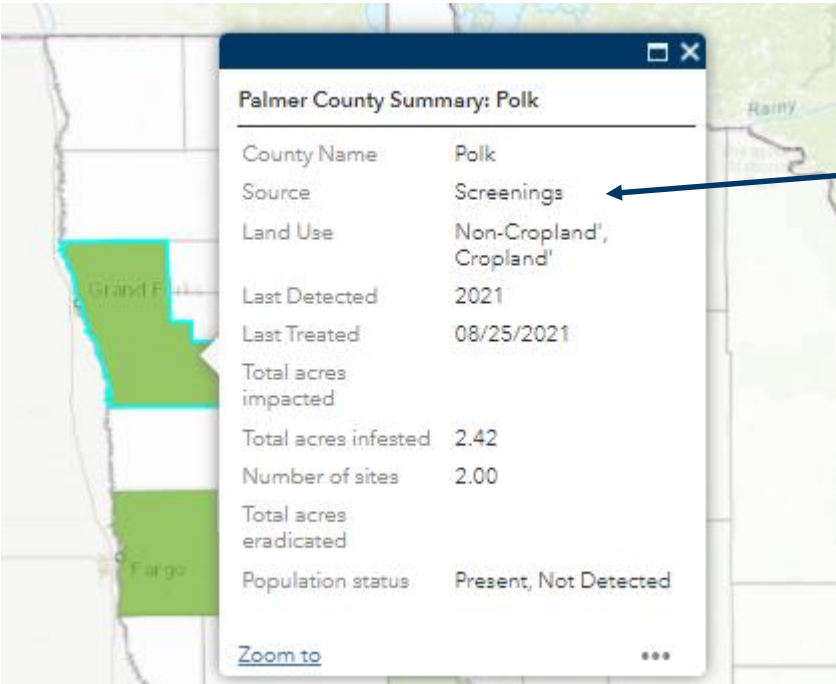


# Why the big deal?

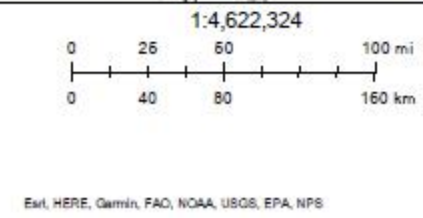
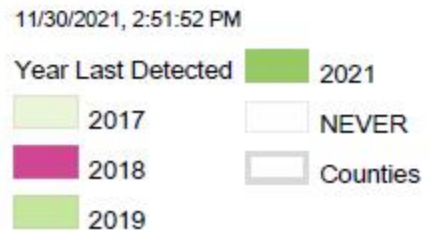
- Fast growing (up to 2-3 inches/day)
- Prolific seed producer
  - Potential 500,000+ seeds/plant
- Can cause severe yield losses
  - Up to 91% in corn & 79% in soybean
- Herbicide resistance concerns
  - R to multiple SOAs common

2	3	4	5	9	14	15	27
ALS INHIBITORS	MICROTUBULE INHIBITORS	SYNTHETIC AUXINS	PHOTOSYSTEM II INHIBITORS	EPSP SYNTHASE INHIBITOR	PPO INHIBITORS	LONG-CHAIN FATTY ACID INHIBITORS	HPPD INHIBITORS
Classic®, Pursuit®	Prowl® H <sub>2</sub> O, Trellan®	2,4-D, Clarity®, quinclorac	atrazine, metribuzin, Linex®	Roundup® (glyphosate)	Flexstar®, Cobra®	Dual®, Harness®	Callisto®, Laudis®





# MDA – Palmer Amaranth Public Map





# Key Introduction Modes...

- Feed and forage sources:
  - E.g. Hay, cottonseed meal, **sunflower screenings\*\***
- Contaminated CRP / cover crop seed
- Contaminated equipment

**\*\*Newer issue!!**

Source Denis Bastianelli (CIRAD), Feedpedia

**KNOW YOUR SOURCES**

Photo Tom Peters, U of MN

Source: Adam Henning, Feedpedia

Photo Liz Stahl, U of MN



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# If you suspect Palmer amaranth.....

## 1) Take Photos and record location

## 2) Immediately call

- TOM PETERS, local U of M Extension Educator or IPM Specialist, crop consultant, county agricultural inspector and/or MDA's **Arrest the Pest** at **888-545-6684** to report locations

## 3) SAVE the plant(s) for positive ID!

- Leave in the field if you can until the MDA can verify the plant and collect sample for genetic confirmation
- If hand-pulled, collect at least 5 leaves from each plant, place in Ziploc bag and refrigerate until you contact the MDA
- Dead and dry plant material should be placed in a paper bag and stored at room temperature.



# Thank you for your continued support

Tom Peters

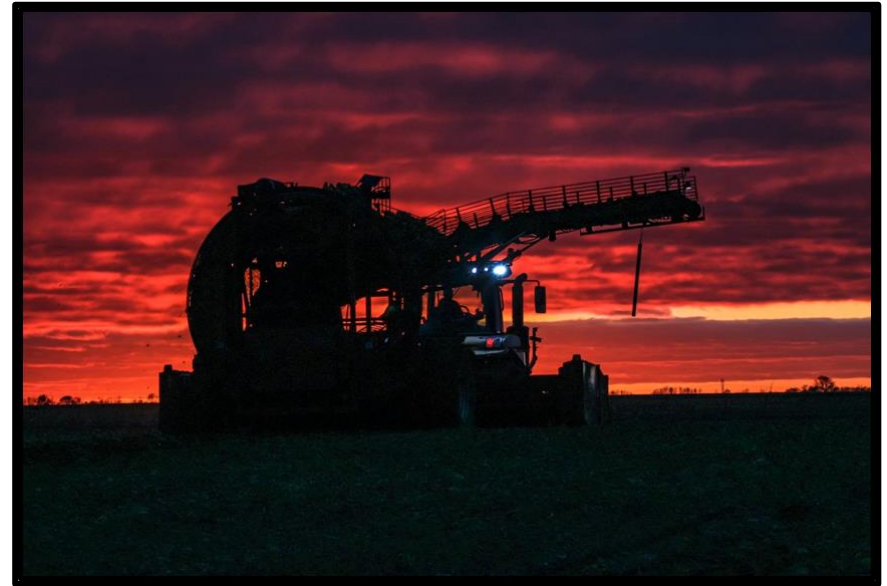
- Extension Sugarbeet Agronomist and Weed Control Specialist

- [thomas.j.peters@ndsu.edu](mailto:thomas.j.peters@ndsu.edu)

-  BeetWeedControl @tompeters8131

- 701-231-8131 (office)

- 218-790-8131 (mobile)



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# We appreciate your trust

- The Sugarbeet Research and Education Committee, especially Mr. Brian Ryberg and Mr. Ryan Carlson (SMBSC board members) for supporting our field research program.
- To Mike Anderson (Benson), Brett Petersen, and Youngkrantz Brothers for providing us the opportunity to conduct our experiments on their fields.
- To the Research Team at SMBSC, especially to David Mettler.

