

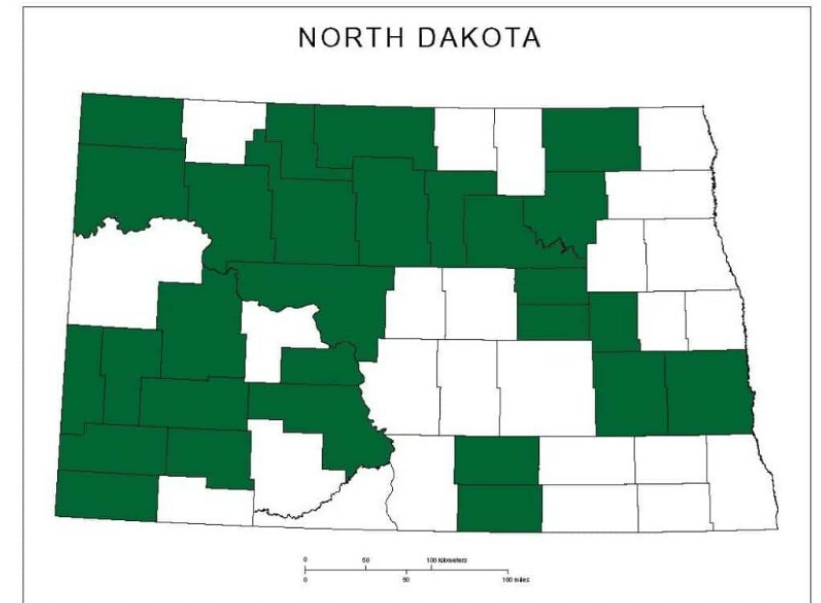
# How do we get rid of weeds so we can grow sugarbeet?

Thomas Peters and Adam Aberle,  
North Dakota State University and University  
of Minnesota, Fargo, ND



# If we look for herbicide resistant weeds you will find them

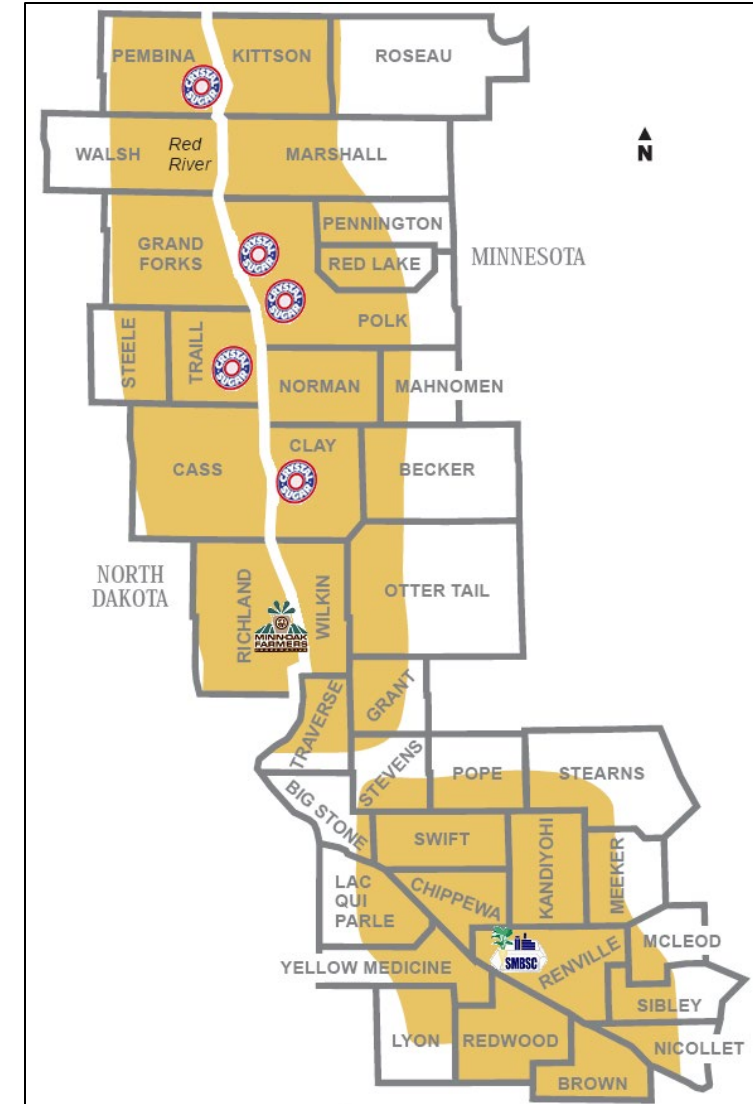
- Confirmed populations of glufosinate (SOA10) resistant waterhemp in Illinois; perhaps six other states (Farm Journal, Ag Web, January 2026)
- Group 15 herbicides resistant waterhemp in Illinois (Brownfield, January 2026)
- POST (SOA 14) herbicide resistant waterhemp populations in North Dakota (Farm and Ranch Guide, December 2025)
- Dr. Jenks identified kochia resistance to Group 14, which has now been found in more than half of North Dakota's counties (map) ([www.growiwm.org](http://www.growiwm.org))
- Atrazine has remained a useful herbicide, although atrazine resistant weeds were first documented in the Midwest in the 1980s
- The Ikley Lab reports triazine resistance weeds in ND might be broader than suspected (Ikley, personal communication)





# GR weeds dominate the landscape in Minnesota and eastern North Dakota

- GR waterhemp was the most troublesome weed control challenge on 451,888 acres or 71% of acreage according to 2025 survey.
  - Identified as most troublesome weed at all grower seminars
- GR common ragweed was 2% overall but 26% identified as the second most important weed in Crookston and EGF factory districts.
- GR kochia was 17% overall but 37% in Drayton factory district.

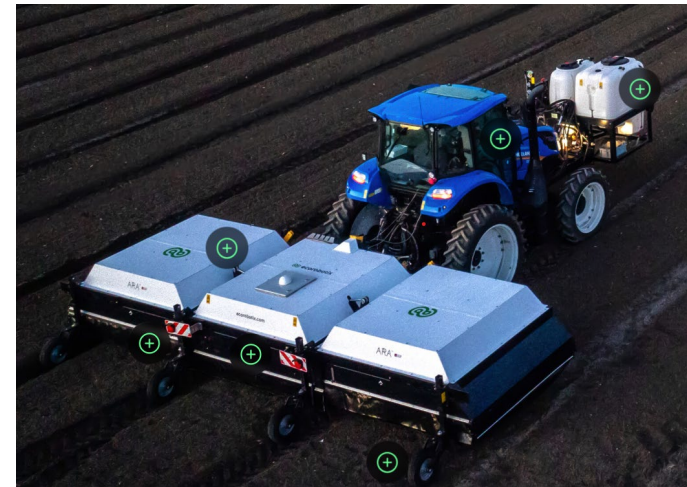


# Waterhemp Control Program in Sugarbeet

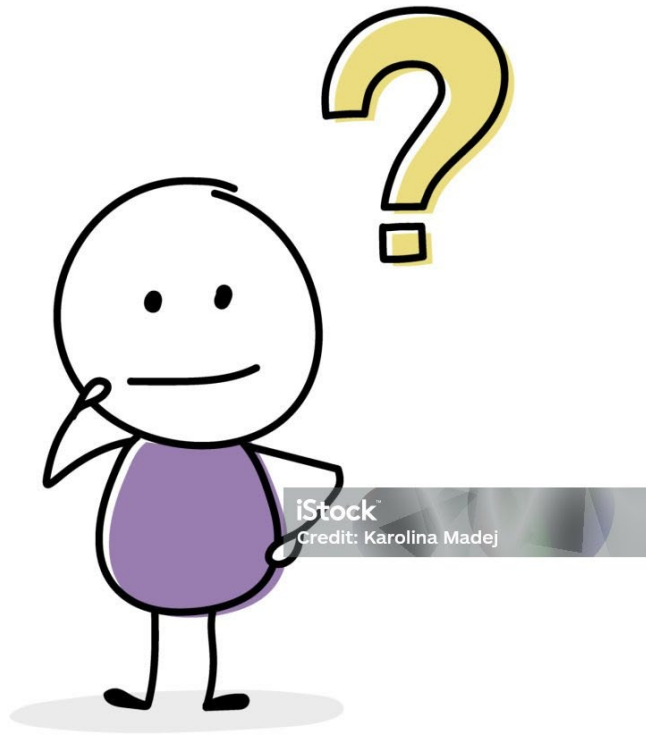
<b>Planting Date</b>	<b>Recommendation</b>
<b>Sugarbeet plant in April or May</b>	Dual Magnum at 0.5 to 1.0 pt/A, ethofumesate at 3 to 7.5 pt/A or Dual Magnum at 0.5 to 0.75 pt/A plus ethofumesate at 2 to 3 pt/A
	Split lay-by application (early postemergence / postemergence). Chloroacetamide herbicides applied at 2-lf sugarbeet fb 6- to 8-lf sugarbeet
<b>June</b>	Continue to scout fields for waterhemp. Control escapes with Ultra Blazer (Section 18ee) or inter-row cultivation
<b>July</b>	Electric Discharge Systems (WeedZapper™)
<b>August / September</b>	Hand remove waterhemp

# What is new for waterhemp control in sugarbeet?

- Fall application of Dual Magnum or Eptam
  - Dual Magnum at 2 pt/A
  - Eptam at 5 pt/A
  - Follow with the layby program
- Truvera™ sugarbeet seed
  - Dicamba applied either PRE or EPOST
  - Glufosinate at row closure
- AI influenced technologies
  - Xin Rex Sun Lab, NDSU
  - John Deere See & Spray™ Technology
  - Aigen Element
  - Verdant Robotics Sharp Shooter
  - Carbon Robotics LaserWeeder™

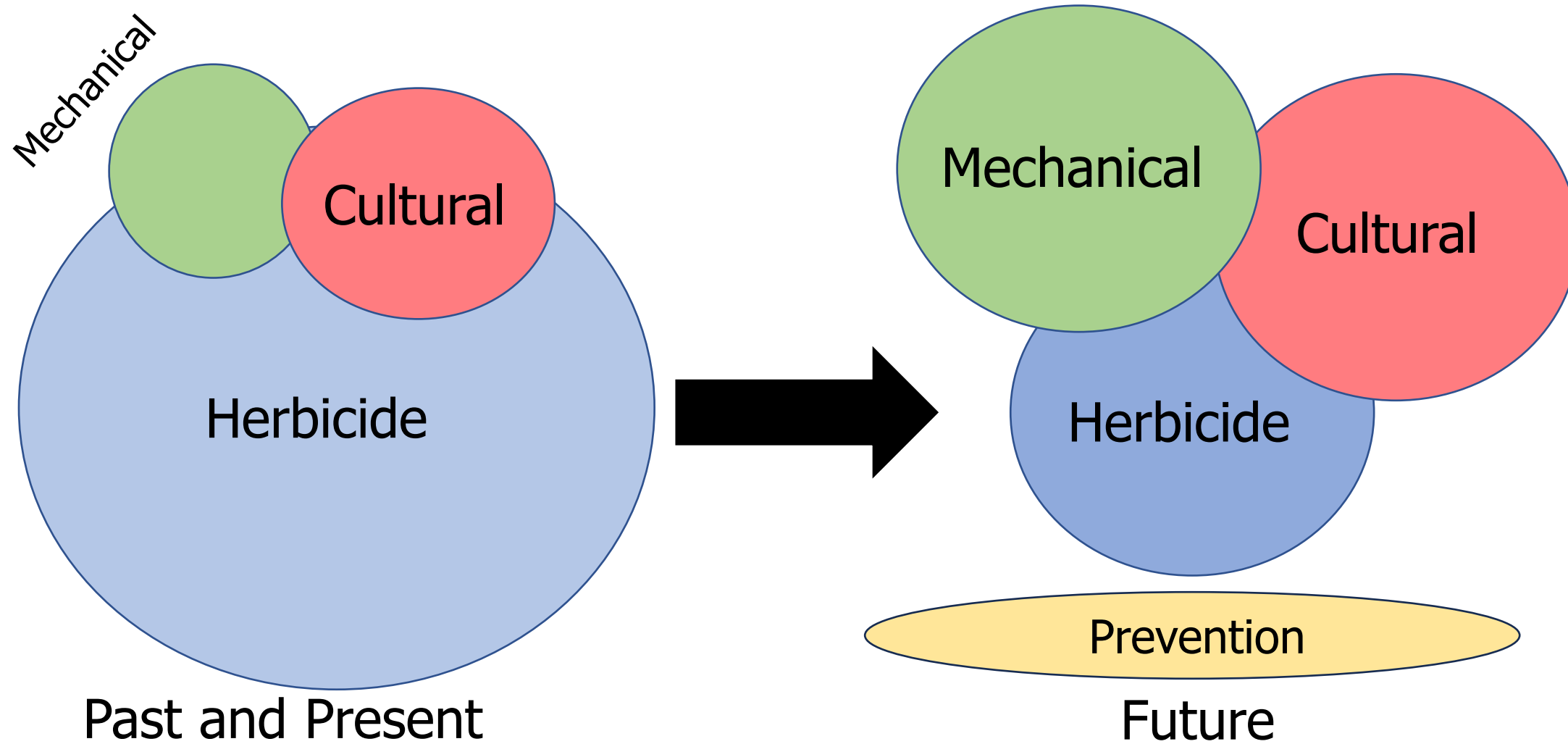


# How are we going to control weeds in the short term?



- Focus groups at Renville, Wahpeton and Moorhead in November and December 2025
- Growers, ag-retailers, crop consultants and cooperative agriculturalists
- 2 hour brainstorming session with action items for followup

# Integrated Weed Management



# Use the winter season to get back into the classroom

- Get back to herbicide basics
  - Create the best herbicide trait/herbicide program for the crops you grow on your farm
  - Learn about PREMIXes, effective herbicides and crop rotation restrictions
- How can mechanical and cultural control practices be integrated into the operation?
- Weed prevention
  - What does 'weed prevention' mean?
  - Who is going to manage field edges? And how?



Need 3-4 effective active ingredients in a program. POST when weeds are 2-3". 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

# Create the best herbicide trait/herbicide program for your farm

## Wheat

- Group 27 + bromoxynil (premix)
  - Huskie, 9 m CRR
  - 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



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POST/PRE	(15)	(15)	(15)	(15)
POST	(27) (6) (4)		(4) (5) (27)	(4) (10)

- Weed control in soybean is challenging but there are lots of options
- Edible beans is a different story

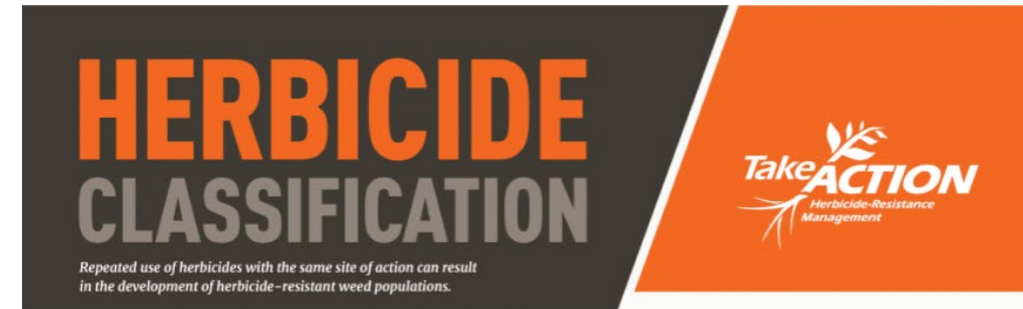
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- Is corn the easiest crop to control waterhemp?
- What happens after the rows close?
- Is my ag retailer comfortable with POST programs with dicamba?

# 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? 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.



## by MODE OF ACTION (MOA) (effect on plant growth)

This chart groups herbicides by their modes of action to assist you in selecting herbicides 1) to maintain greater diversity in herbicide use and 2) to rotate among effective herbicides with different sites of action to delay the development of herbicide resistance.

SITE-OF-ACTION GROUP	SITE OF ACTION	NUMBER OF RESISTANT WEED SPECIES IN U.S.		
		CHEMICAL FAMILY	ACTIVE INGREDIENT	PRODUCT EXAMPLES (Trade Name)
<b>LIPID SYNTHESIS INHIBITORS</b>				
1	ACCase INHIBITORS (only CA metabolism)	acetolactate synthase	glyphosate	Roundup®
		acetolactate synthase (leaf)	glyphosate	Roundup®
		acetolactate synthase (stem)	glyphosate	Roundup®
		acetolactate synthase (root)	glyphosate	Roundup®
		acetolactate synthase (seed)	glyphosate	Roundup®
<b>AMINO ACID SYNTHESIS INHIBITORS</b>				
2	ALS INHIBITORS (acetolactate synthase)	acetolactate synthase	acetolactate synthase	Roundup®
		acetolactate synthase	acetolactate synthase	Roundup®
		acetolactate synthase	acetolactate synthase	Roundup®
		acetolactate synthase	acetolactate synthase	Roundup®
		acetolactate synthase	acetolactate synthase	Roundup®
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		acetolactate synthase	acetolactate synthase	Roundup®
		acetolactate synthase	acetolactate synthase	Roundup®
		acetolactate synthase	acetolactate synthase	Roundup®
<b>EPSP SYNTHASE INHIBITOR (2-methylerythritol 2-phosphate)</b>				
9	EPSP SYNTHASE INHIBITOR	glyphosate	Roundup®	Roundup®
<b>GROWTH REGULATORS</b>				
4	SYNTHETIC AUXINS (2,4-D and related ester isomers)	2,4-D	2,4-D	2,4-D
		2,4-D	2,4-D	2,4-D
		2,4-D	2,4-D	2,4-D
		2,4-D	2,4-D	2,4-D

## by PREMIX

This chart lists premix herbicides alphabetically by their trade names so you can identify the premix's component herbicides and their respective site-of-action groups. Refer to the Site of Action chart on the left for more information.

PREMIX	COMPONENT		SITE-OF-ACTION GROUP
	ACTIVE INGREDIENT	TRADE NAME	
ACRON	glyphosate	Roundup®	1
ACRON PLUS	glyphosate	Roundup®	1
ACRON 2T	glyphosate	Roundup®	1
ACRON 3T	glyphosate	Roundup®	1
ACRON 4T	glyphosate	Roundup®	1
ACRON 5T	glyphosate	Roundup®	1
ACRON 6T	glyphosate	Roundup®	1
ACRON 7T	glyphosate	Roundup®	1
ACRON 8T	glyphosate	Roundup®	1
ACRON 9T	glyphosate	Roundup®	1
ACRON 10T	glyphosate	Roundup®	1
ACRON 11T	glyphosate	Roundup®	1
ACRON 12T	glyphosate	Roundup®	1
ACRON 13T	glyphosate	Roundup®	1
ACRON 14T	glyphosate	Roundup®	1
ACRON 15T	glyphosate	Roundup®	1
ACRON 16T	glyphosate	Roundup®	1
ACRON 17T	glyphosate	Roundup®	1
ACRON 18T	glyphosate	Roundup®	1
ACRON 19T	glyphosate	Roundup®	1
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ACRON 97T	glyphosate	Roundup®	1
ACRON 98T	glyphosate	Roundup®	1
ACRON 99T	glyphosate	Roundup®	1
ACRON 100T	glyphosate	Roundup®	1

PULL HERE TO OPEN ▶

# RESTRICTED USE PESTICIDE

(GROUND AND SURFACE WATER CONCERNS)

FOR RETAIL SALE TO AND USE ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION, AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION.

THIS PRODUCT IS A RESTRICTED-USE HERBICIDE DUE TO GROUND AND SURFACE WATER CONCERNS. USERS MUST READ AND FOLLOW ALL PRECAUTIONARY STATEMENTS AND INSTRUCTIONS FOR USE IN ORDER TO MINIMIZE POTENTIAL FOR ATRAZINE TO REACH GROUND AND SURFACE WATER.

Sale, use and distribution of this product in Nassau and Suffolk Counties in the State of New York is prohibited.



ATRAZINE	GROUP 5	HERBICIDE
BICYCLOPYRONE	GROUP 27	HERBICIDE

MESOTRIONE	GROUP 27	HERBICIDE
S-METOLACHLOR	GROUP 15	HERBICIDE

# Acuron<sup>®</sup>

Herbicide

Escanee QR para Español



A Herbicide for Control of Annual Grass and Broadleaf Weeds in Field Corn, Seed Corn, Silage Corn, Sweet Corn and Yellow Popcorn

*Active Ingredients:*

S-Metolachlor: (CAS No. 87392-12-9) .....	23.40%
Atrazine*: (CAS No. 1912-24-9) .....	10.93%
Mesotrione: (CAS No. 104206-82-8) .....	2.60%
Bicyclopyrone: (CAS No. 352010-68-5) .....	0.65%

*Other Ingredients:* .....

*Total:* .....

Acuron<sup>®</sup> Herbicide is a ZC formulation containing 1.0 pound Atrazine, 0.06 pound Bicyclopyrone, 0.24 pound Mesotrione, and 2.14 pounds S-metolachlor per gallon.

\*Atrazine with a maximum of 0.45% related triazines.

**KEEP OUT OF REACH OF CHILDREN.**

## CAUTION

See additional precautionary statements and directions for use on label.

EPA Reg. No. 100-1466

EPA Est. 100-LA-001

SCP 1466A-L1F 1121

4230207

**2.5 gallons**  
Net Contents

- PPI, PRE, or EPOST
- Rate changes with OM
- Controls numerous important MN and ND weeds including waterhemp
- Flexible
- Reliable

# Case-study, Acuron Herbicide

PREMIX	Active Ingredient	Trade Name	SOA	Effective waterhemp?
Acuron	bicyclopyrone	Optogen	27	✓
	mesotrione	Callisto	27	✓
	atrazine	Aatrex	5	✓
	S-metolachlor	Dual II Magnum	15	✓

What is the use rate for my Amenia, ND Farm?

4% organic matter, 3 qt per acre

What is the herbicide rate in each component in the PREMIX?  
Is the herbicide rate effective for waterhemp control?

Active Ingredient	Trade Name	Rate (lb ai/A in Acuron at 3 qt/A)	Rate for effective control	Effective Herbicide	Comment
bicyclopyrone	Optogen	0.045	0.045	✓	partial control
mesotrione	Callisto	0.188	0.188-0.240	✓	control
atrazine	Aatrex	0.75	2	✓	partial control
S-metolachlor	Dual II Magnum	1.59	1.53	✓	control

# TripleFlex II Herbicide

- PPI, PRE, or EPOST
- Rate changes with OM
- Controls numerous important MN and ND weeds including waterhemp
- One effective waterhemp control herbicide
- 26 MONTH ROTATIONAL RESTRICTION TO SUGARBEET



PREMIX	Active Ingredient	Trade Name	SOA	Effective waterhemp?
TripleFlex	acetochlor	Harness	15	✓
	flumetsulam	Python	2	
	clopyralid	Stinger HL	4	

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**What is the purpose of tillage? Is tillage for soil disturbance, manage residue, or to control weeds?**



# Vertical tillage vs. field cultivator

## Vertical Tillage

- manage residue and prepare seedbeds
- cause less disturbance than shanks since the blades roll through the soil as they cut
- generally does not attempt to bury the residue
- operated in fall and spring conditions
- **“can be a hindrance as much as a help in weed control”**

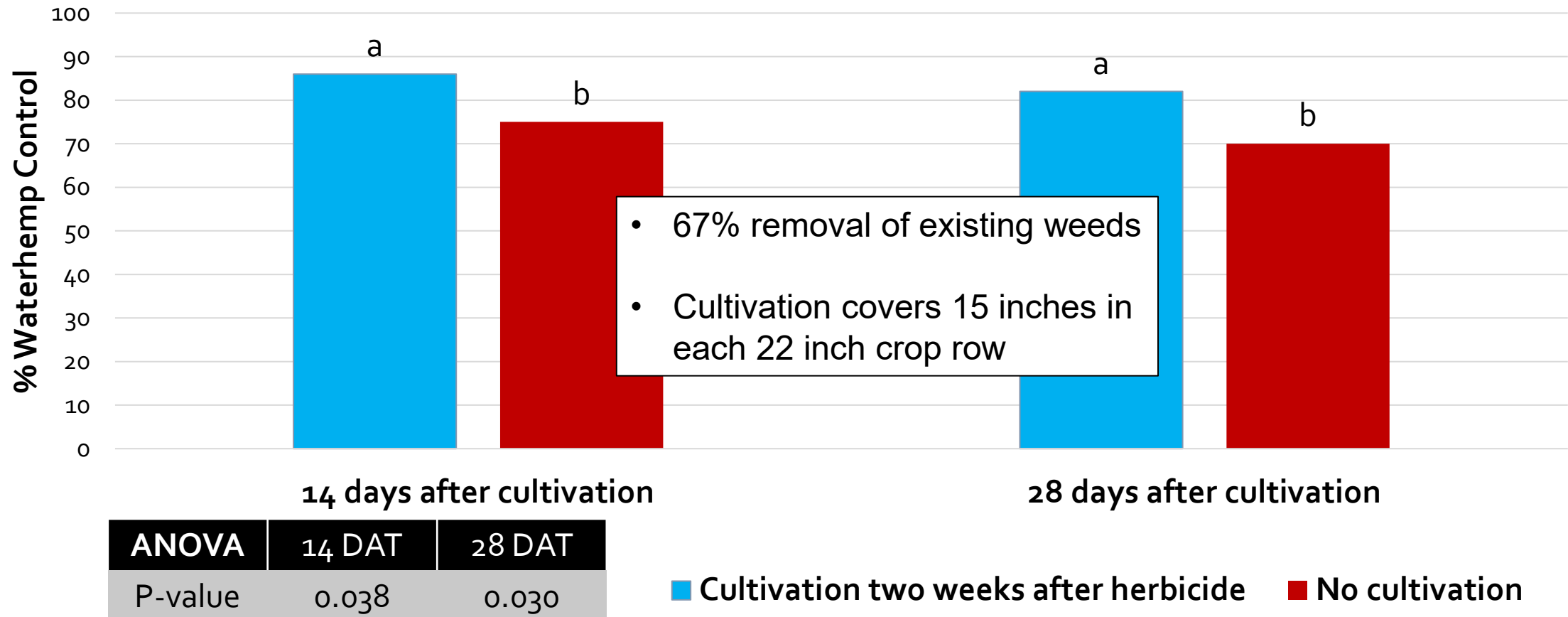
## Field Cultivator

- push the soil to level
- slice through the soil on a horizontal plane to provide weed control and produce a level seedbed
- run at a depth deeper than vertical tillage
- excellent for small emerging weeds
- **designed to lift the soil and undercut to eliminate weeds**



Schmoll Farms  
Lake Lillian, MN

# Delayed cultivation two weeks after POST spray improved waterhemp control 11-12% across four environments

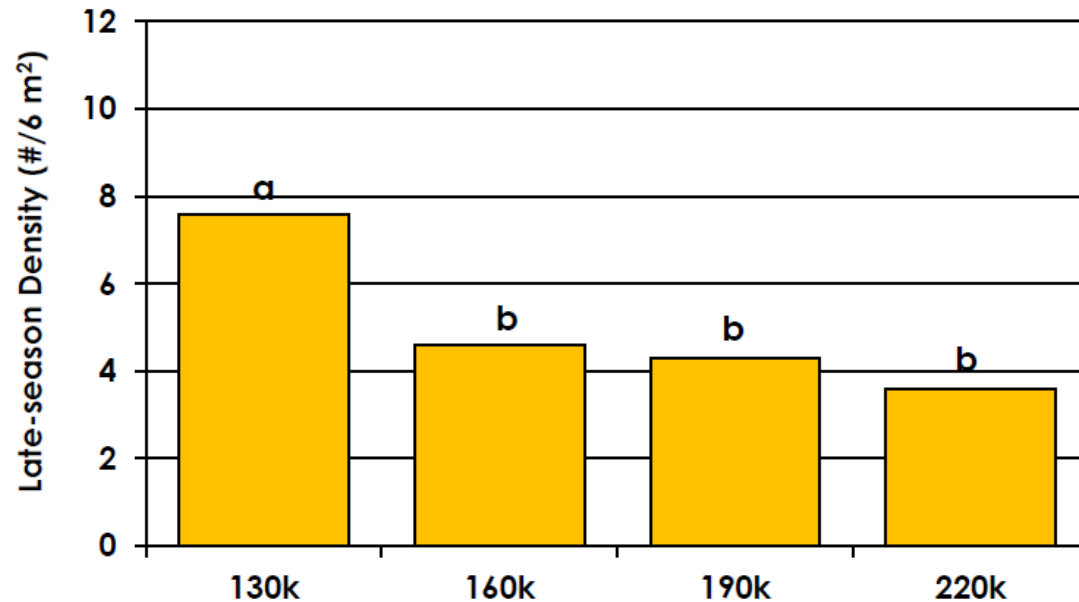




**Petersen Farms &  
Louriston Dairy  
Murdock, MN**

# Use your crop to your weed control advantage to eliminate late germinators

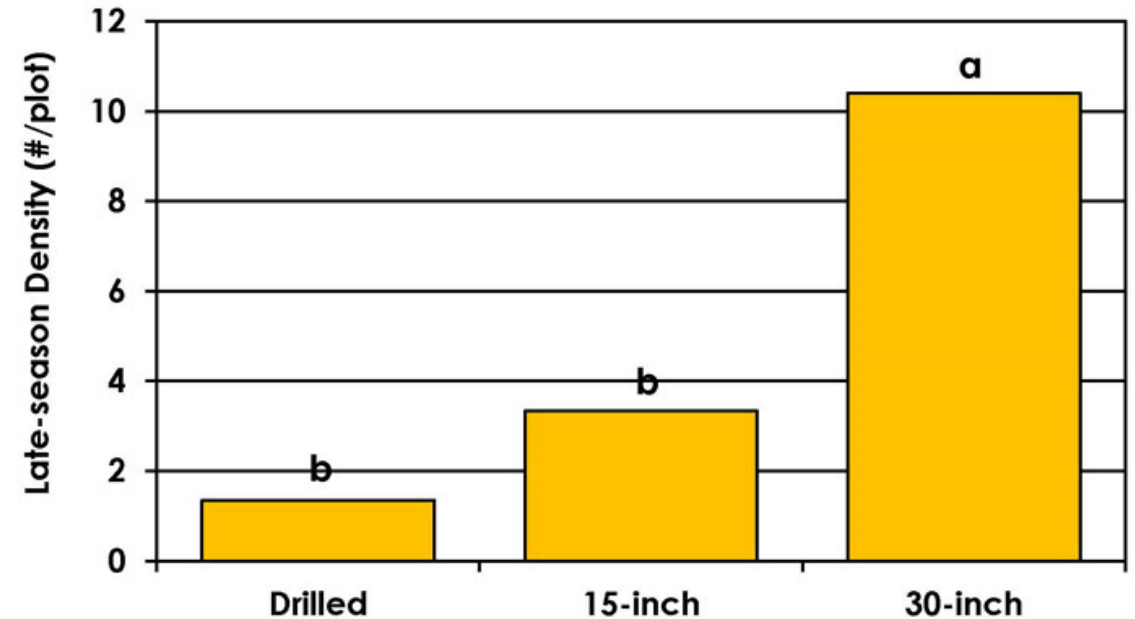
What effect does soybean planting population have on pigweed control?



\*Results summarized across herbicide programs, tillage types, and row spacings.

\*\*Means followed by the same letter are not different,  $P \leq 0.05$

What effect does soybean row spacing have on pigweed control?



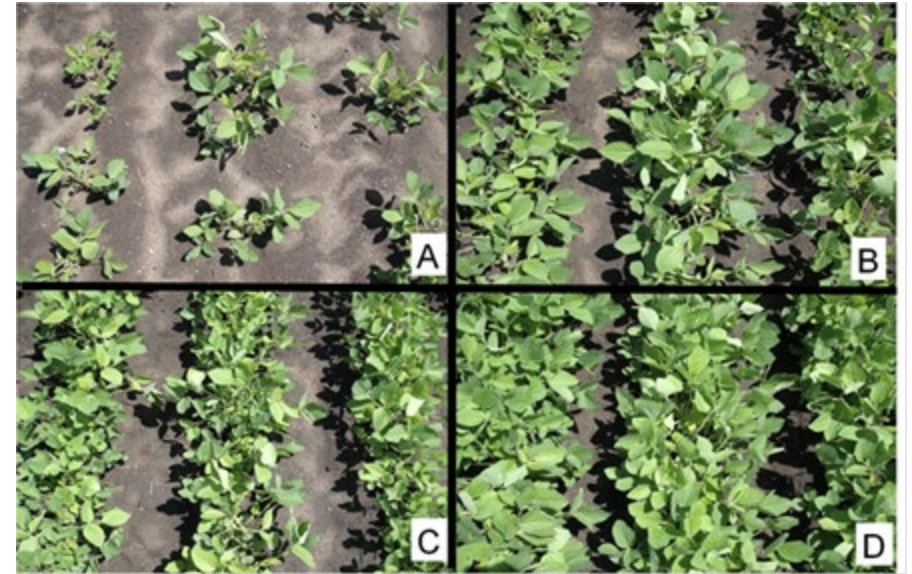
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# Do certain soybean varieties emerge quicker and / or have rapid early season development?

NO.

- There has been renewed interest among some public breeders to look for varieties that are more competitive with living cover crops (such as oilseeds like camelina or pennycress)
- Dr. Jim Orf, UMN Soybean Breeder, selected for soybean more competitive with weeds - specifically for organic systems



Light interception or canopy closure for four seeding rates (seeds/acre) planted in 20 inch rows. A. 25,000, B. 125,000, C. 225,000, D. 275,000.

## Integrated Weed Management



Herfimer, Iowa State University





Wayne Lessard  
St. Thomas, ND



Darrin  
Radermacher  
Amelia, ND



## Seeding sugarbeet between fall-seeded winter rye

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

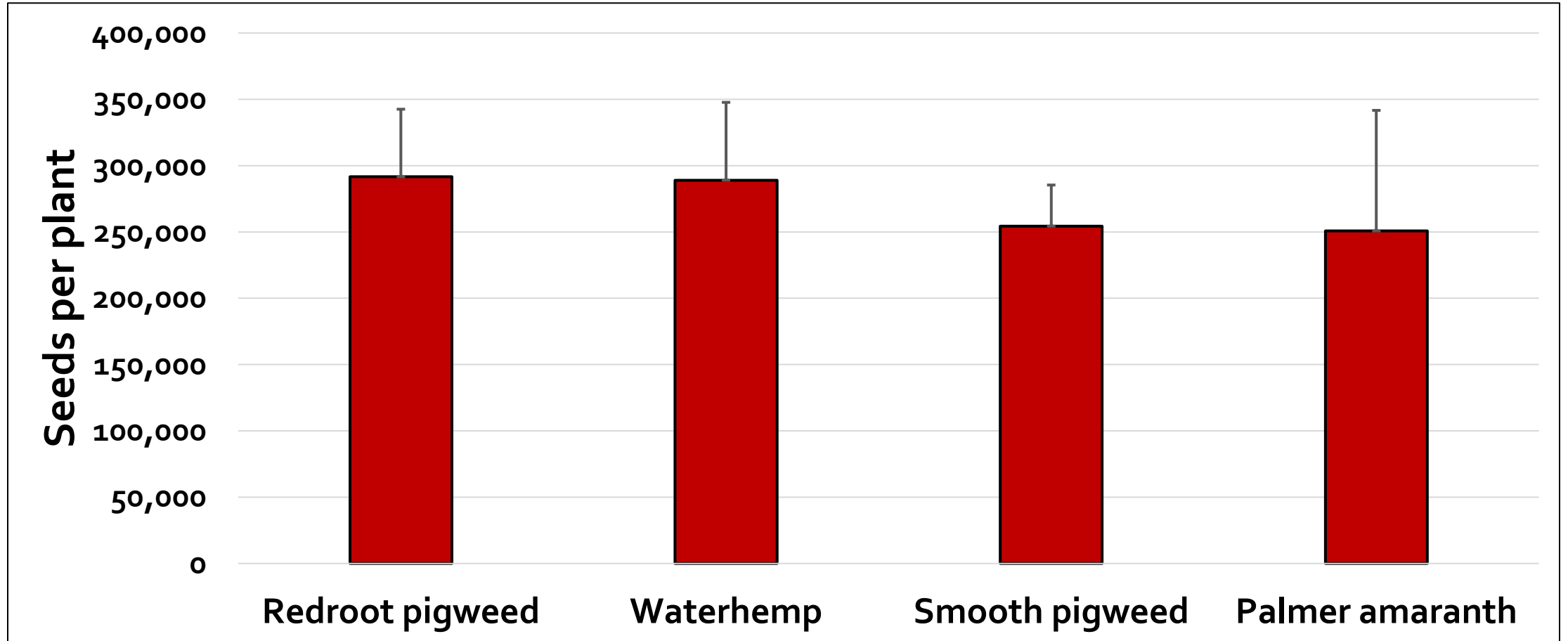
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**Waterhemp seed is viable 7 to 14 days after flowering.  
Carry pigweed from the field if you go through the  
trouble of pulling weeds**



# Pigweed species make a lot of seed



# Who is going to manage field edges?





# Thank you for your continued support

Tom Peters

- Extension Sugarbeet Agronomist and Weed Control Specialist

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**NDSU**

EXTENSION

UNIVERSITY OF MINNESOTA  
**EXTENSION**