MICHIGAN STATE UNIVERSITY

2020/2021 Weed Control Research ir Winter Wheat

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Strategies to manage horseweed (marestail) in winter wheat – *Year 1 (20-08-07-AS)*

Horseweed issues

- Problem in all aspects of the crop rotation
- Prolonged emergence
- Prolific seed production
- Long distance seed dispersal
- Herbicide-resistance issues
  - Glyphosate (Group 9)
  - ALS-inhibitors (Group 2)

High number of seeds produced
(200,000 seeds/plant)

Small windblown seed
(Reports of 125 plants/yd^2, 400 ft from source)

Horseweed is a problem in all aspect of the wheat growing season

- At planting
- Throughout the season
- After harvest

Research objectives
(FY20-21)

1. Evaluate the effects of tillage and fall herbicide treatments on horseweed control in winter wheat.
2. Determine which commonly used broadleaf herbicide in winter wheat herbicides provides the best horseweed control.
3. Determine the effects that horseweed competition has on winter wheat yield.
4. Evaluate management strategies for horseweed after winter wheat harvest.
5. Provide management recommendations for horseweed management to Michigan wheat growers.

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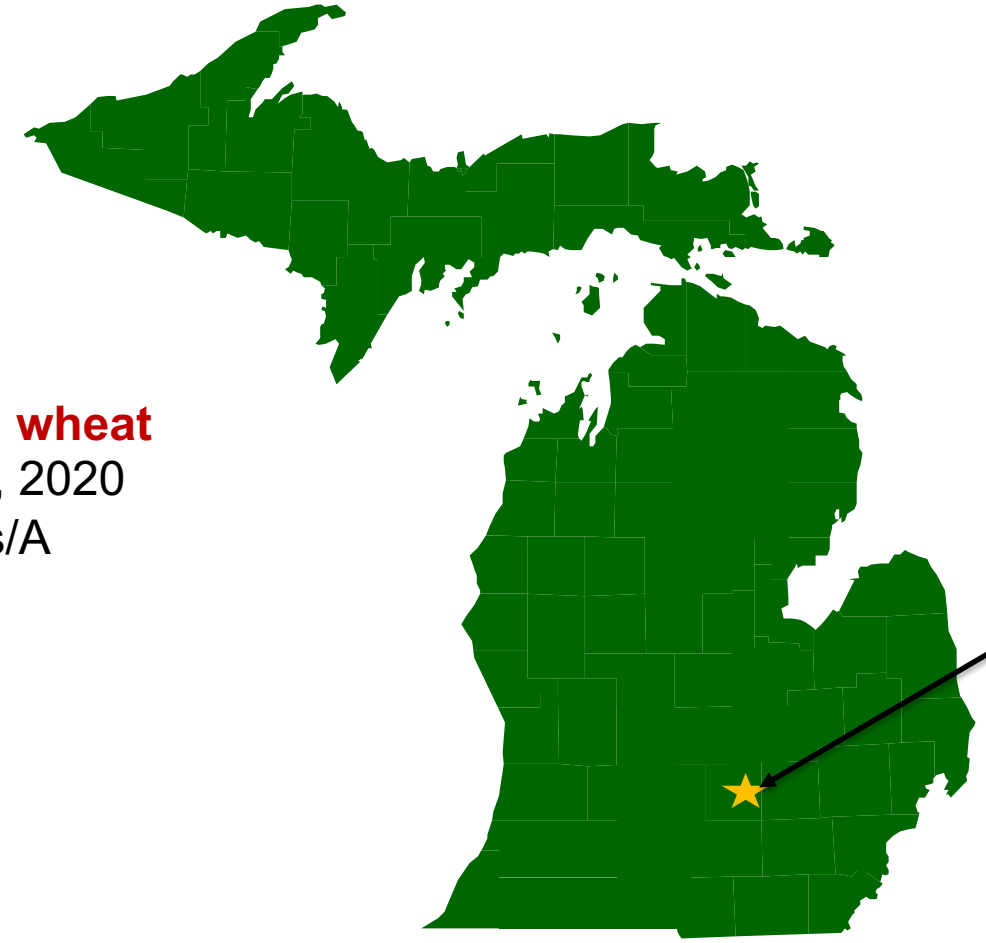
Horseweed control in winter wheat



'Whale' soft red wheat
Planted: Oct. 20, 2020
1.8 million seeds/A

Weed management systems examined (19 trts)

Table 1. Tillage and fall herbicide application main plots.

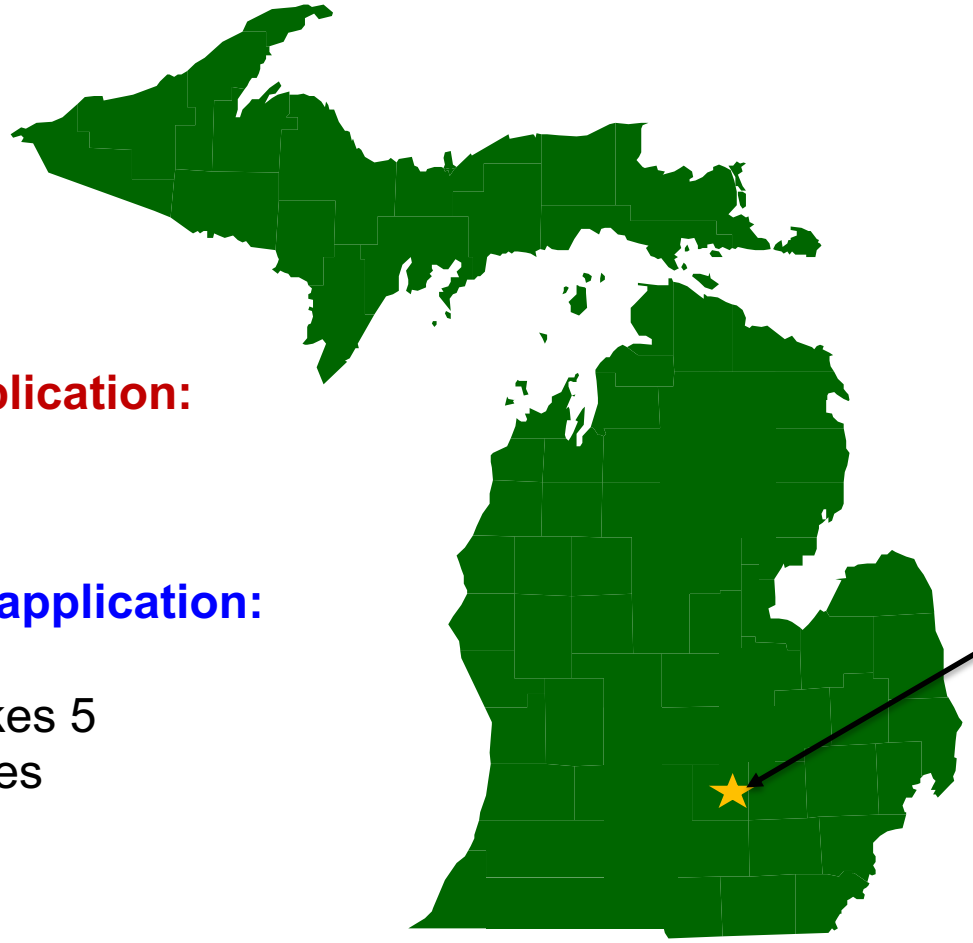
	Tillage treatments	Herbicide treatments
1	Conventional tillage	Spring herbicide treatments in Table 2
2	No-tillage	No fall applications fb. Spring treatments in Table 2
3		Sharpen at 1 fl oz[1] (Fall) fb. Spring treatments in Table 2
4		Sharpen at 2 fl oz[1] (Fall) fb. no spring treatment

Table 2. Spring herbicide treatments applied in each tillage and fall herbicide block.

	Herbicide treatment	SOA[2] Group #	Rate	Additives
1	Huskie	6 + 27	15 fl oz/A	NIS + AMS
2	Talinor	6 + 27	18.2 fl oz/A	CoAct+
3	Quelex	2 + 4	0.75 oz/A	COC
4	Curtail	4 + 4	2 pt/A	
5	MCPA	4	0.38 pt/A	
6	Untreated			

[1] Roundup PowerMax (32 fl oz) + AMS will be included.
[2] Herbicide site of action group numbers.

Horseweed control in winter wheat



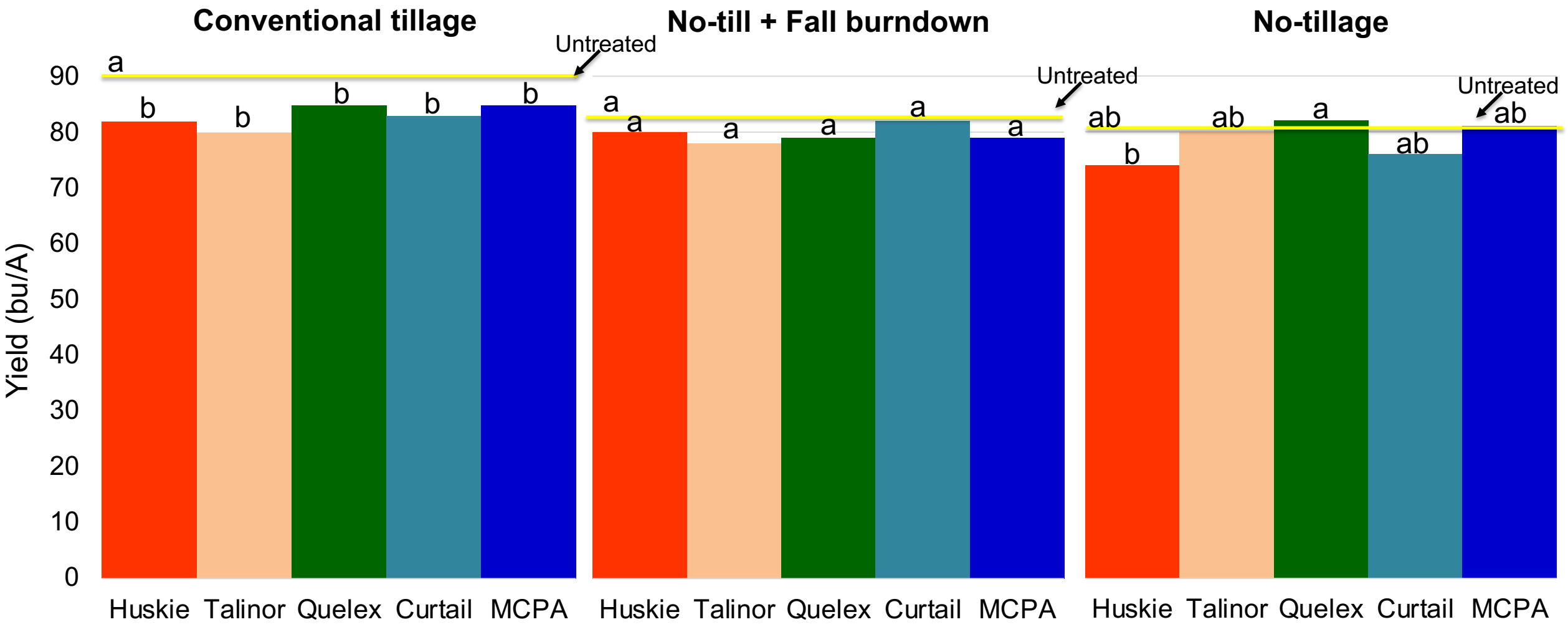
‘Fall herbicide application:
Oct. 20, 2020
Prior to planting

Spring herbicide application:
May 5, 2021
Wheat stage: Feekes 5
Wheat ht.: 13-inches

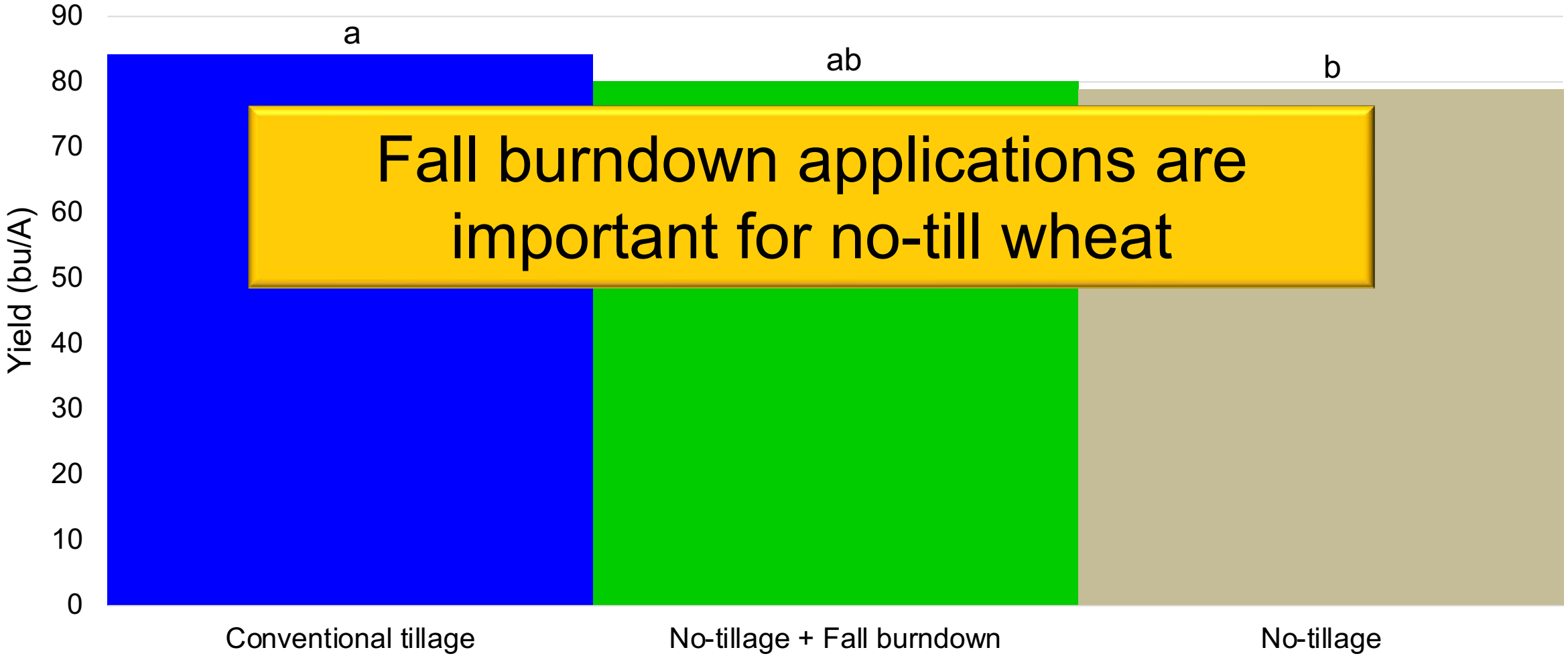
Results

- Due to early dry conditions the wheat effectively competed with horseweed and other weeds.
- Injury was less than 5% with all herbicide applications throughout the season.
- Wheat yield was collected to compare tillage and herbicide applications.

Tillage and herbicide effects on wheat yield



Main effects of tillage on winter wheat yield



Fall burndown applications are important for no-till wheat

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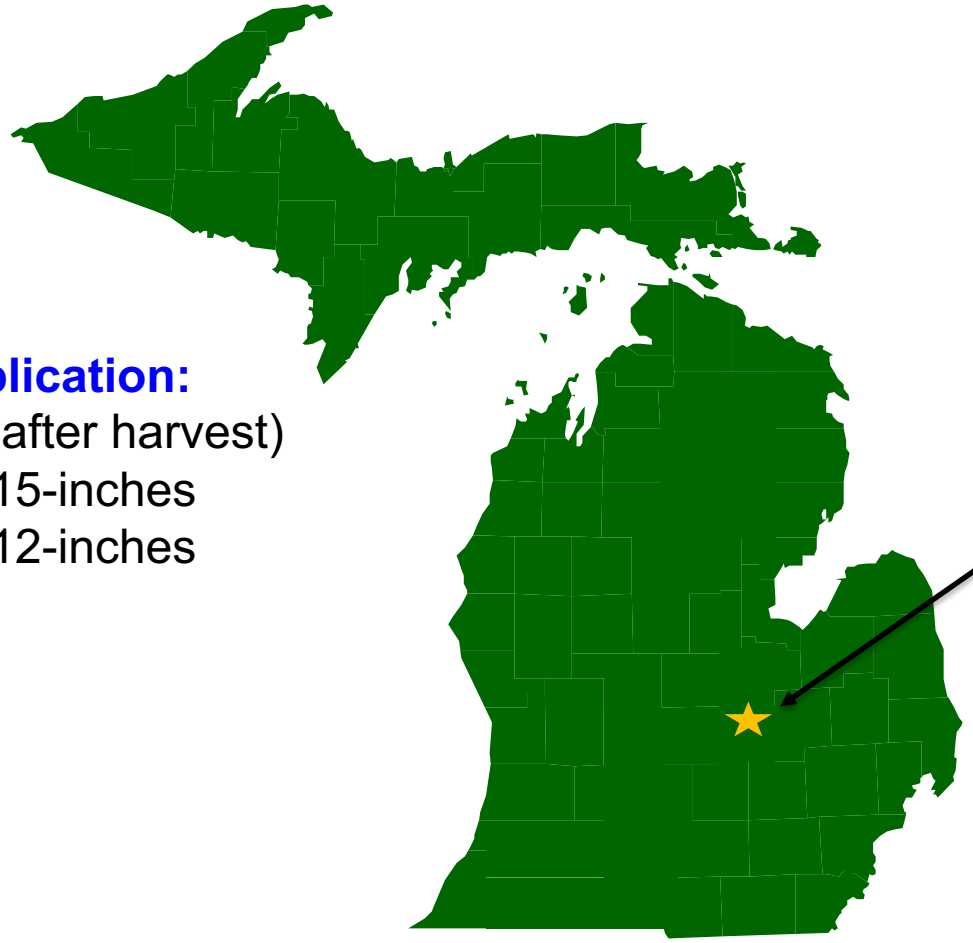
Post-harvest strategies for horseweed control

POST herbicide application:
August 9 (~21 d after harvest)
Ave. horseweed ht.: 15-inches
Ave. c. ragweed ht.: 12-inches



Herbicides evaluated

	Herbicides[1]	SOA[2] Group #	Rate	Additives
1	Roundup PowerMax 3	9	30 fl oz/A	AMS
2	Liberty	10	32 & 43 fl oz/A	AMS
3	Gramoxone SL	22	2.7 pt/A	NIS
4	Enlist One (2,4-D)[3]	4	1 pt/A & 1 qt/A	
5	XtendiMax (dicamba)[3]	4	22 fl oz/A	VaporGrip + Intact
6	Sharpen[3]	14	1 & 2 fl oz/A	MSO
7	2,4-D ester + atrazine[3]	4 + 5	1 pt/A + 1 qt/A	COC
8	Untreated			

[1] 16 treatments with various combinations
[2] Herbicide site of action group numbers.
[3] Roundup PowerMax (32 fl oz) + AMS will be included.

Results

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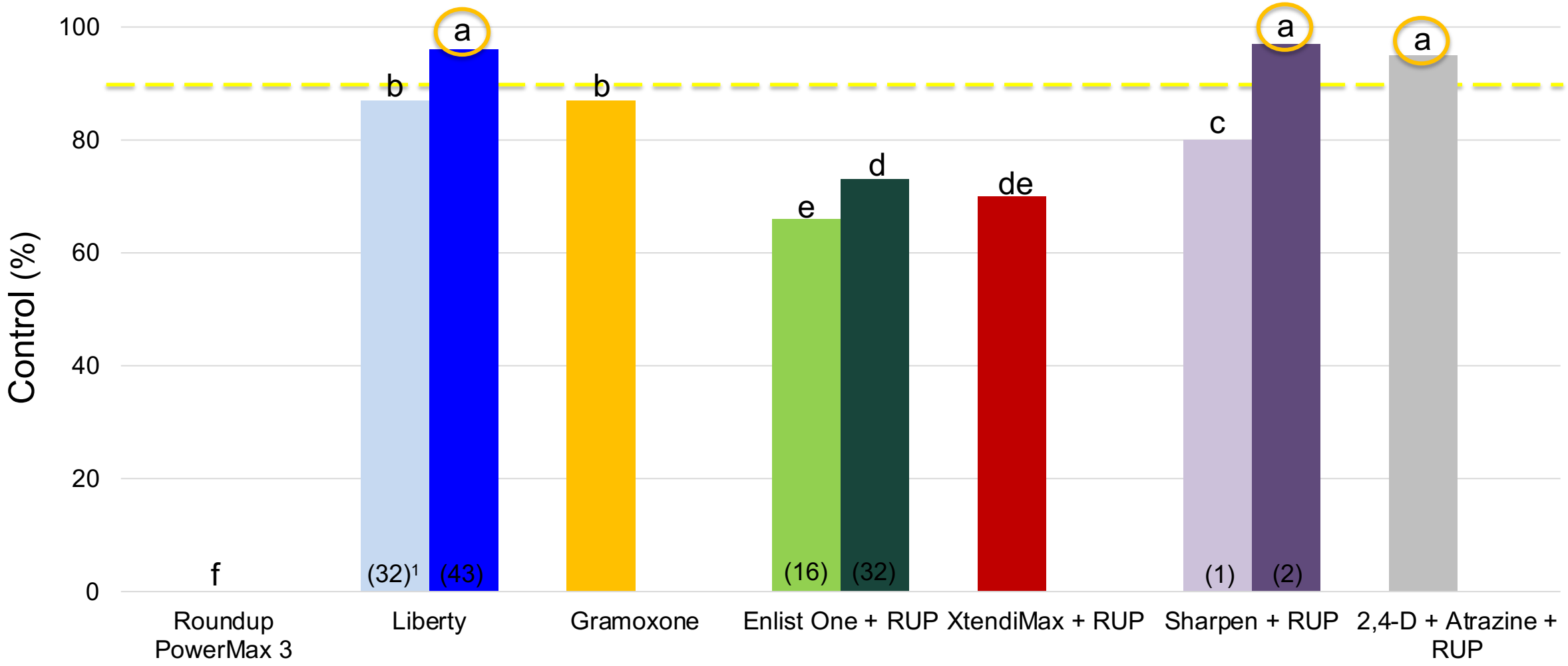
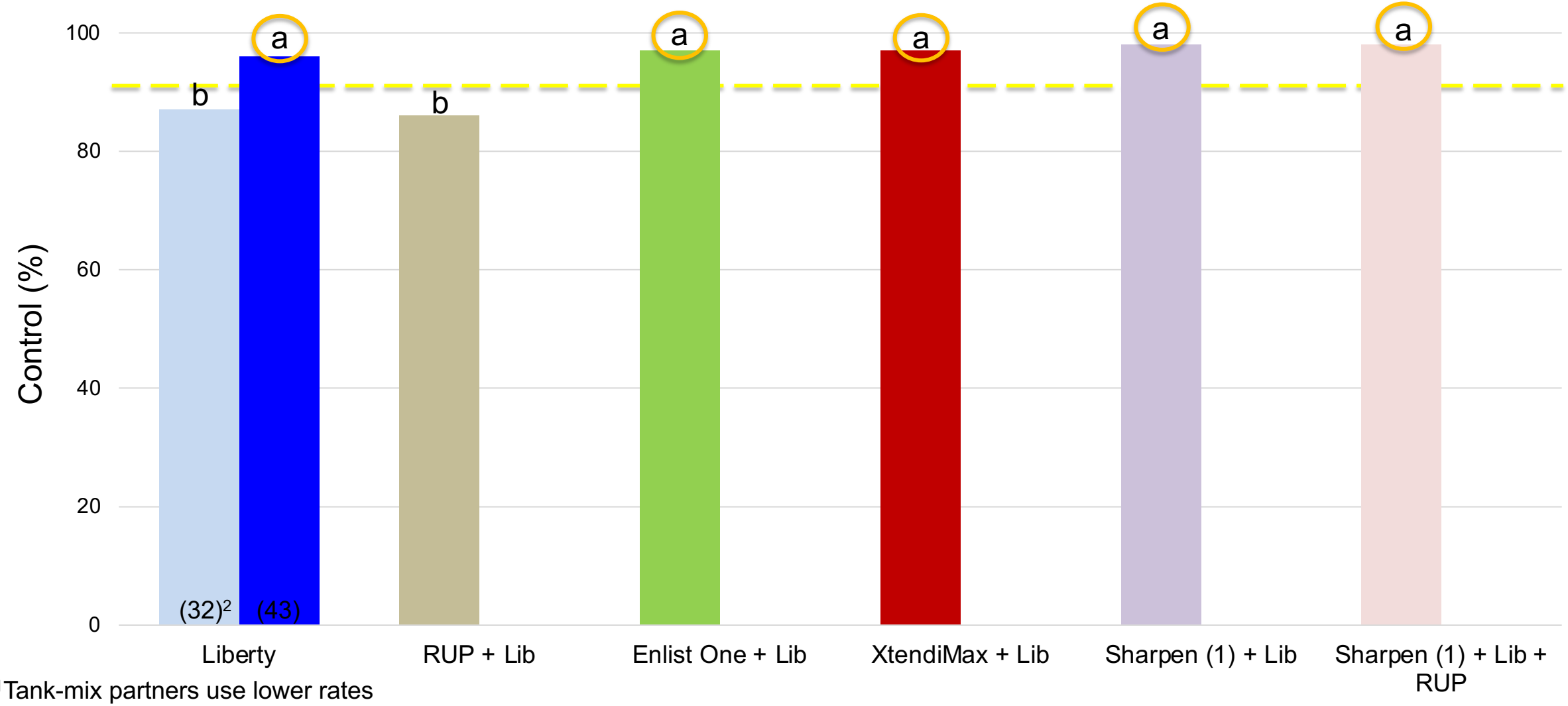
Horseweed control – *(14 DAT)*



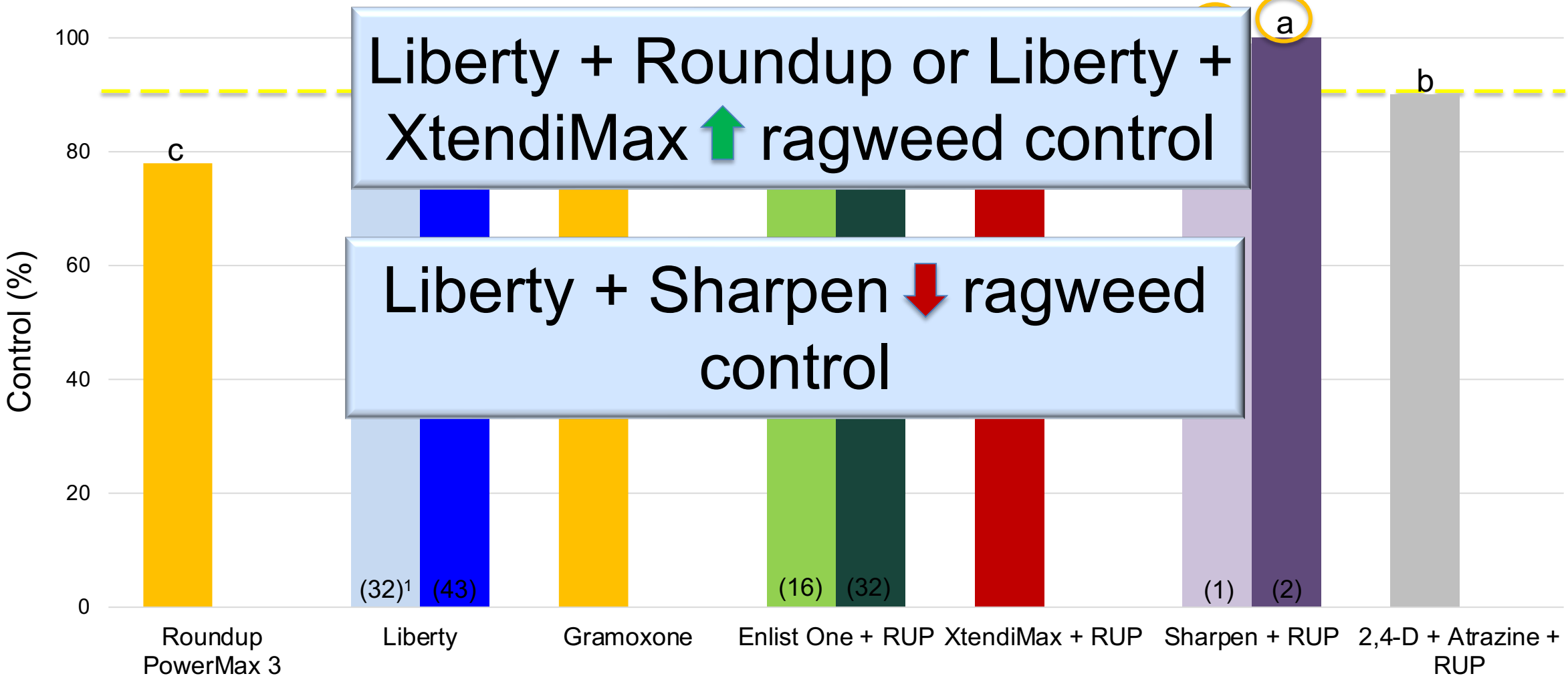
[1]Rates in fl oz/A

Horseweed control with Liberty tank-mixes[1] – *(14 DAT)*



[1]Tank-mix partners use lower rates
[2]Rates in (x) fl oz/A

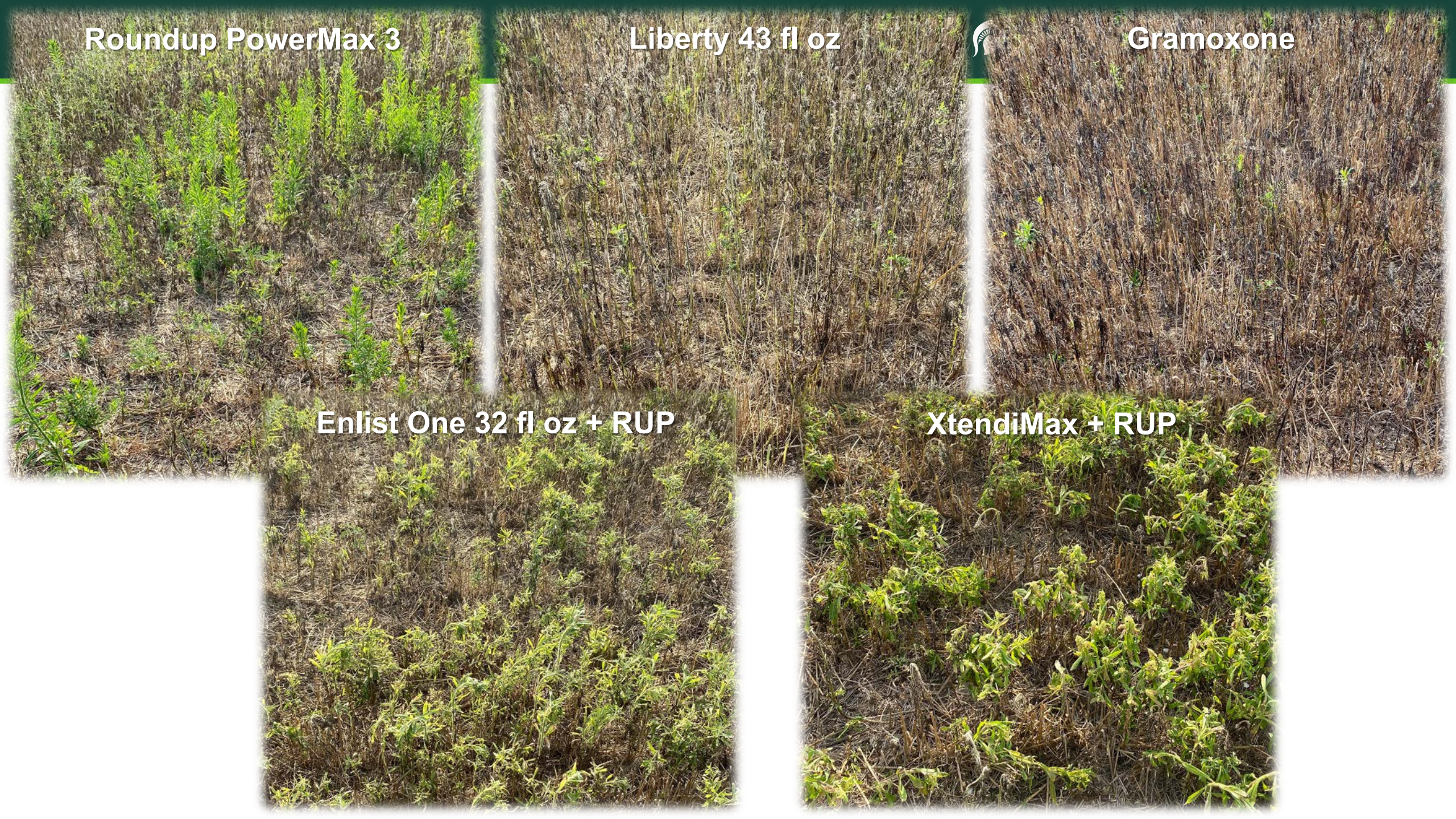
Common ragweed control – *(14 DAT)*

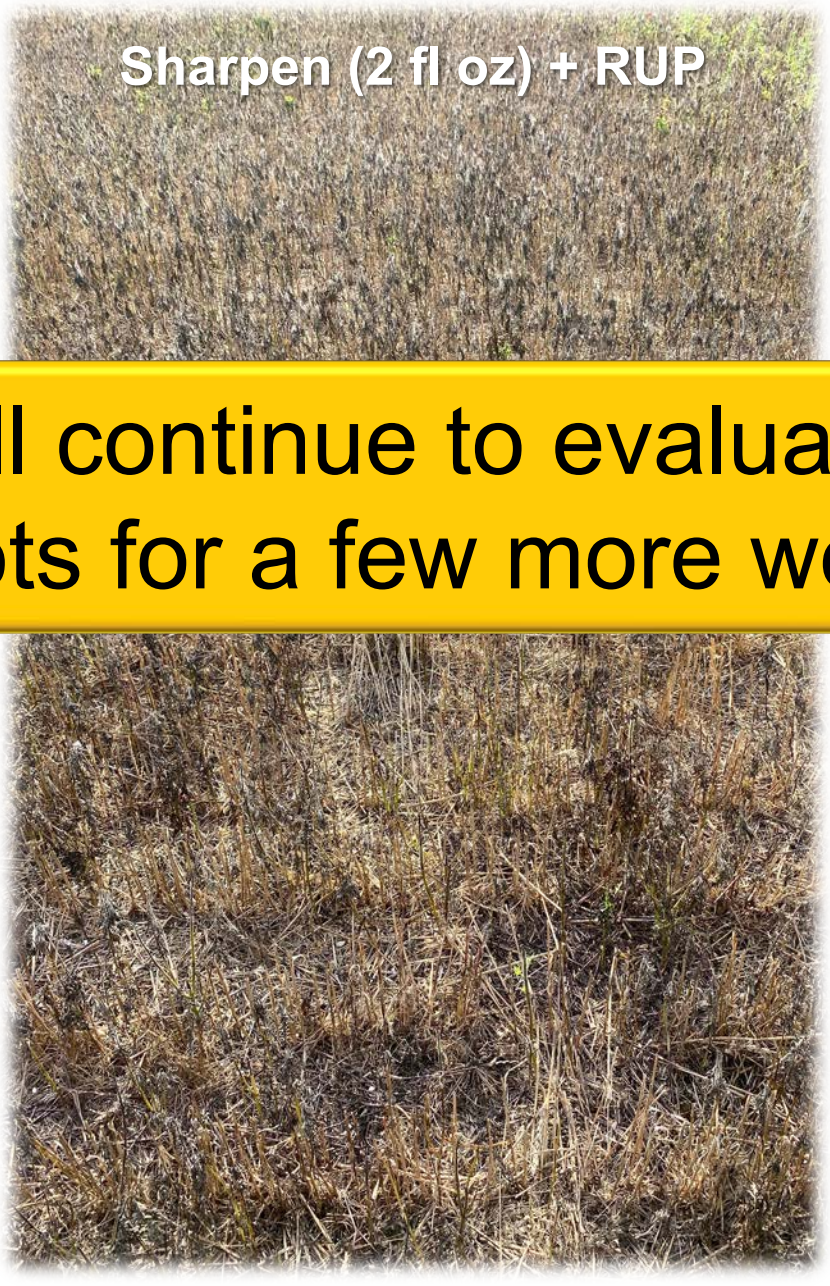


Liberty + Roundup or Liberty + XtendiMax ⬆ ragweed control

Liberty + Sharpen ⬇ ragweed control

[1]Rates in fl oz/A


Roundup PowerMax 3
Liberty 43 fl oz
Gramoxone
Enlist One 32 fl oz + RUP
XtendiMax + RUP



We will continue to evaluate these plots for a few more weeks

Plans for 2021/2022

- We would like to repeat these objectives and research for an additional year
- One change, experiment 1 will focus on the no-tillage treatments, so we will have the ability to be more flexible in finding a suitable field
- Create factsheets that provide these recommendations to wheat growers

Impacts

- Develop recommendations on the most effective horseweed management strategies in wheat and after wheat harvest.
- Proper management of horseweed will improve wheat yields where this weed is present, ultimately increasing economic returns and wheat quality.
- Resulting data will be added to the MSU Weed Control Guide for Field Crops (E-434) and presented in fact sheets, at extension meetings, and at www.MSUweeds.com

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Winter wheat herbicide effects on cover crop establishment – *Year 1 (20-08-06-AS)*

PI's: Christy Sprague and Dean Baas

Cover crops

- Potential benefits:
  - Improve soil health
  - Increase soil O.M., tilth, water holding capacity
  - Improve soil fertility
  - Decrease soil erosion
  - Reduce disease & insect pressure
  - Suppress weeds
- Issues:
  - Time for establishment and growth

Options for integrating cover crops in the wheat portion of the crop rotation

- Frost seeding
- Planting cover crops after wheat harvest

Challenge: cover crop establishment after herbicides have been applied

Huskie

Previous work on wheat herbicides that can be used if frost seeding red clover

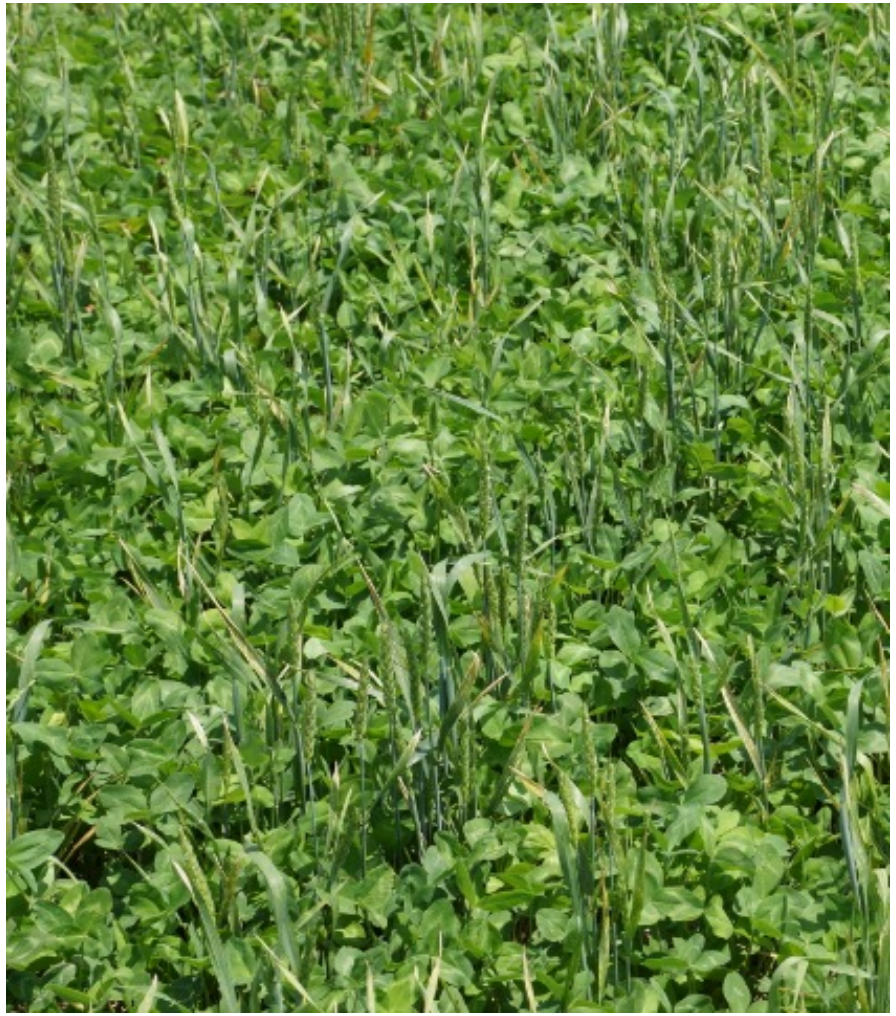
Herbicide	Rate	SOA#	FALL	SPRING
Affinity BroadSpec	0.75 oz	2 2	Y	N
Huskie	13.5 fl oz	27 6	Y	N
Osprey	4.75 oz	2	C	N
PowerFlex HL	2 oz	2	C	N
Clarity	0.25 pt	4	Y	N
2,4-D ester*	1 pt	4	Y	N
MCPA	0.38 pt	4	Y	Y
Quelex	0.75 oz	2 4	N	N
Axial XL	16.4 fl oz	1	Y	Y

* Not registered in Fall due to wheat yield losses

Y = Yes, C = Caution, N = No

Issues with herbicides and frost seeding red clover

- Limited spring applied herbicides can be used
- Late wheat planting limits opportunities for fall herbicide applications
- Newer weed problems may require spring herbicide applications

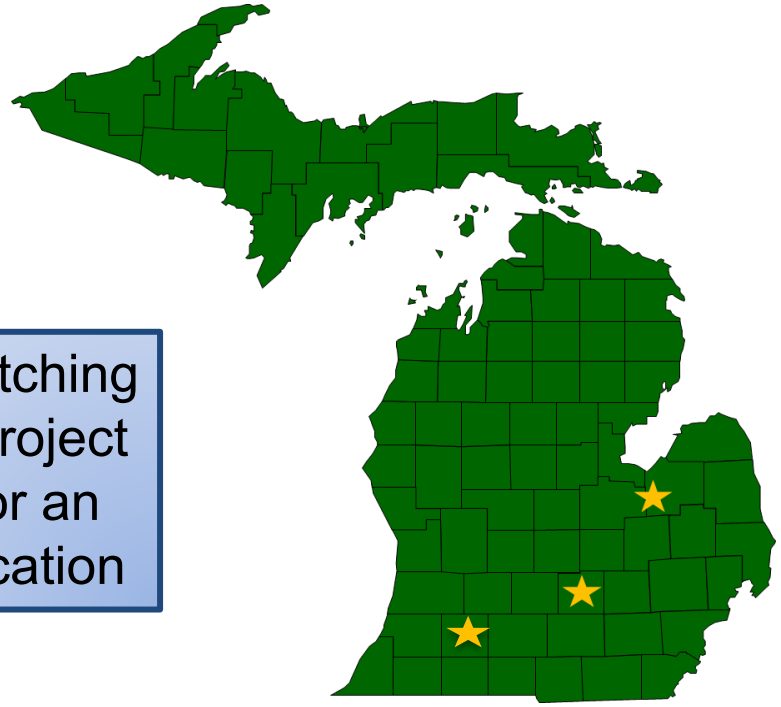


After wheat harvest provides opportunities for planting cover crops

Question: What cover crops can I plant after wheat harvest if I apply X herbicide?

Research on cover crop tolerance

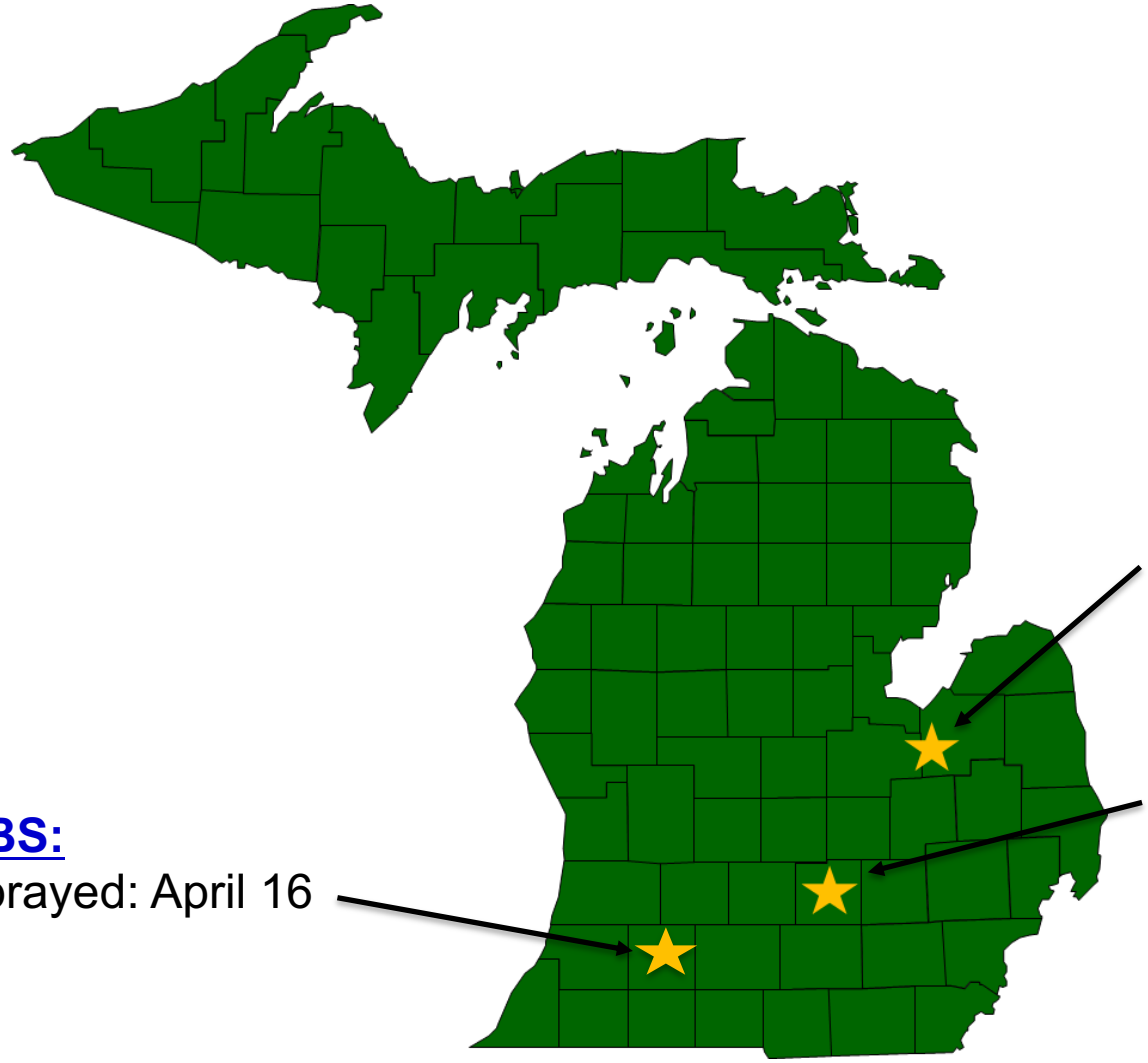
Evaluate the effects of wheat herbicides on cover crop establishment and growth following winter wheat harvest.



Received matching funds from Project GREEEN for an additional location

	Herbicide treatment	Rate
1	Huskie	15 fl oz/A
2	Talinor	18.2 fl oz/A
3	Affinity BroadSpec	1 oz/A
4	Quelex	0.75 oz/A
5	Osprey Xtra	4.75 oz/A
6	PowerFlex HL	2 oz/A
7	Axial Bold	15 fl oz/A
8	Stinger	0.33 pt/A
9	Untreated	

Herbicide applications



SVREC:
Sprayed: April 7

Campus:
Sprayed: April 26

KBS:
Sprayed: April 16

Herbicides did not cause wheat injury - *SVREC* or *KBS*

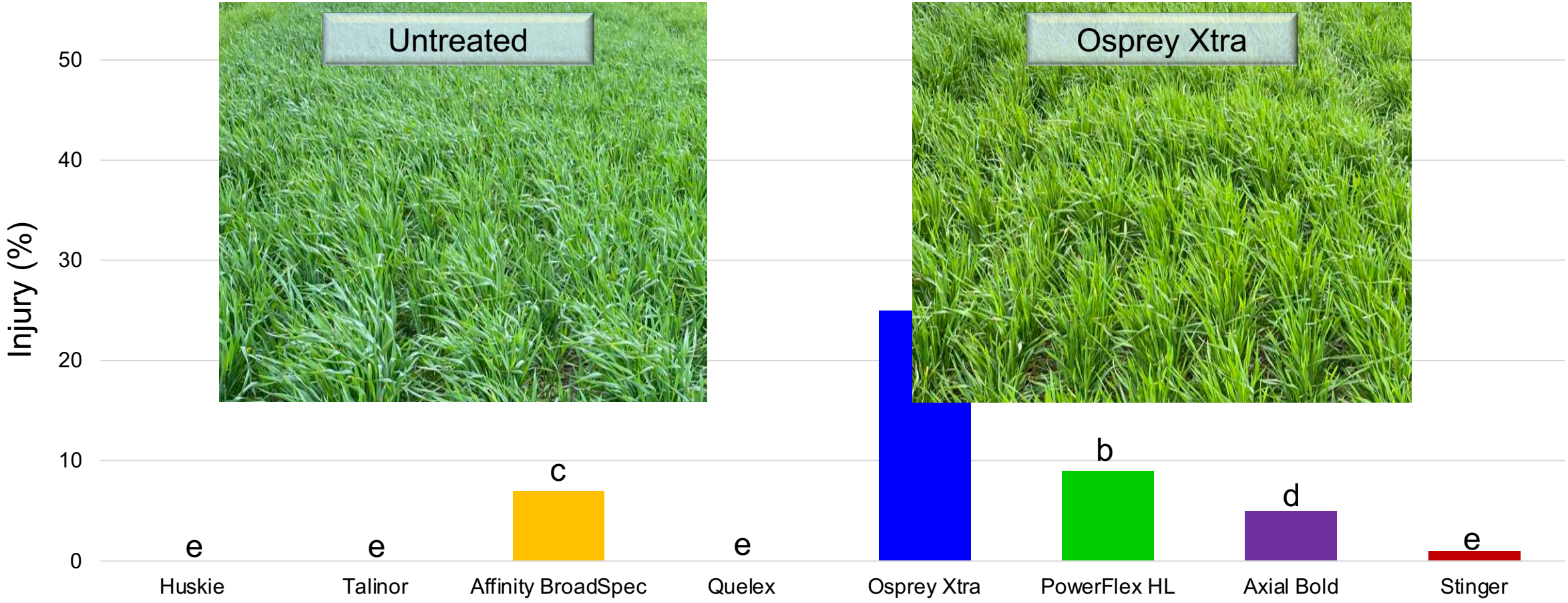
Certain herbicides injured wheat at MSU

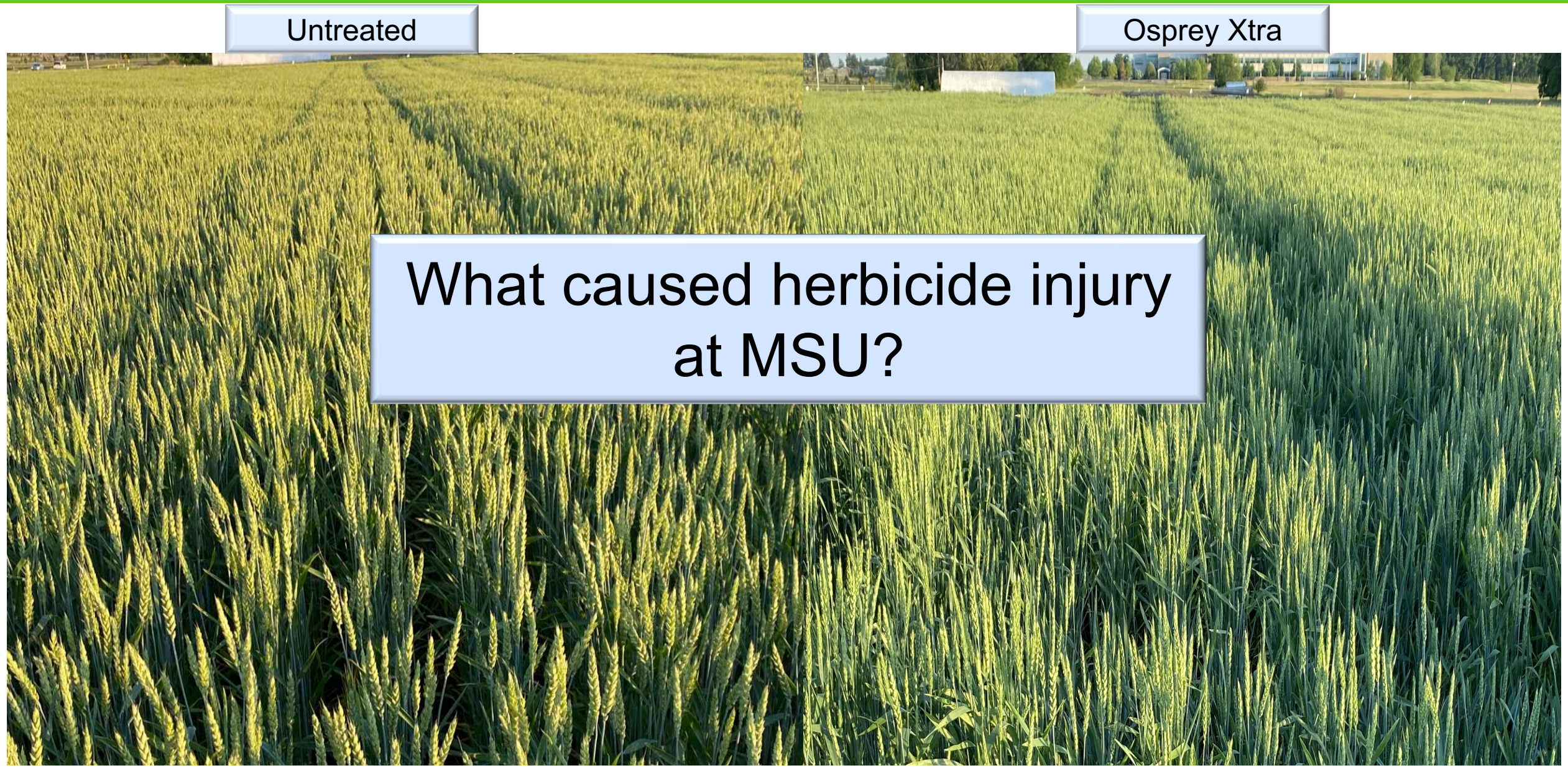
Affinity BroadSpec
Osprey Xtra
PowerFlex HL

Herbicide injury on wheat

MSU

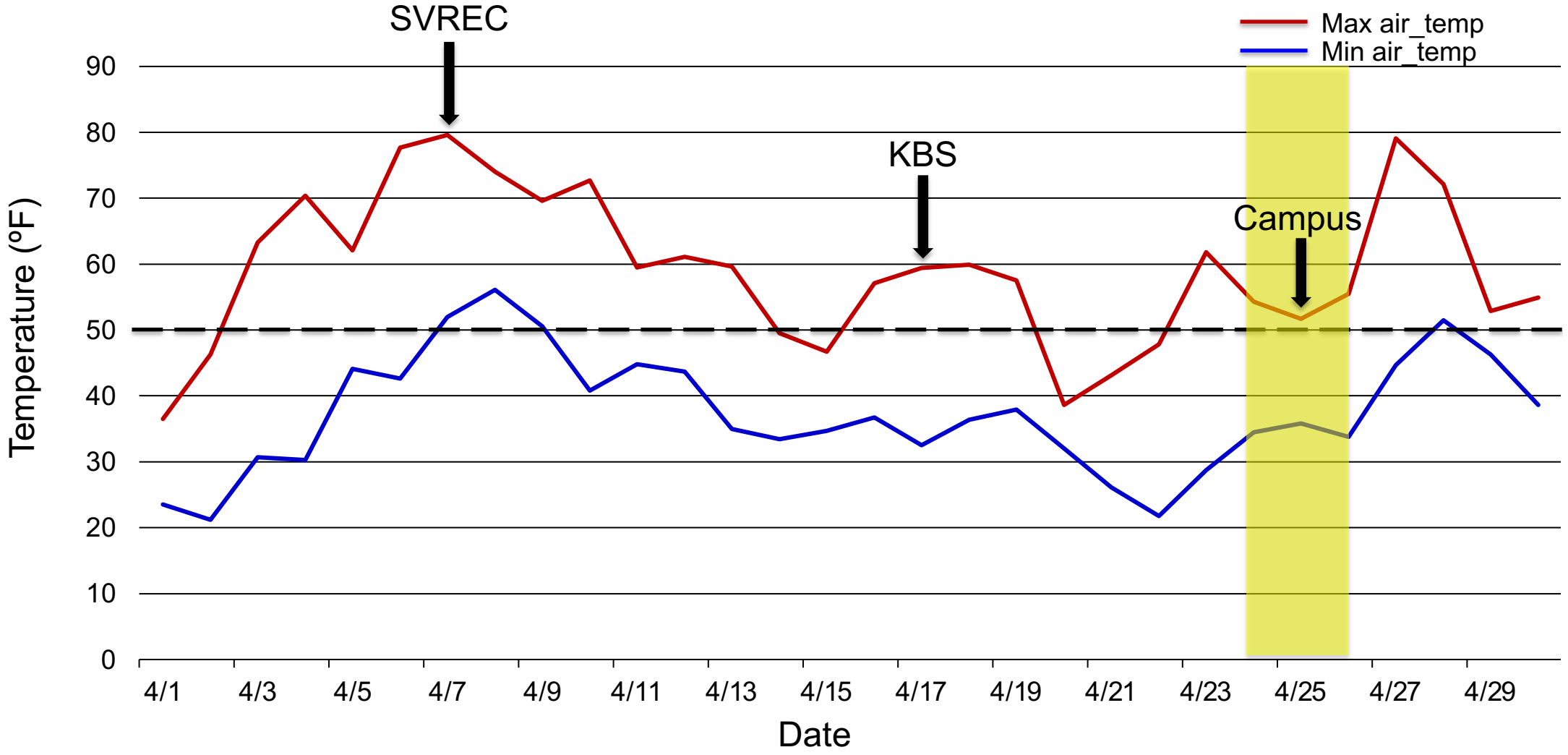
The ALS-inhibiting (Group 2) herbicides caused the most injury – *(14 DAT)*



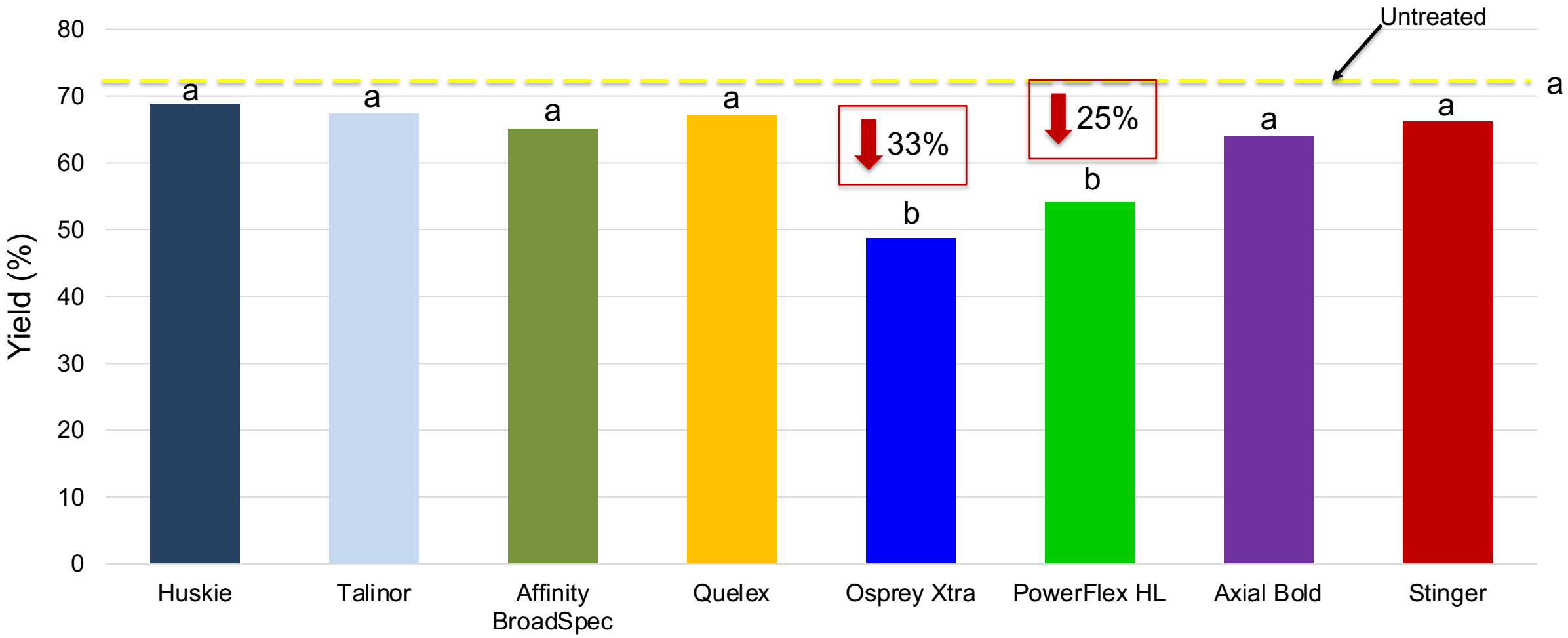


What caused herbicide injury at MSU?

Cold temperatures at herbicide application impacted herbicide injury to wheat



Injury due to cold temperatures at application resulted in yield loss from Osprey Xtra and PowerFlex HL



Cold temperatures at herbicide application

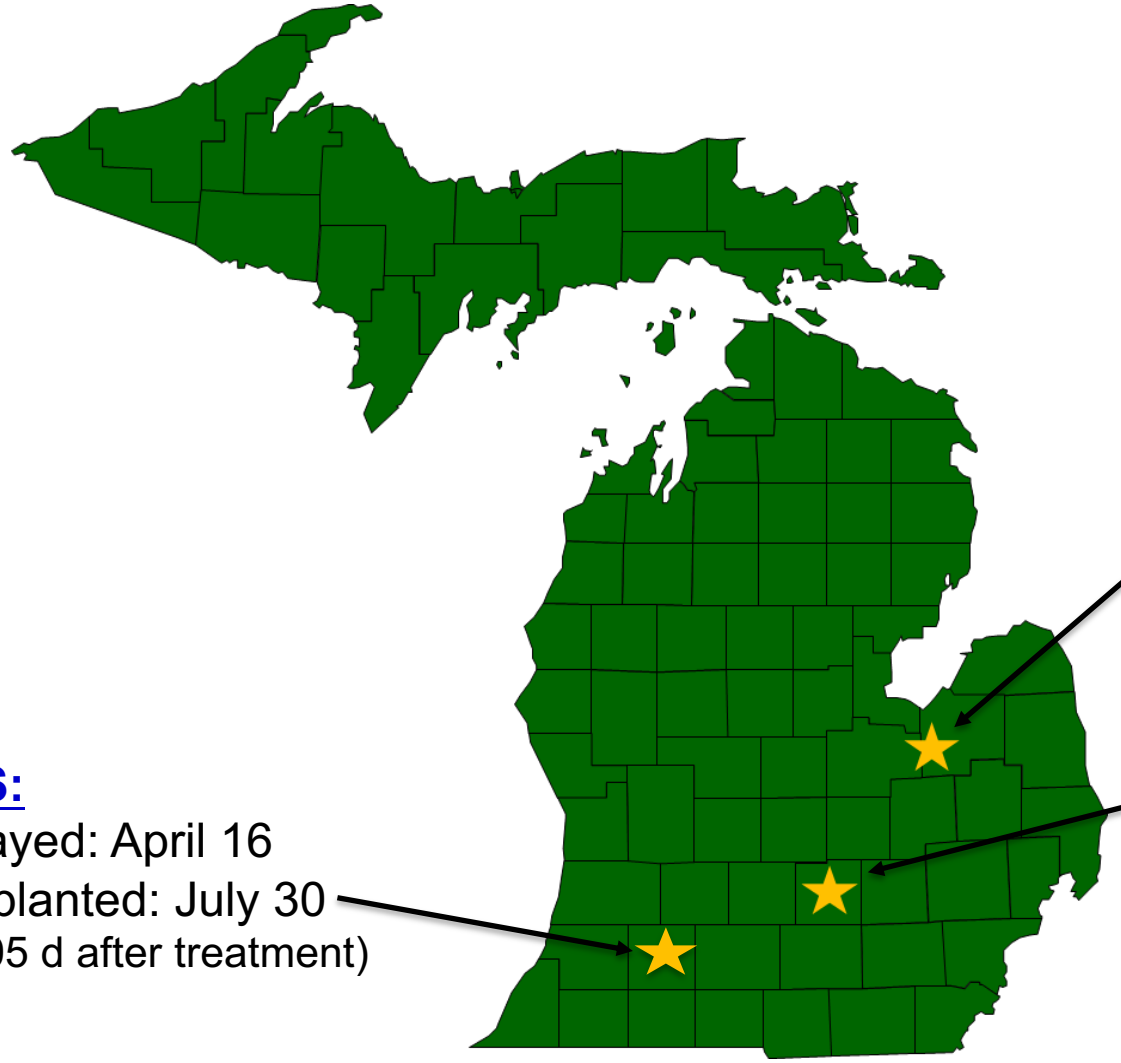
Can increase herbicide injury to wheat

- Herbicide applications should be made when *weeds are actively growing*
- DO NOT apply when crop is under stress from:
  - Cold temperatures
  - Wide fluctuations in day/night temperatures
  - Frost
  - Temperatures below freezing prior to/at/immediately following the application

- *Rule of thumb:*
  - Only apply herbicides to winter wheat when daily temperature is 50° F or higher.

Nine different cover crops were seeded after harvest

Cover crop planting

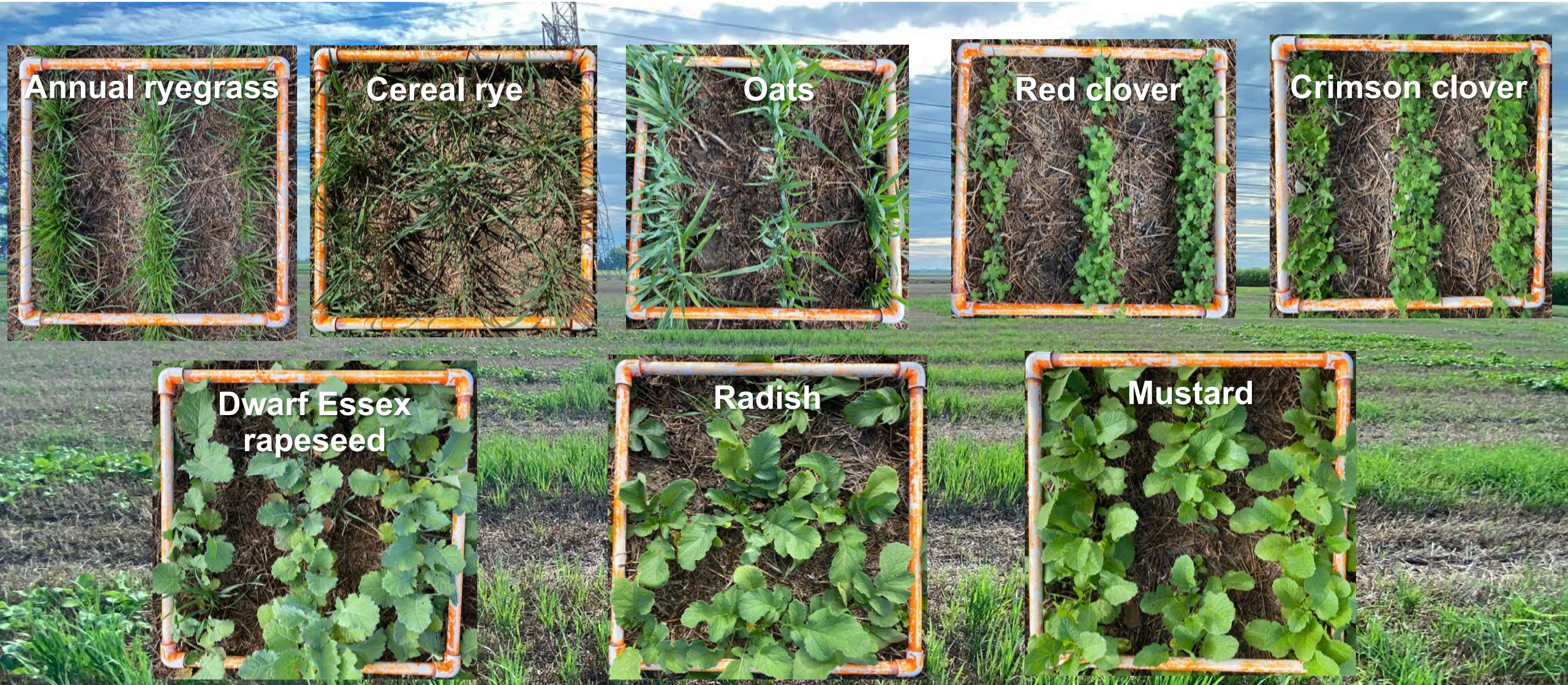


SVREC:
Sprayed: April 7
CC planted: July 28
(112 d after treatment)

Campus:
Sprayed: April 26
CC planted: July 28
(91 d after treatment)

KBS:
Sprayed: April 16
CC planted: July 30
(105 d after treatment)

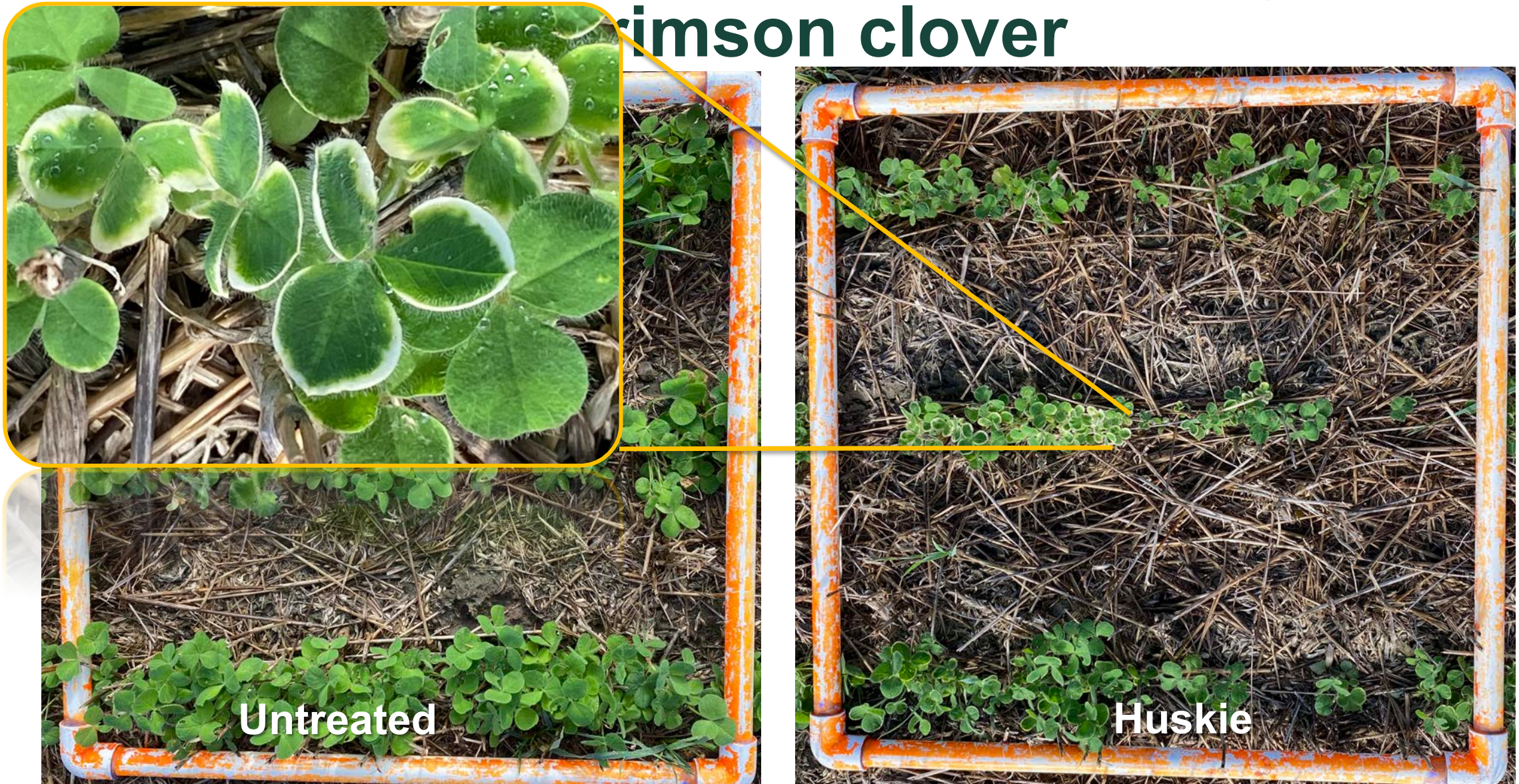
Establishment – 28 DAP



HPPD (Group 27) injury to red clover

Untreated | Huskie | Talinor

Huskie caused bleached leaf margins
rimson clover



Plans for 2021/2022

- Prior to first frost, this year's cover crops will be counted and harvested for biomass
- We would like to repeat this research in 2021/2022 at three locations
- Create factsheets that provide these recommendations to wheat growers

Impacts

- New recommendations will be developed on what cover crops can be safely established following applications of herbicides commonly used in winter wheat production.
- Recommendations will help ensure the successful establishment of cover crops that will ultimately lead to increases in crop yield.
- Resulting data will be added to the MSU Weed Control Guide for Field Crops (E-434) and presented in fact sheets, at extension meetings, and at www.MSUweeds.com

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Questions?

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