

A wide-angle photograph of a large agricultural field. The field is filled with golden-brown crops, likely corn, which are interspersed with numerous green weeds. The horizon is flat and extends to the distance under a clear sky. The overall scene depicts a typical agricultural landscape with a weed control issue.

2024 Weed Control Update

Brian Jenks
North Dakota State University

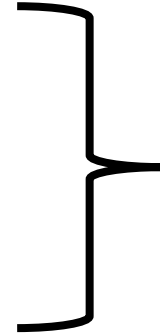
Group 14 Herbicides

Aim

Sharpen

Vida

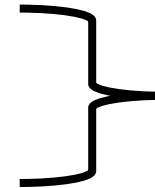
Reviton



**Burndown
herbicides**

Spartan products

Valor

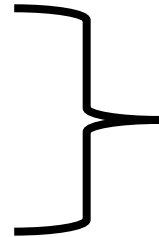


**Soil-applied
herbicides
(residual)**

Flexstar

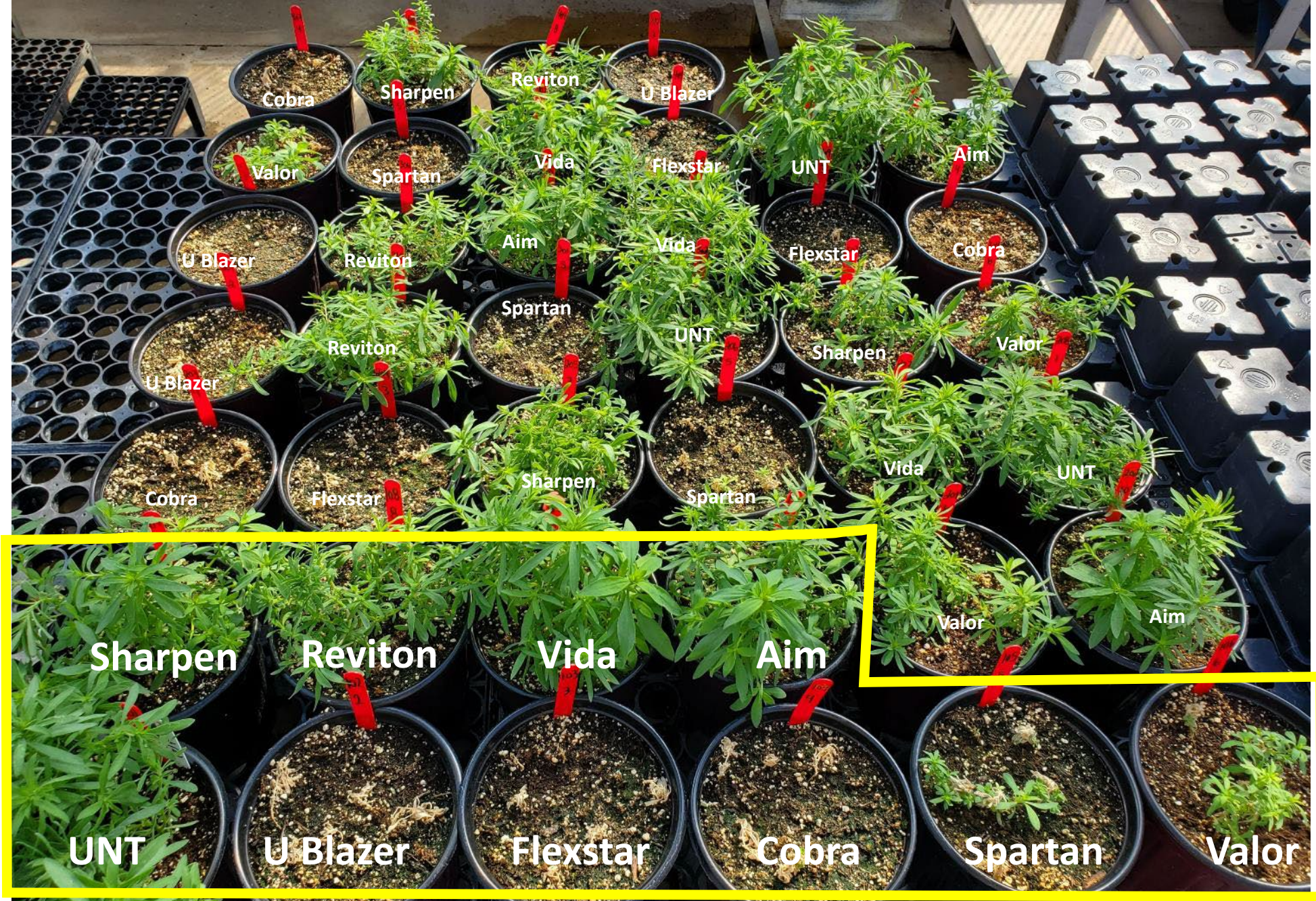
Cobra

Ultra Blazer



**Foliar soybean
herbicides**

Minot



Will Flexstar, Cobra, and Ultra Blazer control 4-inch kochia?

No. Target 1-3 inch kochia.

Susceptible



Mandan



Planted/Sprayed

Feb 22

Photo: 20 DAT

3 reps



Valor

Spartan

UNT

1

2

3

4

5

6

7

1. Mott
2. Mandan
3. Berthold
4. Minot
5. Mohall-F
6. Mohall-I
7. Susceptible

21 DAT

UNT

Valor

Zidua

Fierce

**Susceptible
check 2**



Minot



Mohall



**Susceptible
check 1**



**Valor 3 fl oz
Zidua SC 2.5 fl oz
Fierce 6 fl oz**



HELP SAMPLE

Herbicide Resistant Pigweeds and Kochia



NDSU

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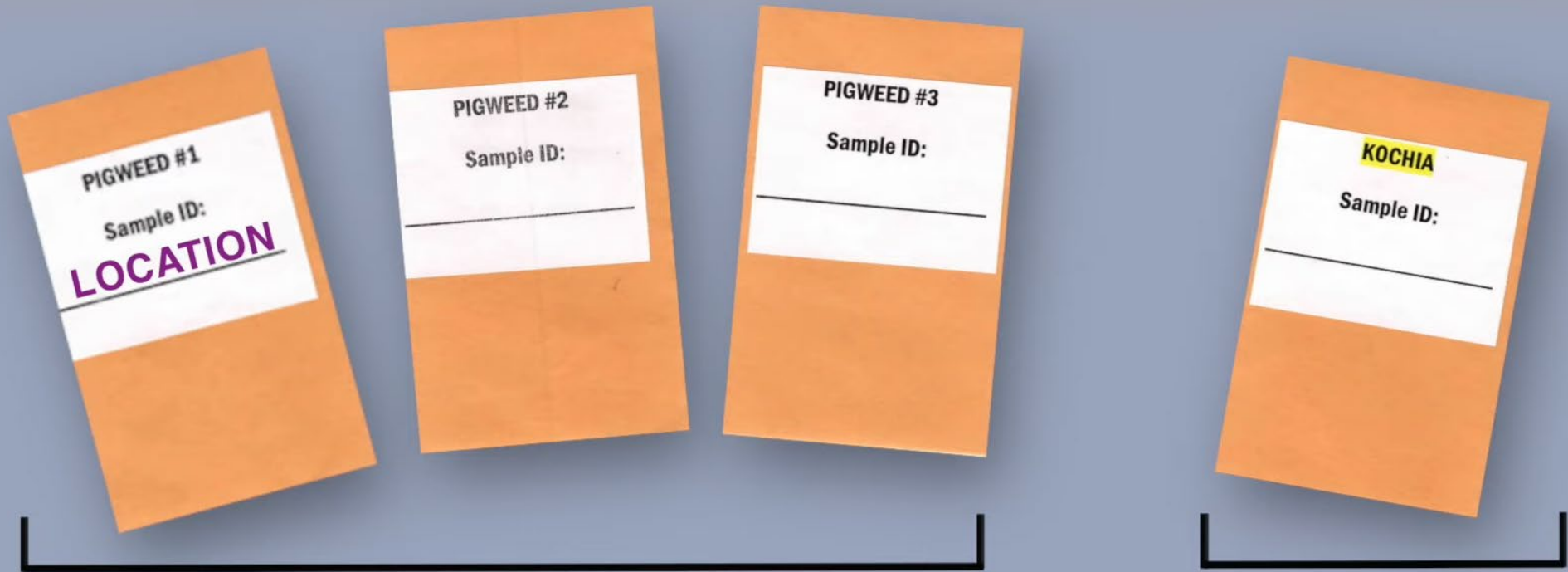
Zack Bateson

Research Manager / National Agricultural Genotyping Center
Fargo, North Dakota

I am Zach Batson, the research manager at the



Label Envelopes



Palms
envelope with a proper ID so you know where
that plant came from.

Kochia



waterhemp, go out to the field, identify one individual and collect two leaf samples from



Label/Submit Samples



Results for pigweed 1-2 weeks. Kochia, longer.

**prepaid envelope that will be sent to the
National AG Genotyping Center for us to**

How to proceed with kochia?

- **Group 14 resistance is not everywhere, but need to monitor for it**
- **Use different burndown products where possible**
 - **Sharpen, Aim**
 - **Roundup**
 - **Gramoxone**
 - **Dicamba (where appropriate)**
- **Monitor effectiveness 3-7 DAT**
- **If you see poor control, send leaves in for testing (pending)**
- **Use Metribuzin PRE (soybean and dry pea)**
- **Good options in corn, wheat**
- **Spray small kochia**

Herbicides used to control kochia - historically

Group 2

Glean
Ally
Express
Harmony
Raptor

Group 3

Sonalan
Treflan
Prowl

Group 4

2,4-D
Starane
Dicamba

Group 5

Atrazine
Metribuzin

Group 9

Roundup

Group 10

Liberty

Group 15

Zidua?

Group 22

Gramoxone

Group 14

Aim
Sharpen
Vida
Reviton

} Burndown herbicides

Spartan products
Valor

} Soil-applied herbicides (residual)

Flexstar
Cobra
Ultra Blazer

} Foliar soybean herbicides

Spring weed burndown options

Treatment	Rate	Weed Control					
		Kochia		Lambsquarters		Yellow foxtail	
		-----%-----	-----%-----	-----%-----	-----%-----	-----%-----	-----%-----
Untreated							
Glyph + Spartan Charge ^{ab}	20 oz + 5 oz						
Liberty ^a	29 oz						
Reglone ^c	1.5 pt						
Gramoxone ^c	2 pt						
Elevore ^b	1 oz						
Pixxaro ^b	6 oz						
LSD (0.05)							

^a Treatments applied with AMS (2.5 gal/100 gal)

^b Treatments applied with MSO (1 %)

^c Treatments applied with NIS (0.5 %)

Treatments applied May 30

Kochia: 1-4" (average 3")

Lambsquarters: 1-7" (average 4")

Yellow foxtail: 2"

Spring weed burndown options

Treatment	Rate	Weed Control					
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		6-Jun	20-Jun	6-Jun	20-Jun	6-Jun	20-Jun
		-----%-----		-----%-----		-----%-----	
Untreated		0	0	0	0	0	0
Glyph + Spartan Charge^{ab}	20 oz + 5 oz	57	48	99	99	99	98

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Liberty^a	29 oz	99	99	99	99	98	94

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Liberty ^a	29 oz	99	99	99	99	98	94
Reglone ^c	1.5 pt	84	83	45	42	60	23

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Reglone ^c	1.5 pt	84	83	45	42	60	23
Gramoxone 3.0 ^c	2 pt	99	99	99	99	97	93

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Reglone ^c	1.5 pt	84	83	45	42	60	23
Gramoxone 3.0 ^c	2 pt	99	99	99	99	97	93
Elevore ^b	1 oz	42	40	90	95	0	0

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Liberty ^a	29 oz	99	99	99	99	98	94
Reglone ^c	1.5 pt	84	83	45	42	60	23
Gramoxone 3.0 ^c	2 pt	99	99	99	99	97	93
Elevore ^b	1 oz	42	40	90	95	0	0
Pixxaro ^b	6 oz	73	73	91	95	0	0
LSD (0.05)		7.1	7.7	4.5	5.5	4.8	10.3

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Dry pea tolerance to various Spartan and Metribuzin rates

Treatment	Rate equiv		Dry pea injury			Kochia control			Yield	TW
	Spart	Met	May 26	Jun 7	Jun 21	May 26	Jun 7	Jun 21	Aug 15	
	fl oz	lb pr	-----%-----			-----%-----			lb/A	lb/bu
Untreated										
Spart + Metri 75DF	4.0	0.25								
Preview (10.9 oz)	3.0	0.25								
Preview (14.3 oz)	4.0	0.33								
Preview (17.7 oz)	5.0	0.41								
Preview (21.2 oz)	5.9	0.49								
Preview (24.5 oz)	6.9	0.57								
LSD (0.05)										
CV										

- Treatments applied PRE May 11.
- May 11-13: 3.23 inches rain

- Gramoxone applied PRE to control emerged weeds.
- Loam, pH 6.2, OM 3.1%

Minot 2023

Dry pea tolerance to various Spartan and Metribuzin rates

Treatment	Rate equiv		Dry pea injury			Kochia control			Yield	TW
	Spart	Met	May 26	Jun 7	Jun 21				Aug 15	
	fl oz	lb pr	-----%-----						lb/A	lb/bu
Untreated			0	0	0				1197	65.1
Spart + Metri 75DF	4.0	0.25	0	5	4				1909	65.6
Preview (10.9 oz)	3.0	0.25	0	5	5				2187	65.4
Preview (14.3 oz)	4.0	0.33	0	11	10				2216	65.5
Preview (17.7 oz)	5.0	0.41	0	17	17				2340	65.8
Preview (21.2 oz)	5.9	0.49	0	20	18				2412	65.8
Preview (24.5 oz)	6.9	0.57	3	41	49				1941	65.6
LSD (0.05)			1.7	4.5	9.6				348	0.7
CV									9.6	

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Minot 2023

Dry pea tolerance to various Spartan and Metribuzin rates

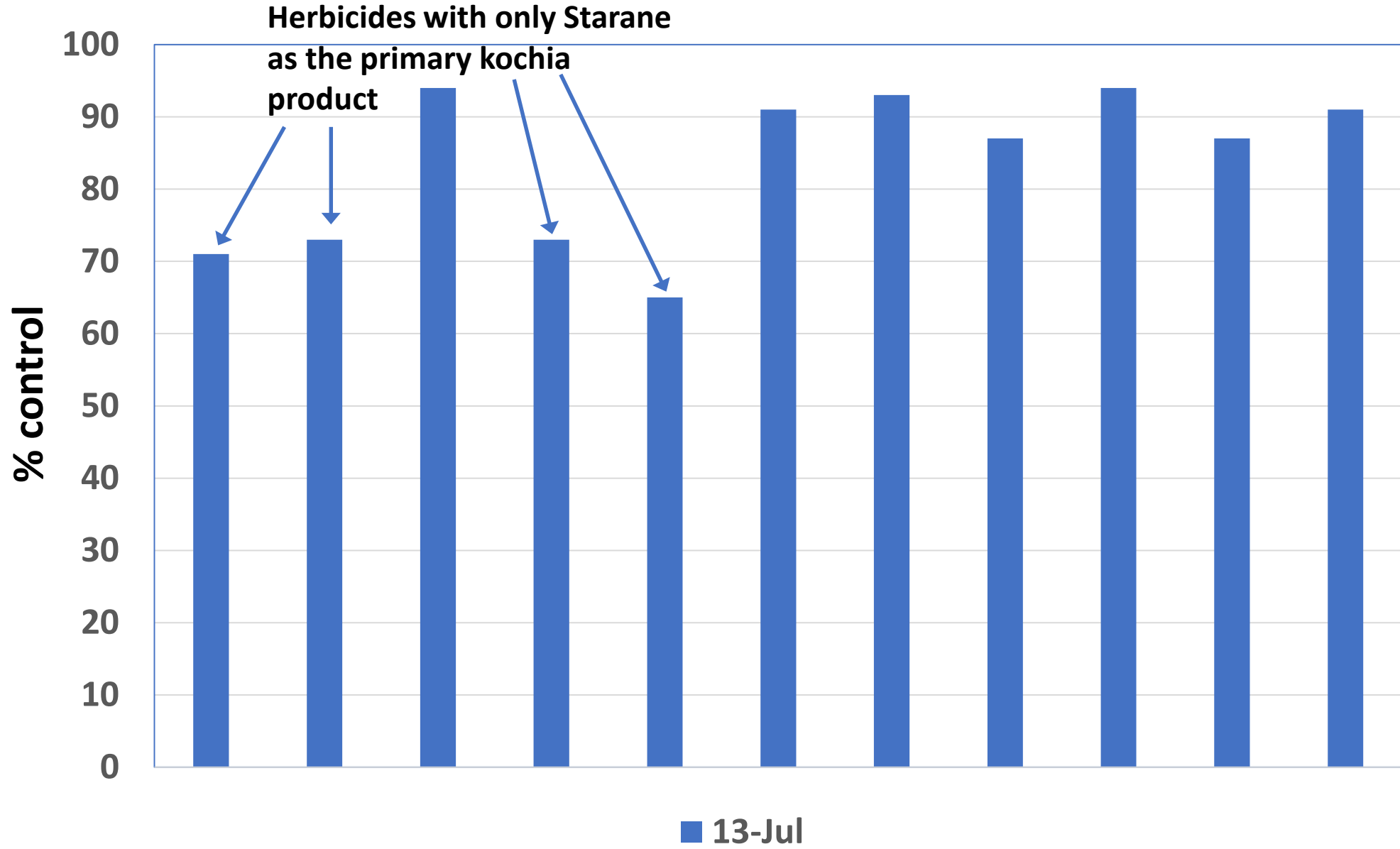
Treatment	Rate equiv		Dry pea injury			Kochia control			Yield	TW
	Spart	Met	May 26	Jun 7	Jun 21	May 26	Jun 7	Jun 21	Aug 15	
	fl oz	lb pr	-----%-----			-----%-----			lb/A	lb/bu
Untreated			0	0	0	0	0	0	1197	65.1
Spart + Metri 75DF	4.0	0.25	0	5	4	61	64	58	1909	65.6
Preview (10.9 oz)	3.0	0.25	0	5	5	62	64	61	2187	65.4
Preview (14.3 oz)	4.0	0.33	0	11	10	70	79	77	2216	65.5
Preview (17.7 oz)	5.0	0.41	0	17	17	84	89	88	2340	65.8
Preview (21.2 oz)	5.9	0.49	0	20	18	92	98	98	2412	65.8
Preview (24.5 oz)	6.9	0.57	3	41	49	96	99	98	1941	65.6
LSD (0.05)			1.7	4.5	9.6	6.3	9.0	13.4	348	0.7
CV									9.6	

- Treatments applied PRE May 11.
- May 11-13: 3.23 inches rain

- Gramoxone applied PRE to control emerged weeds.
- Loam, pH 6.2, OM 3.1%

Minot 2023

Kochia control with POST herbicides in spring wheat



Wheat herbicides containing multiple modes of action (not complete list)

Kochiavore/Cleansweep D: (2,4-D + bromoxynil + fluroxypyr)

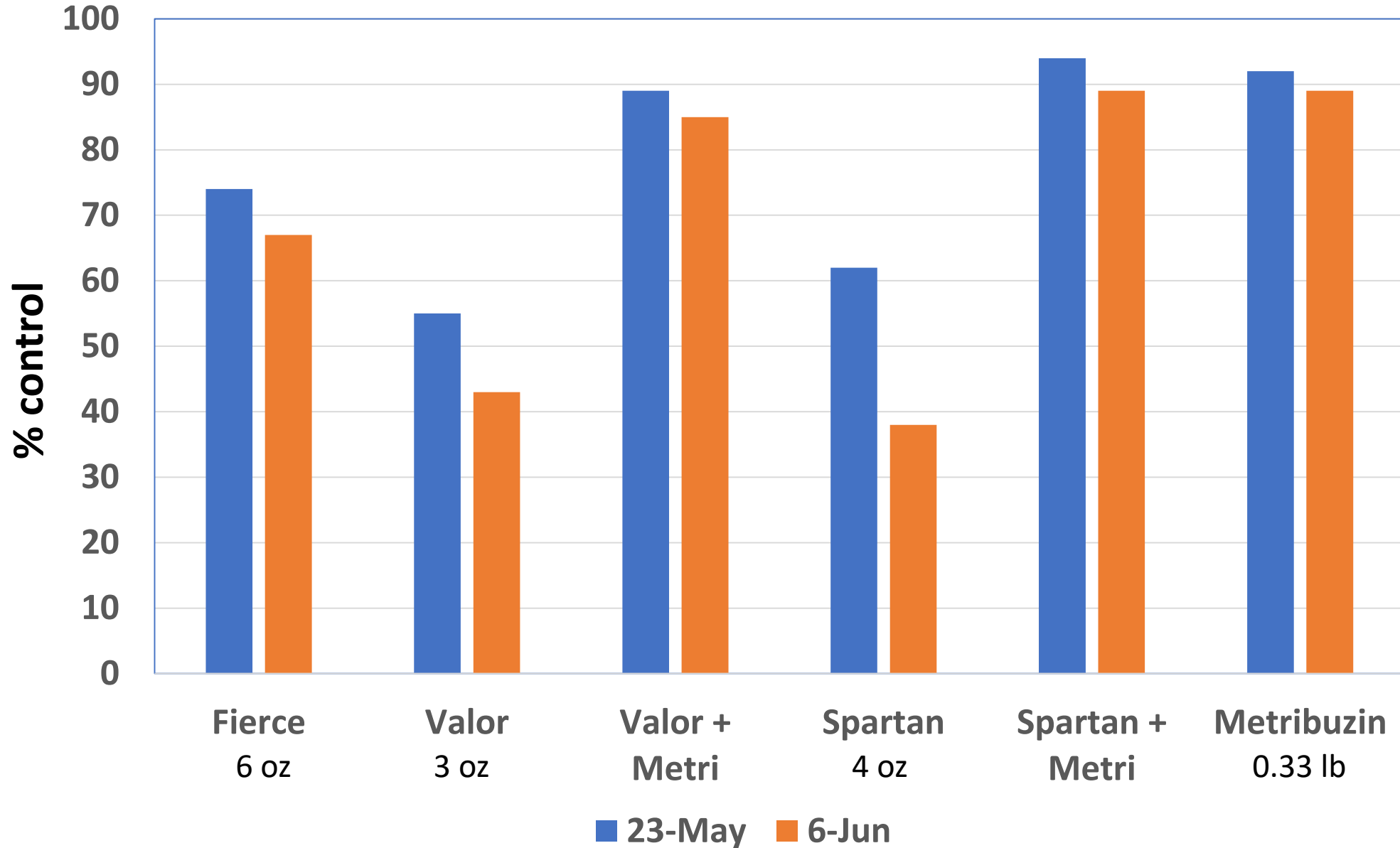
Carnivore/Cleansweep M: (MCPA + bromoxynil + fluroxypyr)

Batalium Amped: (Everest + bromoxynil + fluroxypyr)

Huskie FX: (bromoxynil + pyrasulfatole + fluroxypyr)

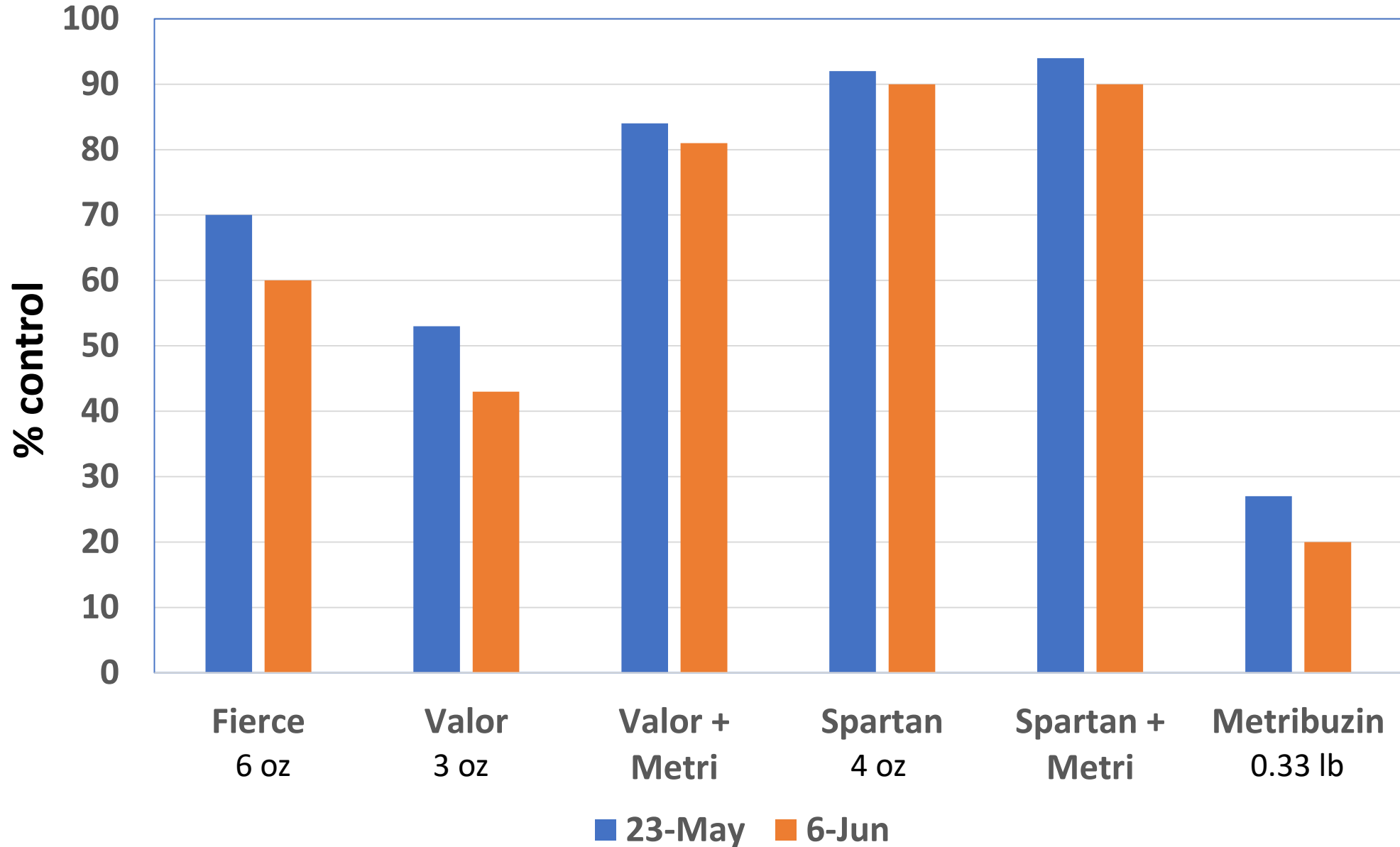
Talinor + Starane: (bromoxynil + bicyclopyrone + fluroxypyr)

Kochia control with fall-applied herbicides



■ 23-May ■ 6-Jun

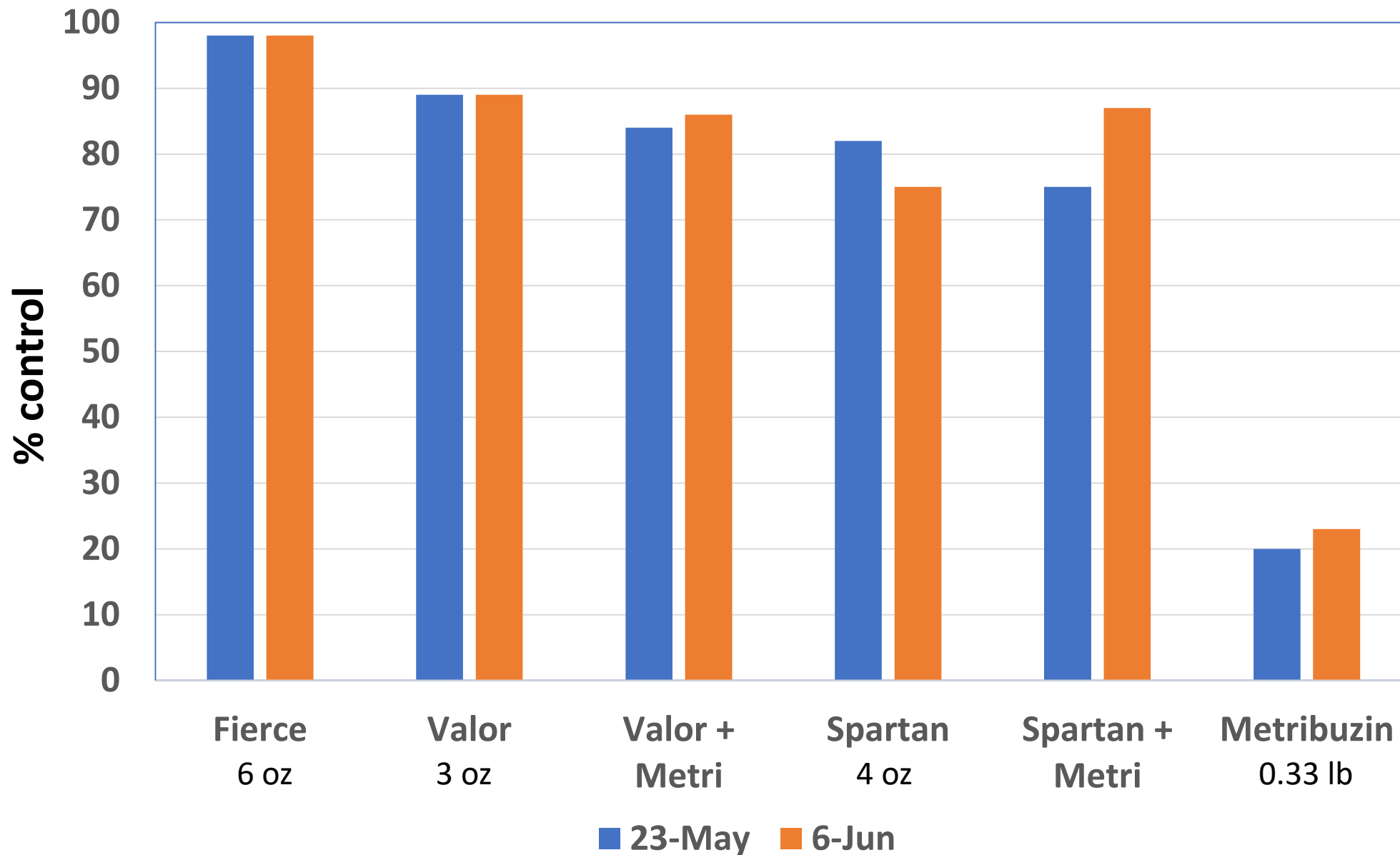
Wild buckwheat control with fall-applied herbicides



■ 23-May ■ 6-Jun

*All treatments applied Oct 18, 2022

Common Mallow control with fall-applied herbicides



Anthem Flex = (Zidua + Aim)

(soybean, corn, wheat, sunflower, dry pea)

- Needs significant rainfall event (0.5-1 inch)
- More useful in no-till where weeds are on surface with minimal old crop residue
- Intended primarily for control as weeds germinate, not POST
- Not intended as a stand-alone product

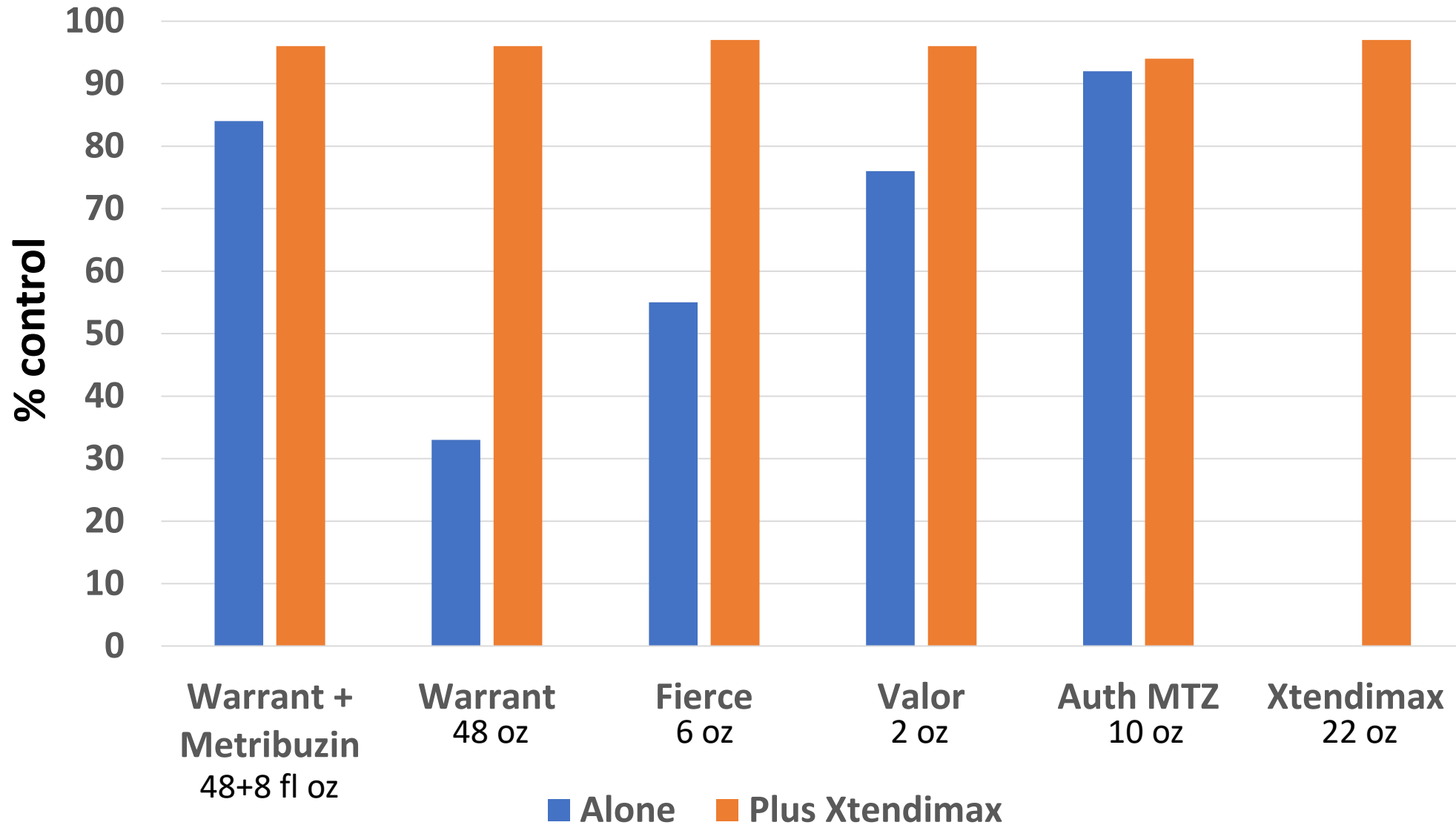
Anthem Flex Label:

- **Fall or spring**
- **Fall: <55 F at 4-inch depth, before ground freezes**
- **Can be tank mixed with Glyphosate, Gramoxone, Dicamba, 2,4-D or Liberty**
- **Use higher rate in soils with higher OM and heavy residue**
- **Dry weather and heavy trash may reduce efficacy**
- **Controlled: Barnyardgrass, foxtails, pigweeds,**
- **Suppressed: Downy brome, Japanese brome, wild oat, wild buckwheat, horseweed, kochia, nightshades, common ragweed**

Best option?

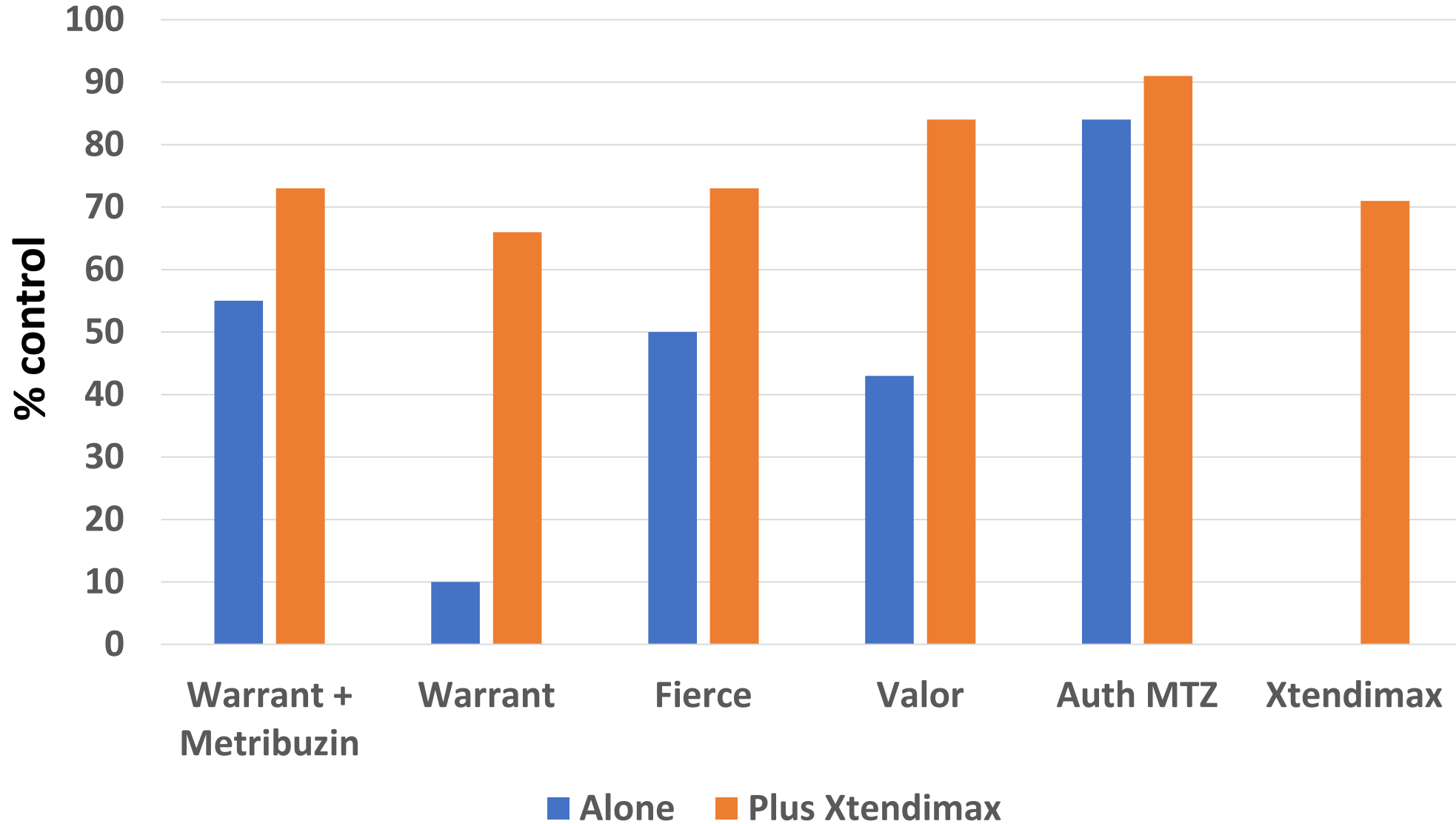
- No-till
- Little crop residue
- Spray late as possible
- Rain to activate

Kochia control in soybean with soil residual herbicides with and without Xtendimax (5 WAT)



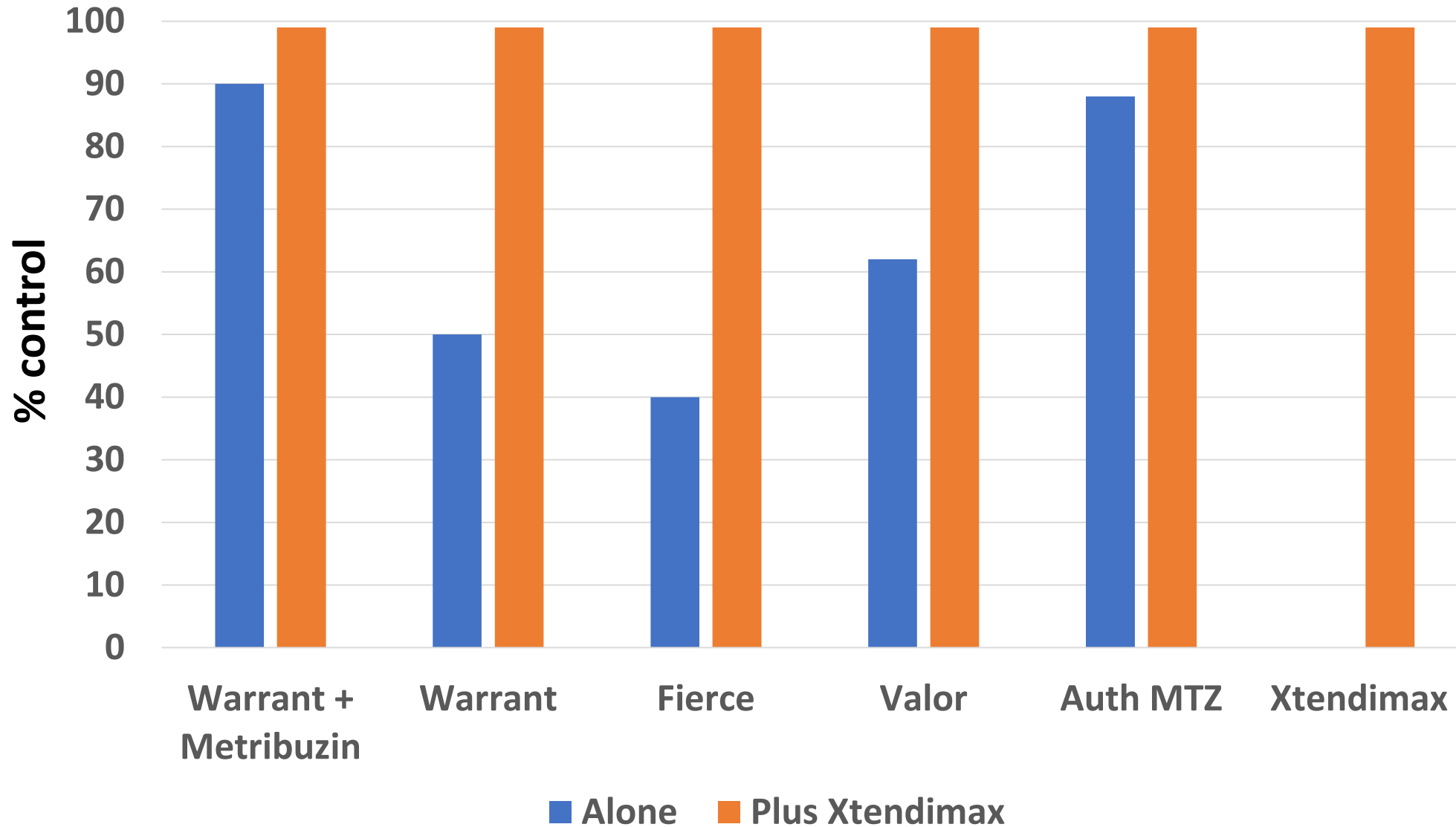
*All treatments applied PRE May 19 (0.63" rain 1 WAT)

Kochia control in soybean with soil residual herbicides with and without Xtendimax (5 WAT)



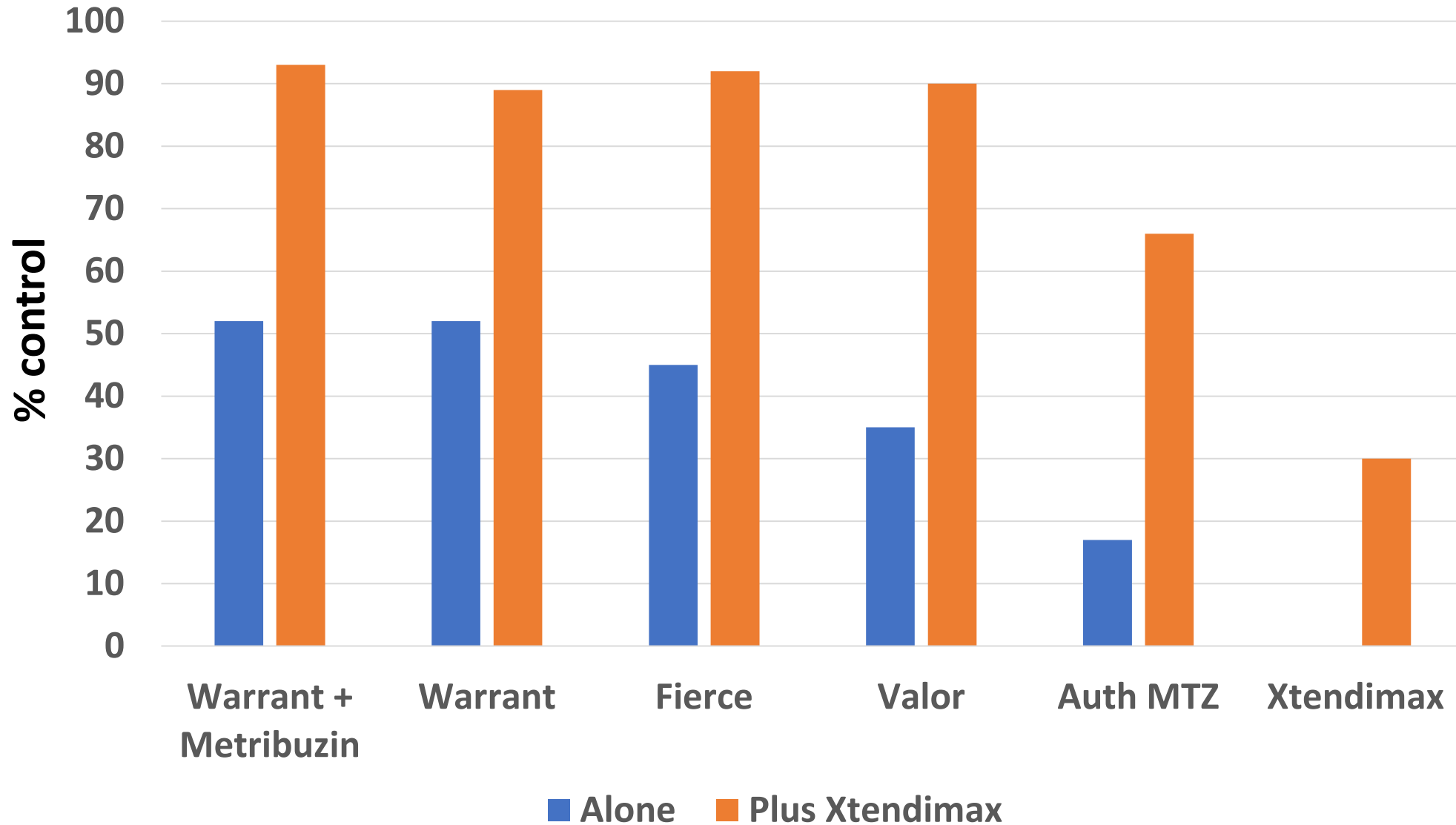
*All treatments applied PRE May 23 (0.67" rain 1 WAT)

Lambsquarters control in soybean with soil residual herbicides with and without Xtendimax (5 WAT)



*All treatments applied PRE May 19 (0.63" rain 1 WAT)

Yellow foxtail control in soybean with soil residual herbicides with and without Xtendimax (5 WAT)



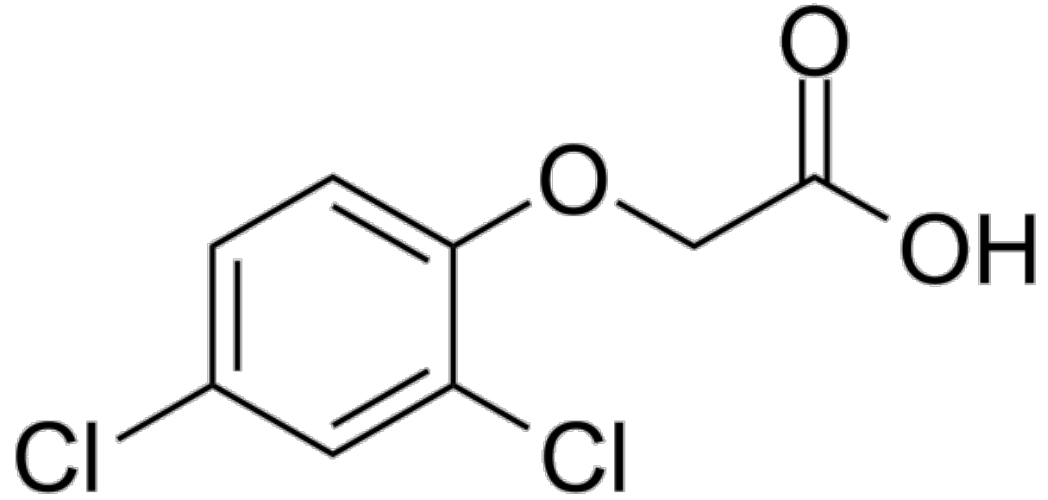
*All treatments applied PRE May 19 (0.63" rain 1 WAT)

Tolvera = tolpyralate + bromoxynil

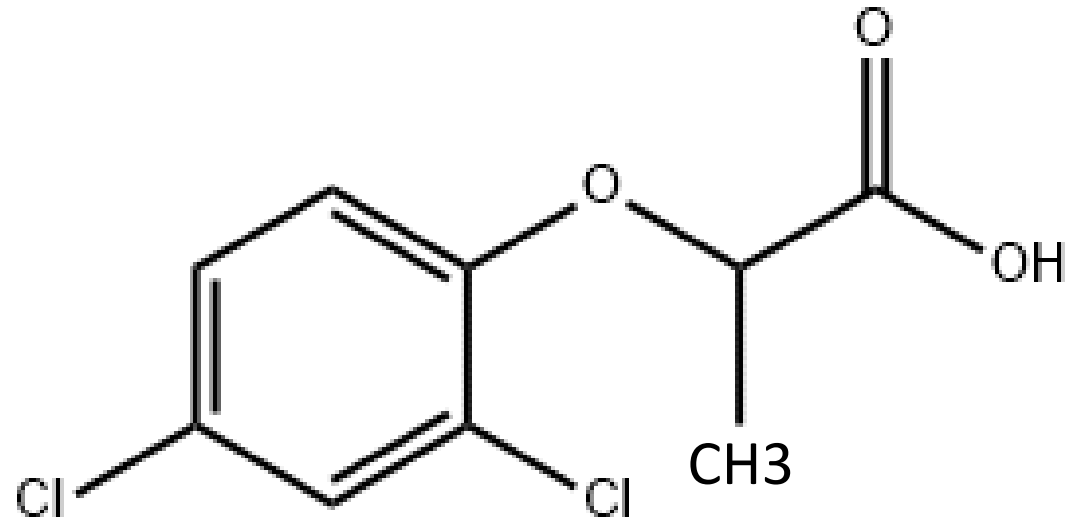
Group 27

Group 6

- **Tolpyralate has broadleaf and grass activity (not wild oat)**
- **May be tank mixed with other products to broaden spectrum**
- **6" kochia: 77-82% control**
- **1-4" kochia: 91-92% control**
- **1-2" kochia: 99% control**
- **Green foxtail: 80-92% control (better control on small foxtail)**



2,4-D



Dichlorprop

Kochia size affects weed control with Dichlorprop and Bromoxynil

Year	Kochia size (inches)	Maestro EXT % control	Dichlorprop % control	Bromoxynil % control
2020	7	53-83	67	57
2021	4	89-97	80	86
2021	6	61-85	62	55
2022	1	99	91	99
2022	6	77-89	74	30
2023	3	93-97	--	--

***Little to no crop injury observed in any year**

Wild oat resistance testing (% resistant)

Herbicide	Group	2016-2020	2021	2022
Puma	1	75	88	92
Axial XL	1	39	35	73
Everest	2	71	85	96
GoldSky	2	71	53	94
Varro	2	85	91	100
Raptor	2	52	24	88
Assure II	1	72	82	88
Select	1	9	18	33

n=208

n=34
25 of 34

n=48
44 of 48

Resistant to both
Puma and Everest

*Samples not randomly collected

Green foxtail resistance testing (% resistant)

Herbicide	Group	2015-2020	2021	2022
Puma	1	65	86	72
Discover	1	67	71	72
Axial XL	1	47	81	61
Everest	2	13	24	78
GoldSky	2	16	24	83
Varro	2	17	19	56
Raptor	2	0	5	22
Assure II	1	45	76	50
Select	1	3	10	17

*Samples not randomly collected

n=118

n=21

n=18



10 of 18 resistant to both Puma and Everest