

MANAGING TROUBLESOME WEEDS IN KANSAS

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OUTLINE

1 **EXTENSION WEED SCIENCE IS EXPANDING!**

2 **HERBICIDE UPDATE**

3 **RESISTANCE UPDATE**

4 **STRATEGIC TILLAGE**



XTEND SYSTEM CHANGES

What we know:

- US District Court in AZ ruled the EPA violated FIFRA notice and comment mandates
 - Court did NOT find ESA violations
- The labels for XtendiMax, Engenia, and Tavium currently do not exist
 - EPA could choose to let 'existing stocks' be used
- Companies, commodity groups, and the EPA are working on a response/appeal to the court ruling



XTEND SYSTEM CHANGES

What can we do for weed control:

- Beef up residual programs
- Encourage canopy cover
- If XtendFlex – Liberty
 - Weed size and spray volume
 - Some evidence the Liberty + PPO inhibitor enhances pigweed control
- If Xtend (dicamba + glyphosate resistance only)
 - Reflex (if no PPO/Group 14 resistance)
 - Hooded sprayer???



ATRAZINE LABEL CHANGES



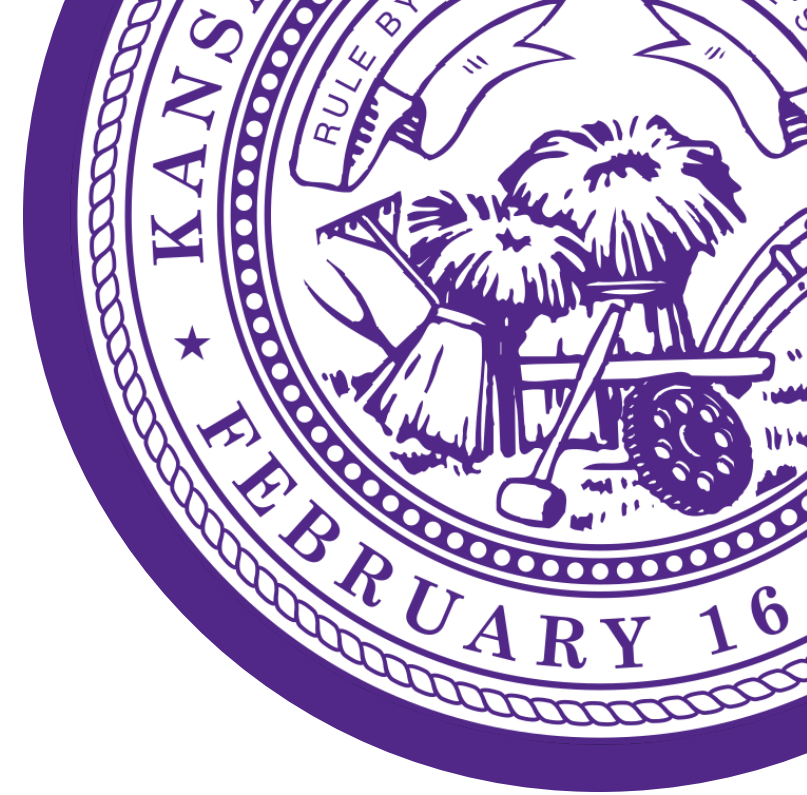
Section 24(c) – Special Local Needs labels not renewed
Wheat-Fallow rotations only labeled non-crop use

AATREX 4L ALONE – CHEMICAL FALLOW

Do not apply more than 2.25 lb ai/A for any application and do not apply more than one application per year.

Users must only apply to fallow land in the following states according to the prescribed rotation pattern in the table below:

Fallow Rotation Pattern	Fallow Use Authorized in these States only
Wheat-Corn-Fallow	CO, KS, ND, NE, SD & WY
Wheat-Fallow-Wheat	CO, KS, ND, NE, SD & WY
Wheat-Sorghum-Fallow	AR, CO, GA, IL, KS, LA, MS, MO, NE, NM, NC, OK, SD & TX



Storen

Syngenta

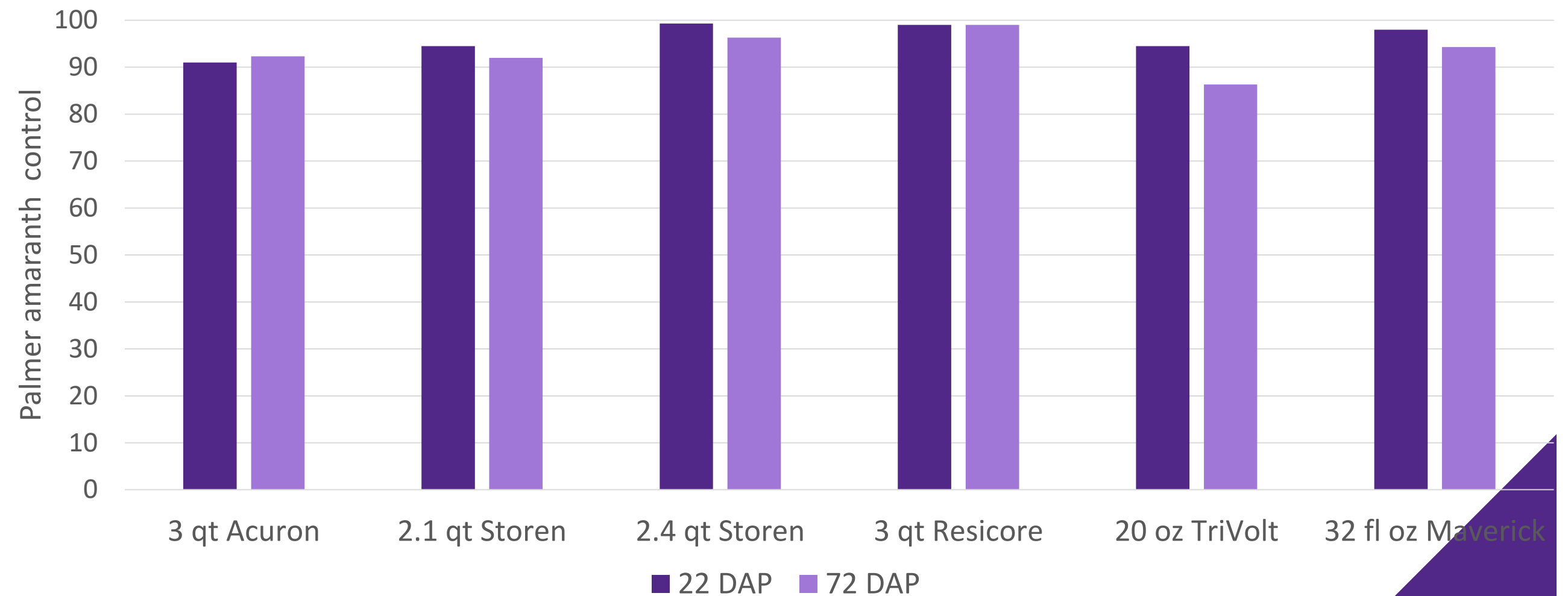
Bicyclopyrone + mesotrione + pyroxasulfone + S-metolachlor

Preplant (up to 28 days before planting) or preemergence

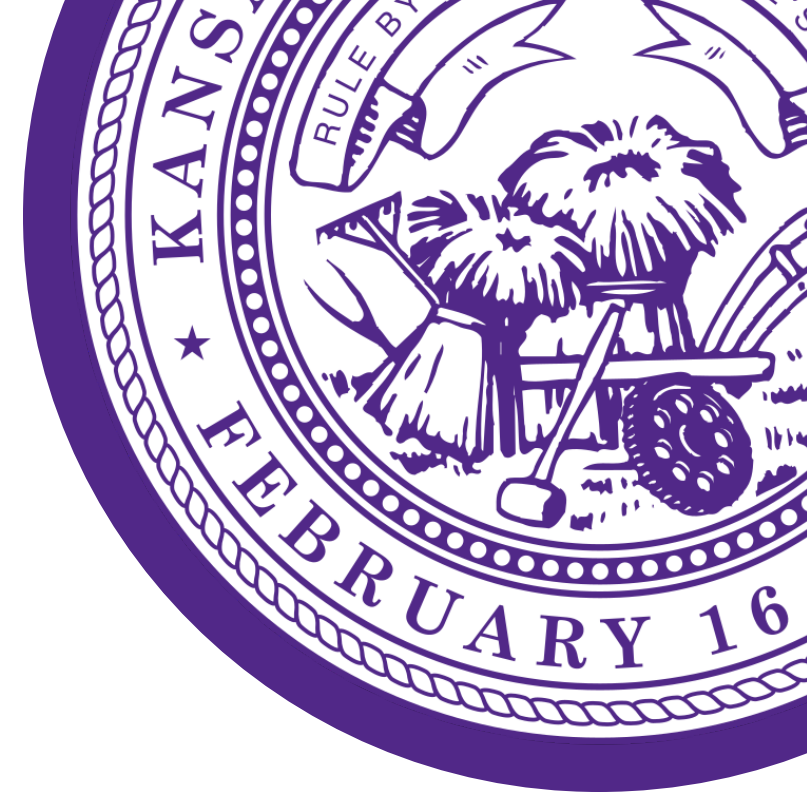
Postemergence (up to V8 corn or 3" weeds)

Split application

COC or MSO before corn emergence; NIS after corn emergence



All except Acuron applied with 0.75 lbs atrazine. No statistical differences among treatments ($\alpha = 0.05$)



Tarzec

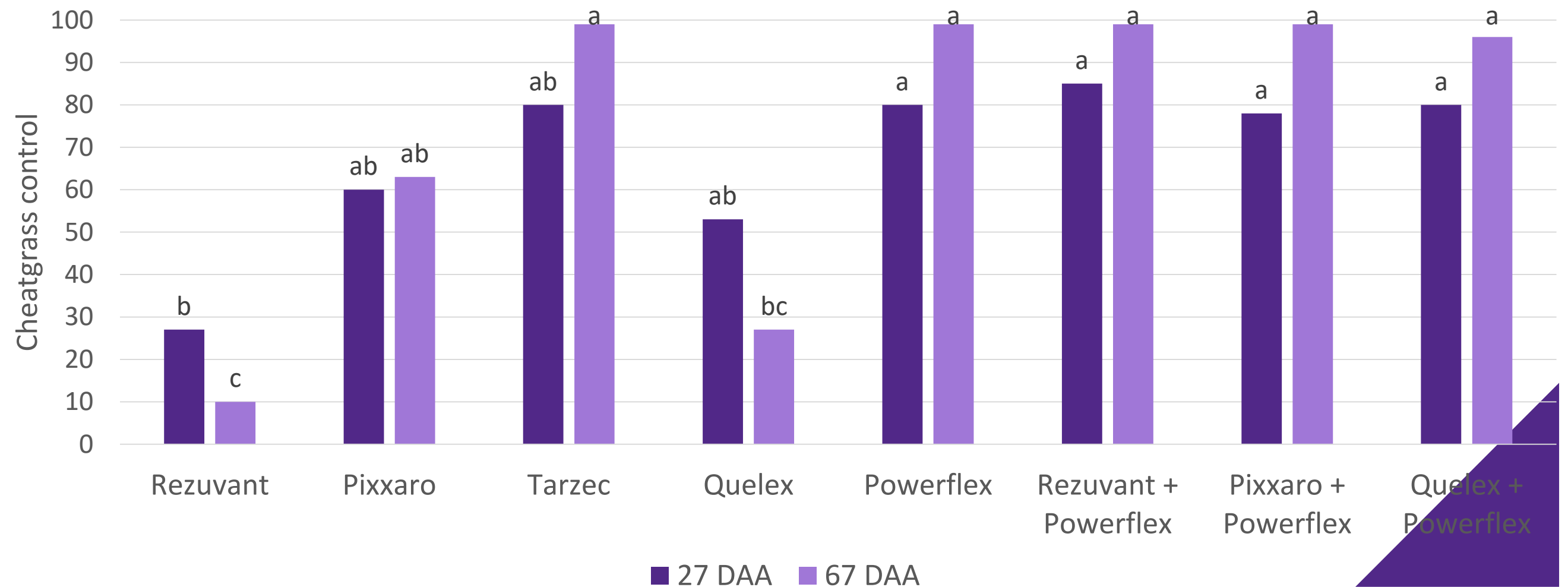
Corteva

Pyroxsulam + halauxifen-methyl

Controls annual grasses (including cheatgrass and Italian ryegrass) and broadleaf weeds (including mustards)

Apply when wheat is 3 leaf to joint

Use 0.25% to 0.5% NIS or 1 to 1.25% COC when applied alone. See label instructions for tank mixing and applying in nitrogen fertilizer carrier.



HERBICIDE RESISTANCE IN PALMER AMARANTH



Herbicide group (example herbicide)	Number of cases	Year (and state) of first report	Year of first report in KS
9, EPSPS inhibitor (glyphosate)	44	2005 (GA)	2011
2, ALS inhibitors (Beyond, Harmony, Glean, Pursuit)	25	1993 (KS)	1993
5, PSII inhibitors (atrazine, metribuzin)	11	1993 (TX)	1995
27, HPPD inhibitors (Callisto, Laudis, Impact)	7	2009 (KS)	2009
14, PPO inhibitors (Reflex, Cobra)	5	2011 (AR)	2021
4, Growth regulators (2,4-D, dicamba)	3	2015 (KS)	2015 (2,4-D) 2021 (dicamba)*
15, VLCFA inhibitors (Dual, Harness, Outlook, Zidua)	2	2016 (AR)	Not yet
10, Glutamine synthetase inhibitor (Liberty)	2	2020 (AR)	Not yet

HERBICIDE RESISTANCE IN WATERHEMP



Herbicide group (example herbicide)	Number of cases	Year (and state) of first report	Year of first report in KS
9, EPSPS inhibitor (glyphosate)	27	2005 (MO)	2006
2, ALS inhibitors (Beyond, Harmony, Glean, Pursuit)	27	1993 (IL, IA)	1995
5, PSII inhibitors (atrazine, metribuzin)	15	1994 (MO)	1995
14, PPO inhibitors (Reflex, Cobra)	12	2001 (KS)	2001
27, HPPD inhibitors (Callisto, Laudis, Impact)	6	2009 (IL)	Not yet
4, Growth regulators (2,4-D, dicamba)	3	2009 (NE)	Not yet
15, VLCFA inhibitors (Dual, Harness, Outlook, Zidua)	1	2016 (IL)	Not yet
10, Glutamine synthetase inhibitor (Liberty)			??

WATERHEMP

21 DAA



Nontreated



64 fl oz Liberty

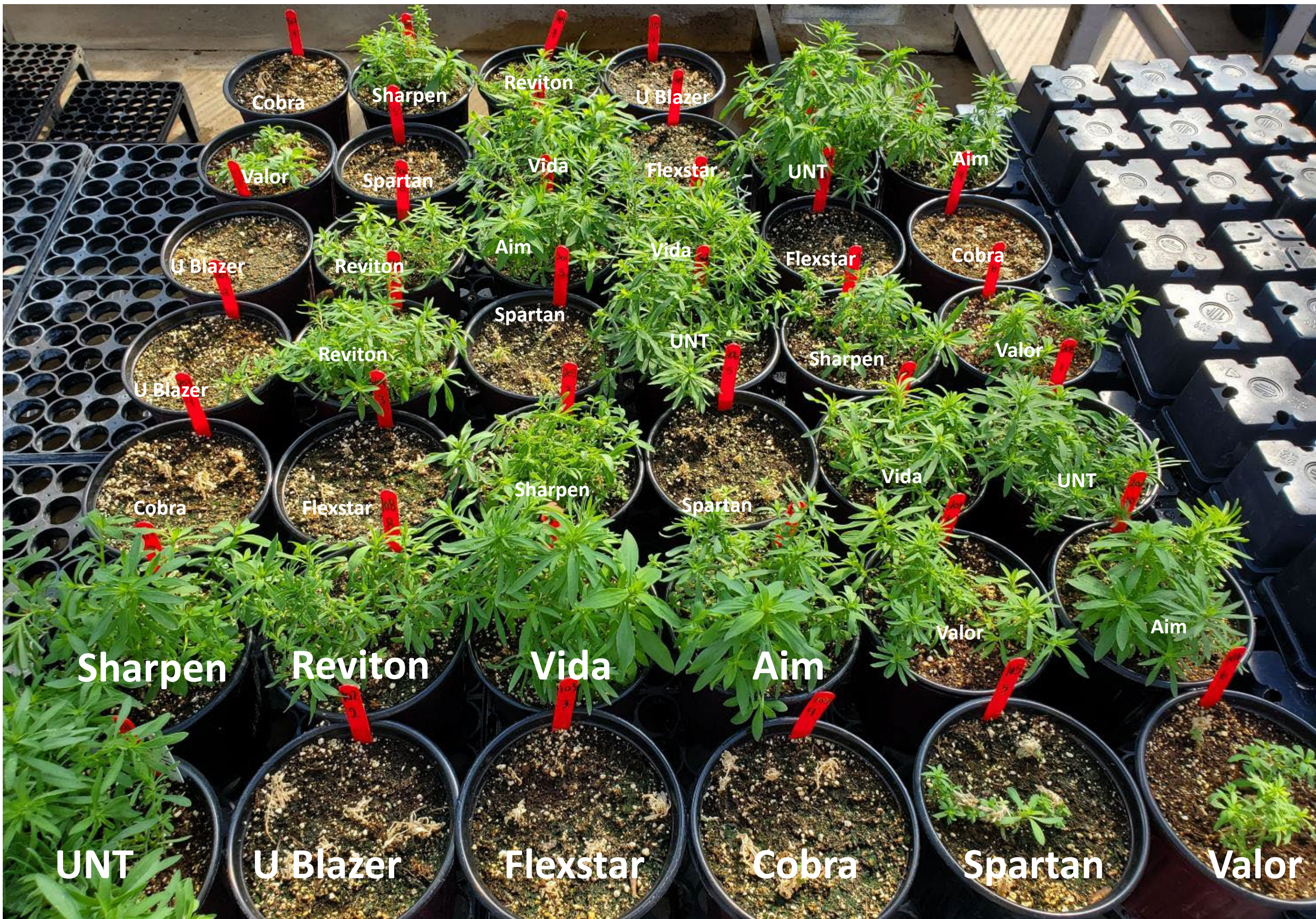


HERBICIDE RESISTANCE IN KOCHIA



Herbicide group (example herbicide)	Number of cases	Year (and state) of first report	Year of first report in KS
2, ALS inhibitors (Glean)	20	1987 (KS)	1987
9, EPSPS inhibitor (glyphosate)	13	2007 (KS)	2007
5, PSII inhibitors (atrazine)	13	1976 (KS)	1976
4, Growth regulators (dicamba)	7	1994 (MT)	2013
14, PPO inhibitors (Valor, Sharpen, Authority)		2023 (ND)	Not yet

Minot



Survivors of 100x Saflufenacil



Mandan-R

Minot-R

Planted/Sprayed
Feb 22

Photo: 20 DAT

3 reps

Soil-applied,
not foliar



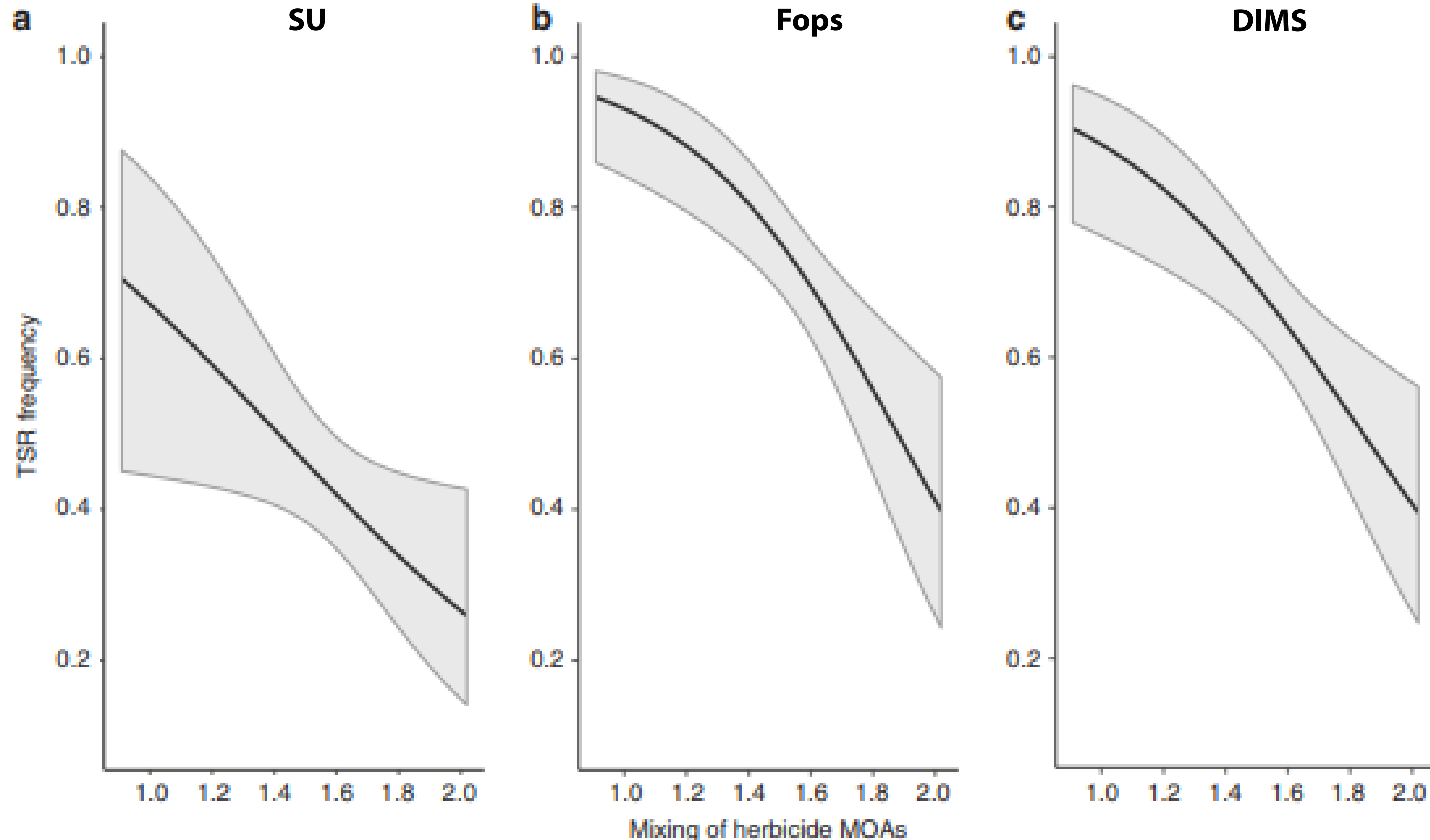
1. Mott
2. Mandan
3. Berthold
4. Minot
5. Mohall-F
6. Mohall-I
7. Susceptible

UNT

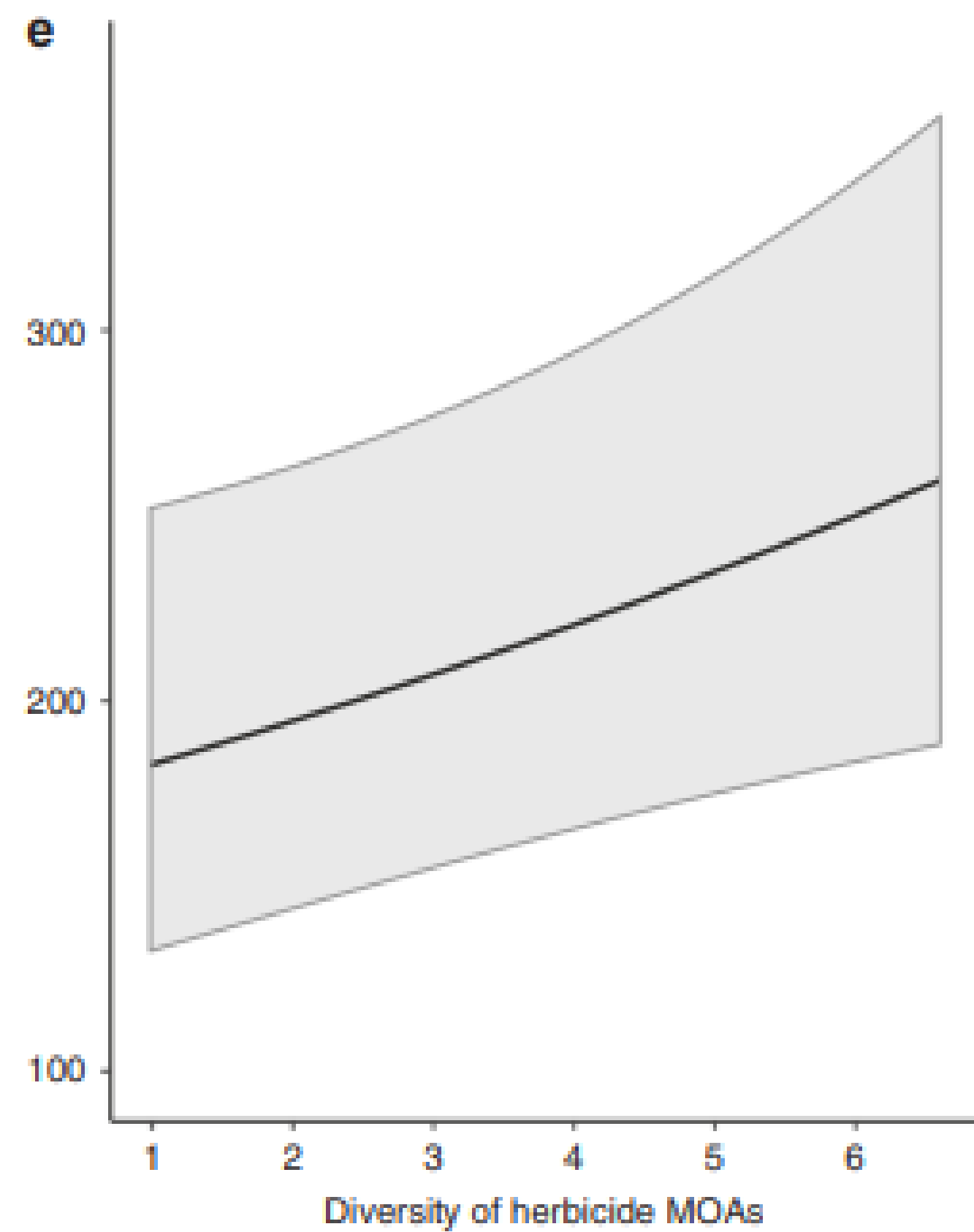
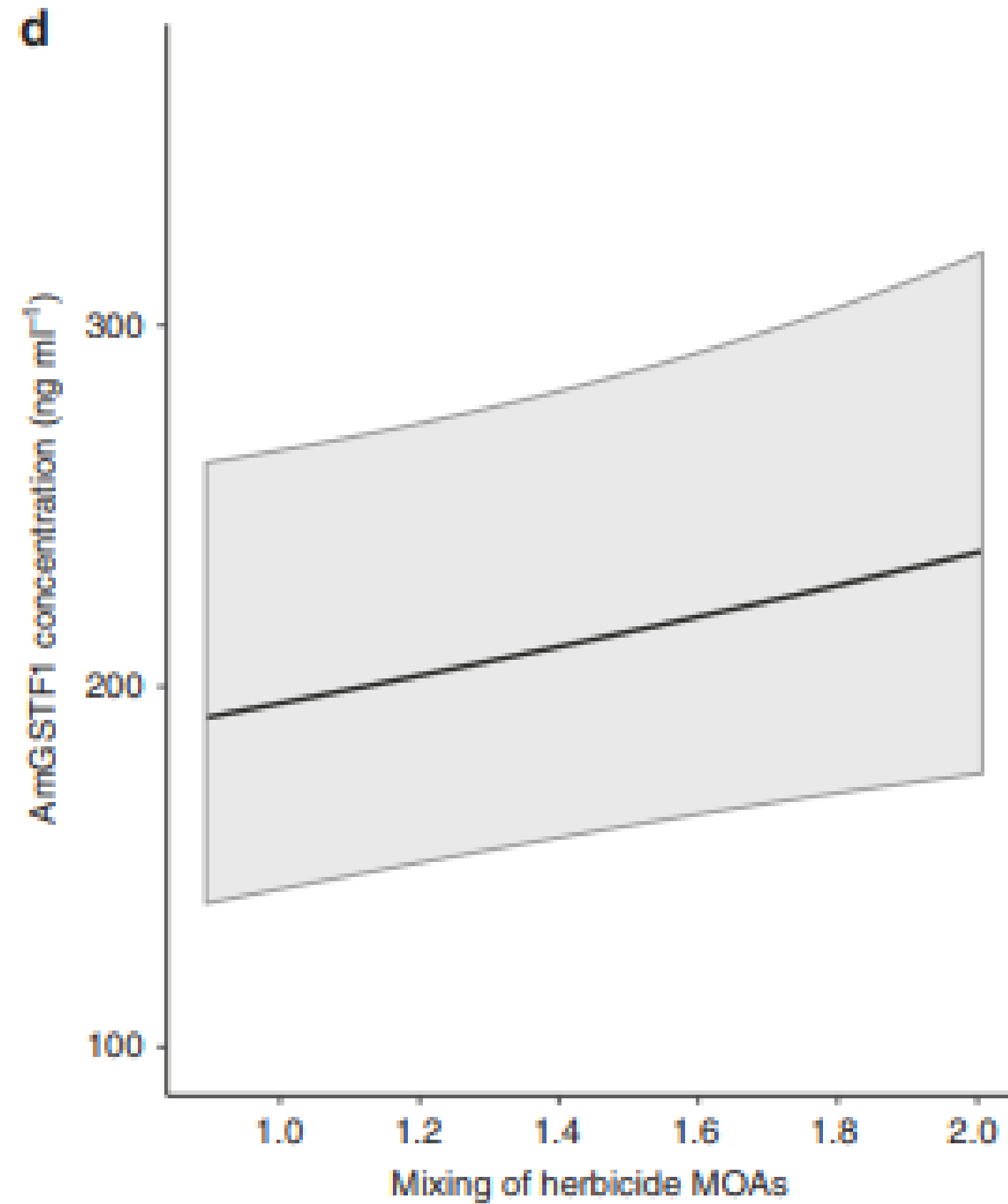
Valor

Spartan

HERBICIDE MIXES DELAY TARGET-SITE RESISTANCE



BUT NOT METABOLIC RESISTANCE

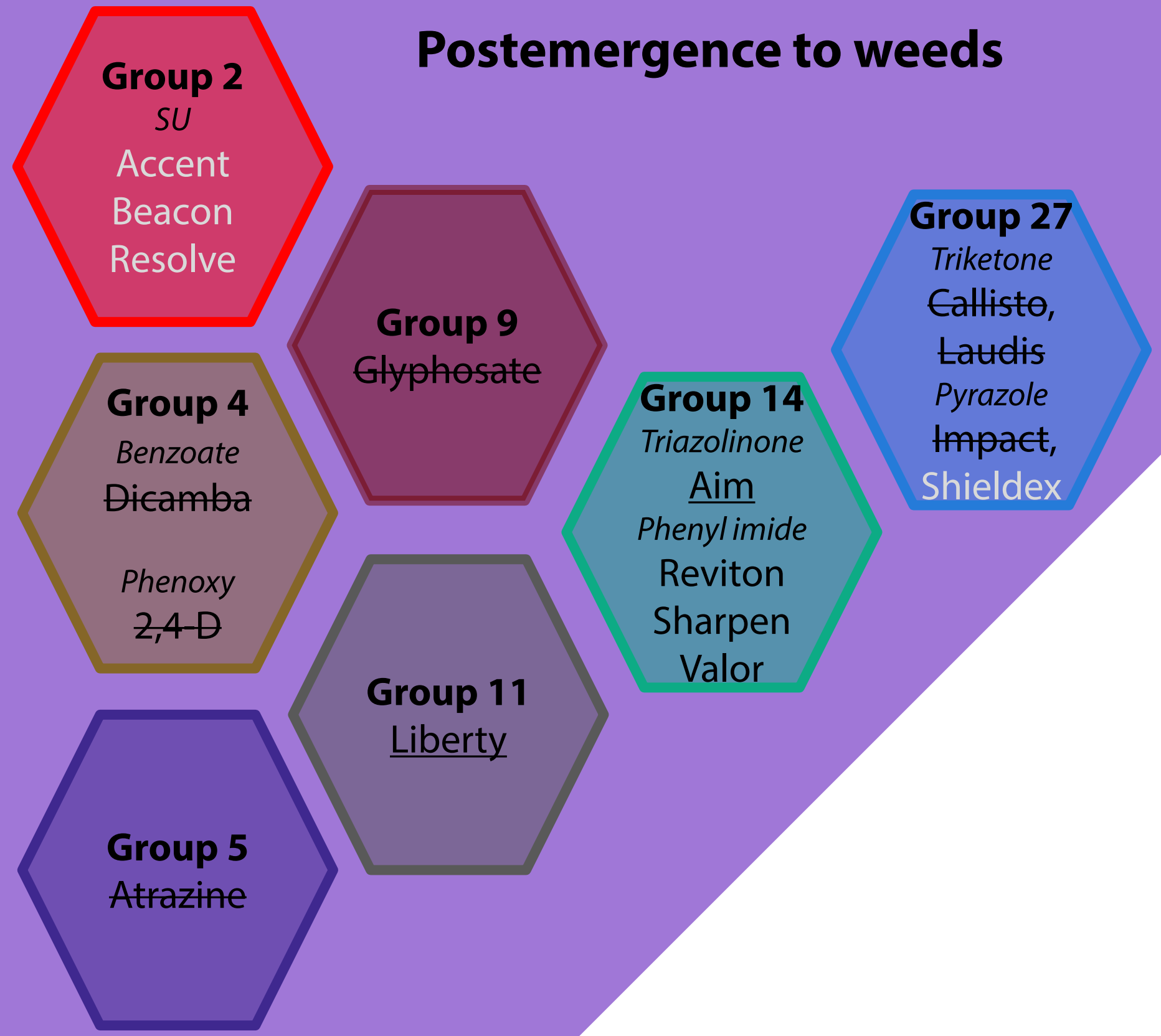


HERBICIDES FOR PALMER AMARANTH CONTROL IN CORN

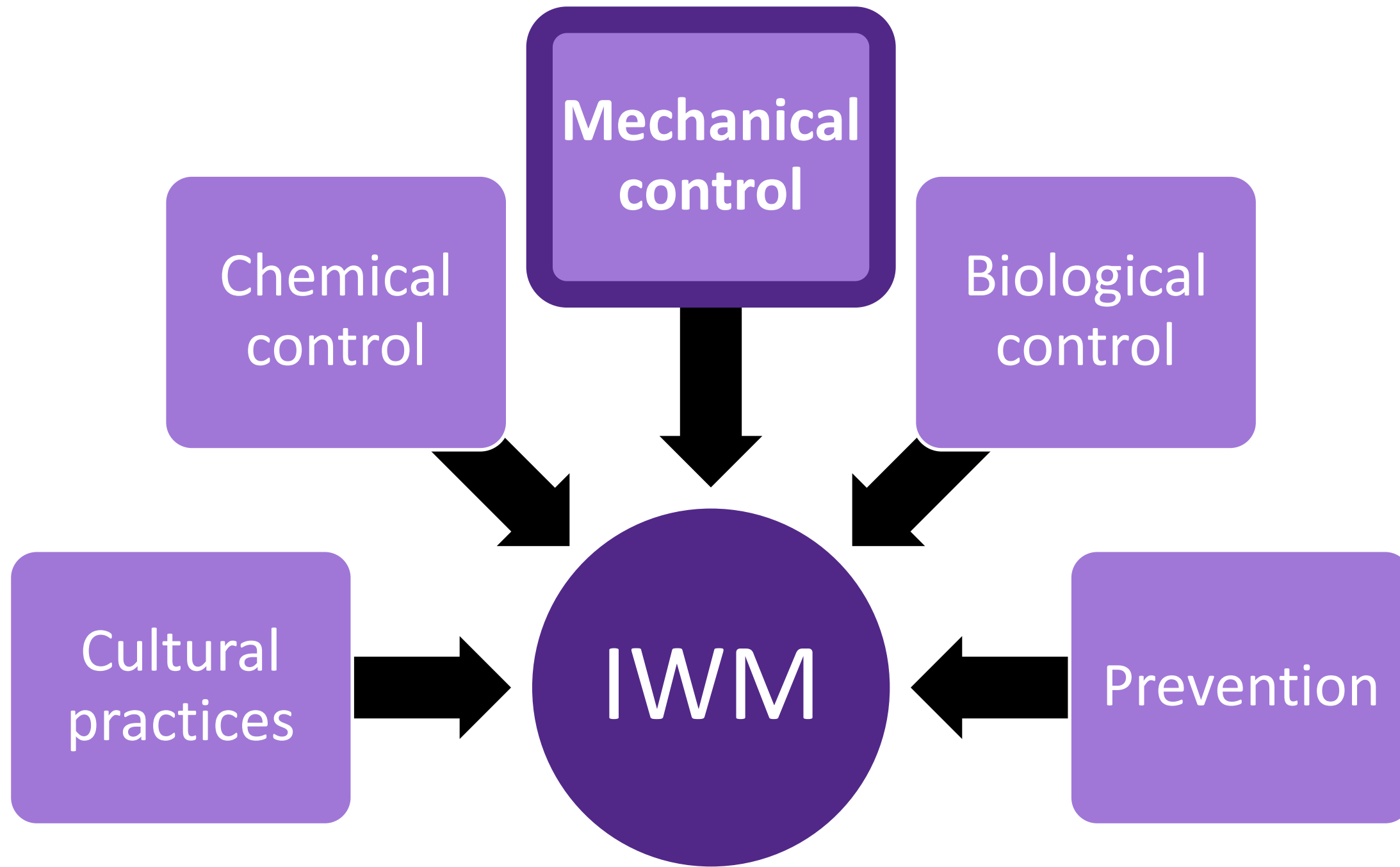
Preemergence to weeds



Postemergence to weeds



INTEGRATED MANAGEMENT



TUMBLE WINDMILLGRASS

Native, warm-season perennial

- Regrowth from crowns and/or short rhizomes
 - Most root system 4 to 5 inches deep

Leaves flat, folded

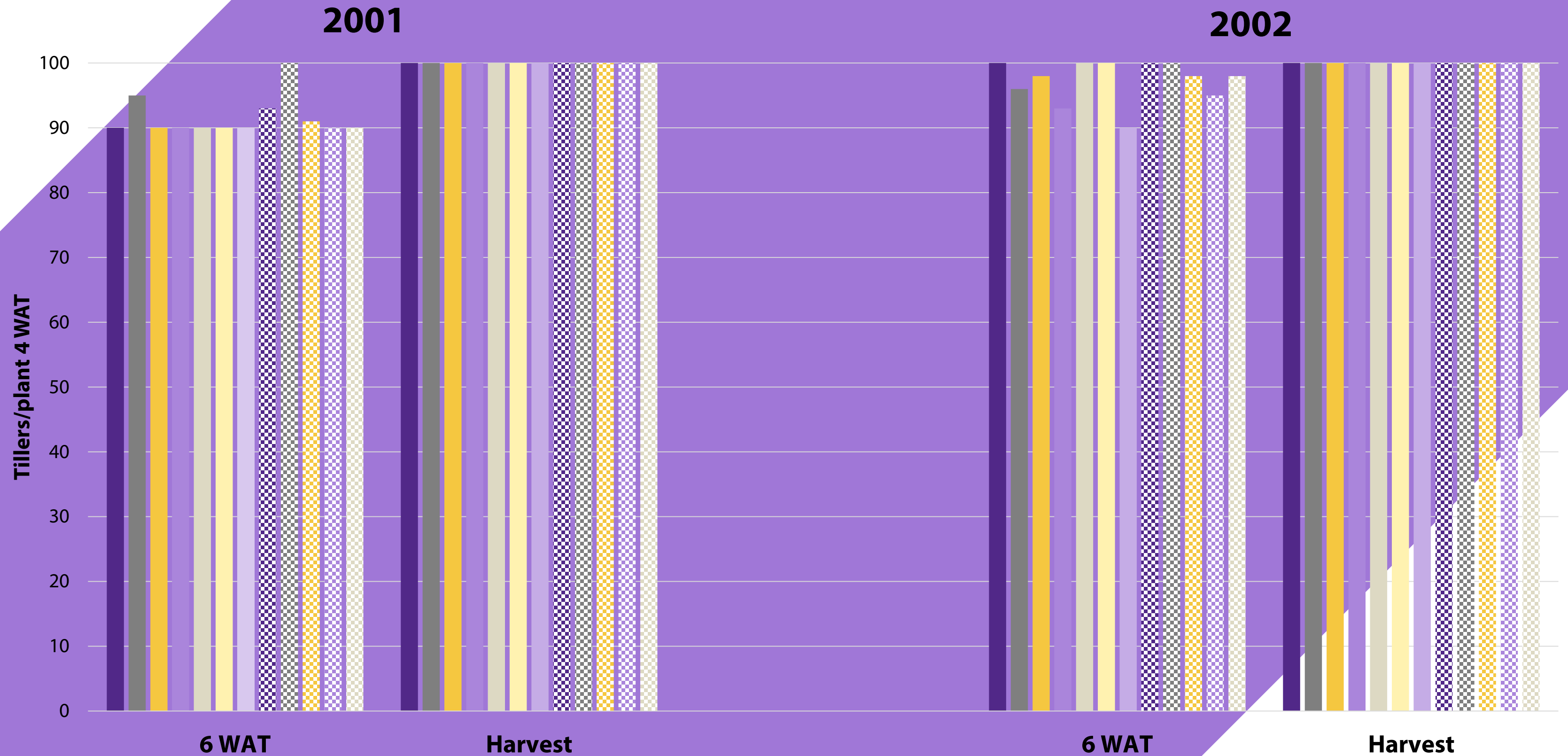
- Form a fan shape at the base
- Leaf sheath has membranous margin

Panicles 10 to 16 branches in 2 to 4 whorls

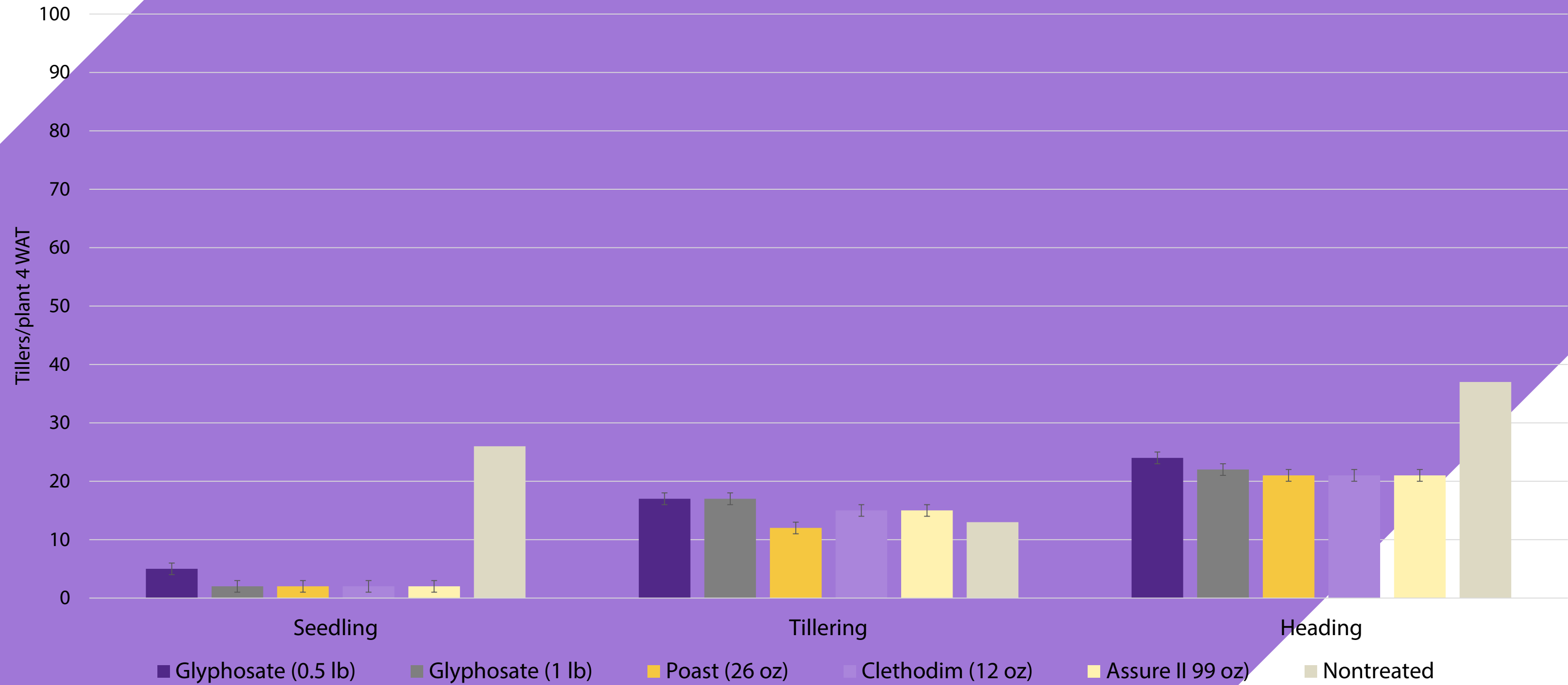
- Separate from stem at top node



1-2" SEEDLING CONTROL IN THE FIELD



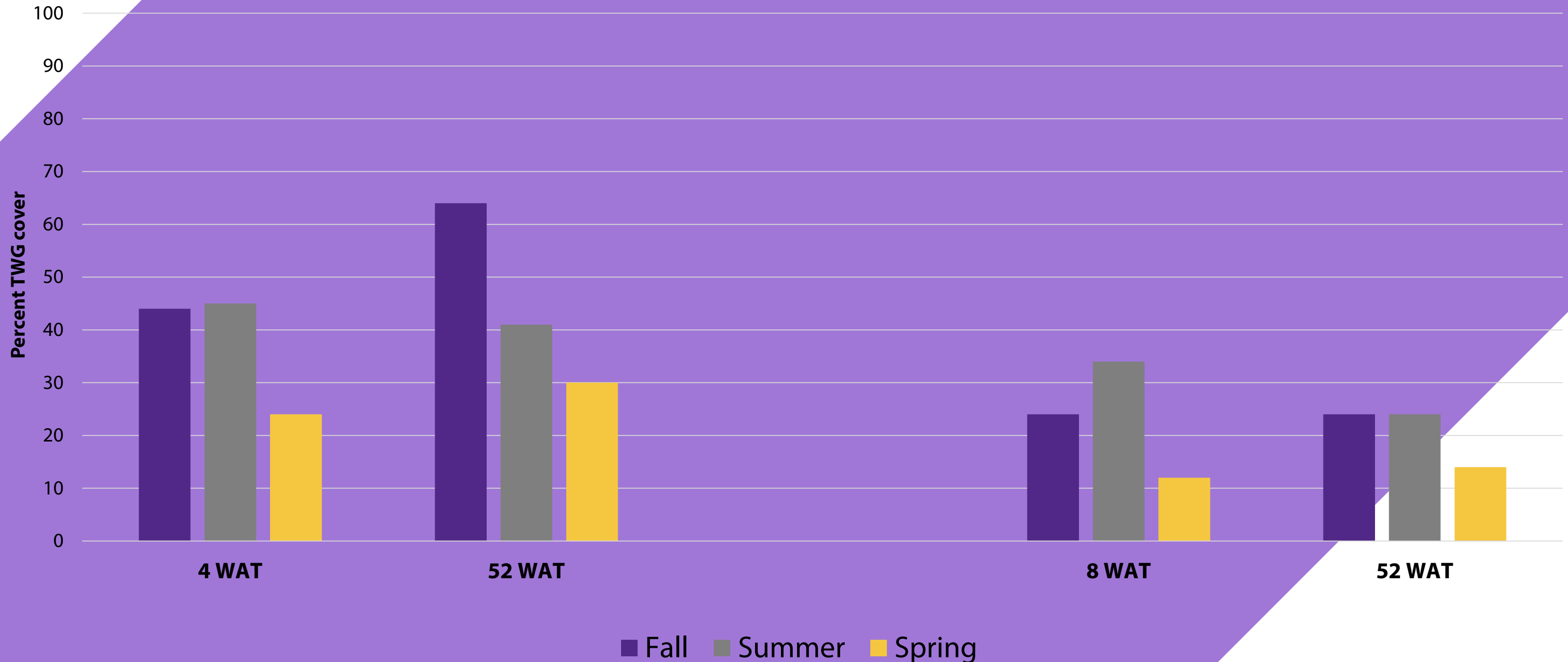
CONTROL OF MATURE PLANTS MORE CHALLENGING



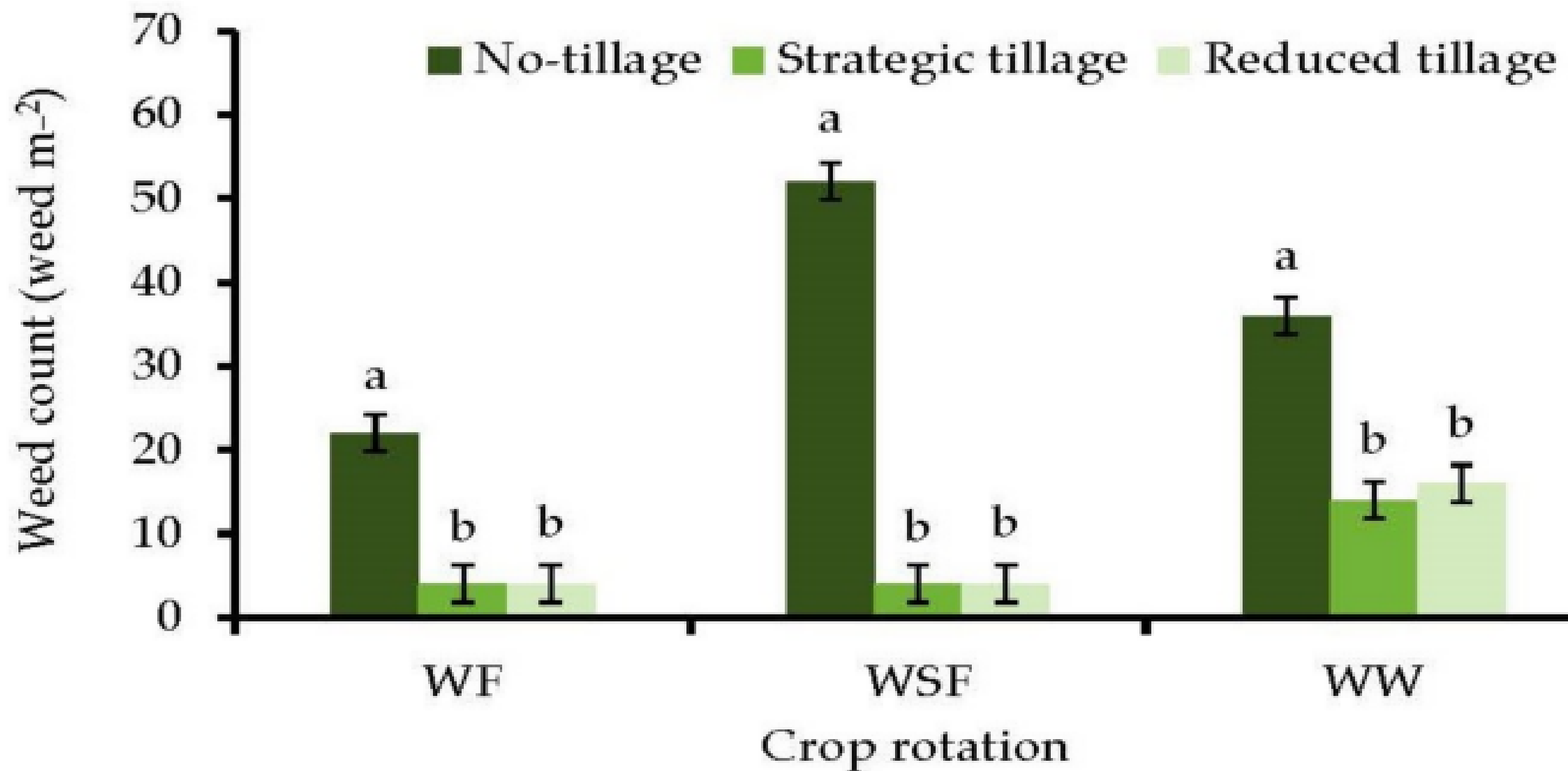
TURFGRASS STUDIES SUGGEST SEASON INFLUENCE

Junction City

Onaga



TILLAGE CAN SUPPRESS TUMBLE WINDMILLGRASS



METHODS



Established in conventionally-tilled sorghum residue

No-till

Sweep plow

- April 27
- Flex-King, 6' blades
- 4-5" deep



METHODS

Sprayed June 3 (2 to 4" clumps)

– 15 GPA, TTJ 1102 tips

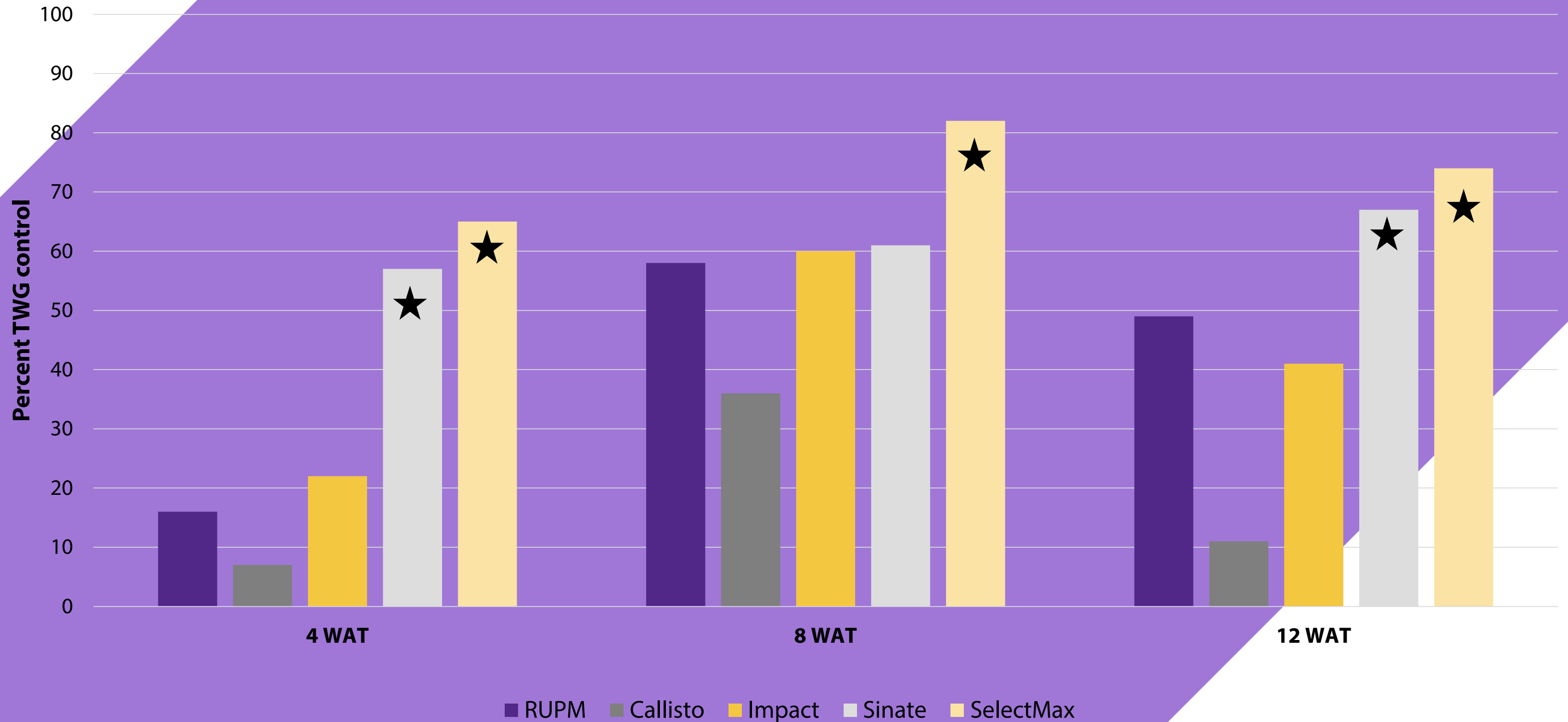
- 64 oz Roundup PowerMax II
- 32 oz SelectMax + 1% COC
- 3 oz Callisto + 1% MSO
- 2 oz Impact + 1% MSO
- 28 oz Sinate + 1% MSO
- 2 pts Remedy Ultra (applied with HPPD-inhibitors)

Rated July 8, August 8, September 12

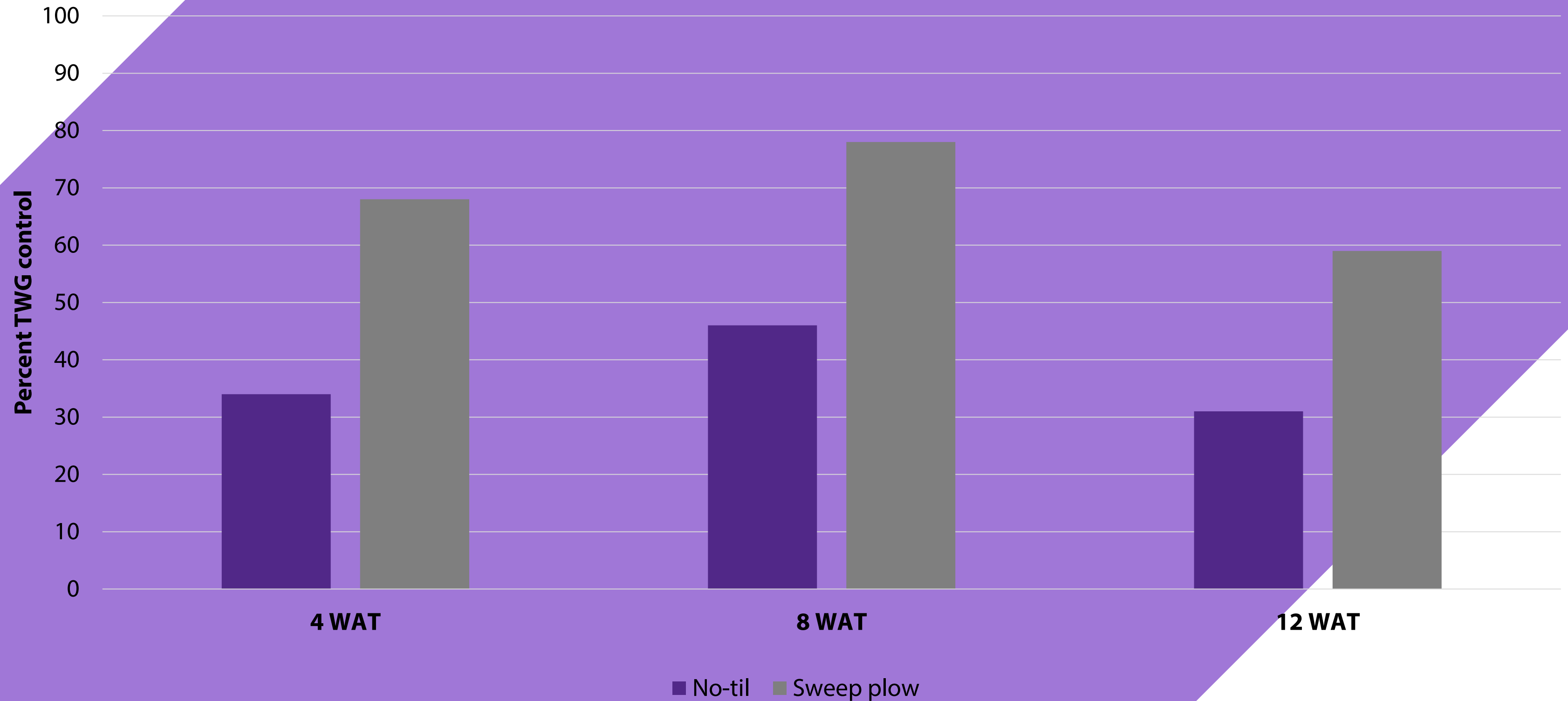
Data analyzed for interactions of tillage and herbicides



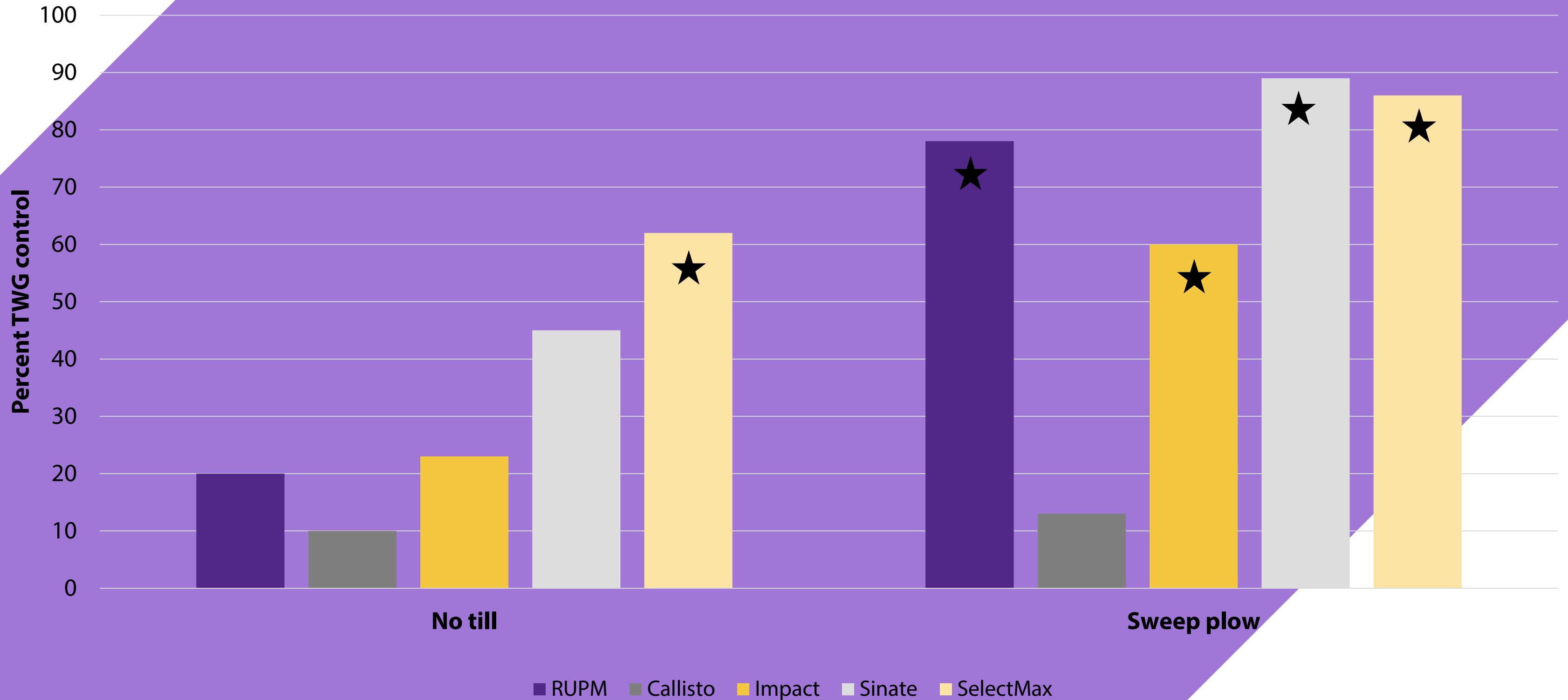
CLETHODIM MOST CONSISTENT CONTROL



TILLAGE INCREASED CONTROL



TILLAGE INCREASED CONTROL



Select – No till



Select – Sweep plow



Sinate – Sweep plow



September 12, 2022

OCCASIONAL TILLAGE STUDY



Treatments in W-S-F rotation

- No-till
- One tillage during summer prior to wheat drilling
- One tillage after wheat harvest (mid-August)
- Two tillage operations during the fallow phase
- One tillage during fallow phase and one tillage post wheat harvest

} Treatments with 2 tillage operations were added in 2019

2 locations – Tribune and Garden City

Table 1. Grain yield response of dryland wheat to a single tillage operation (sweep plow) in a 3-year wheat-sorghum-fallow rotation grown from 2014 to 2022 near Tribune, KS

Tillage	Year									Average
	2014	2015	2016	2017	2018	2019	2020	2021	2022	
	----- bu/a -----									
No-tillage	28	24	75	30	57	93	45	69	14	48a
June in fallow	22	22	81	25	58	89	40	65	13	46b
July post-harvest	23	21	77	27	57	89	42	67	13	46b
ANOVA (P > F)										
Treatment	0.427	0.599	0.174	0.477	0.857	0.202	0.130	0.365	0.628	0.034

ANOVA = analysis of variance.

This is sorghum, after the wheat crop in the W-S-F rotation

Table 2. Grain yield response of dryland grain sorghum to a single tillage operation (sweep plow) in a 3-year wheat-sorghum-fallow rotation grown from 2014 to 2022 near Tribune, KS

Tillage	Year									Average
	2014	2015	2016	2017	2018	2019	2020	2021	2022	
	----- bu/a -----									
No-tillage	77	133	129	147	130	132	99	121a	75a	116a
June in fallow	84	114	129	145	123	129	102	110c	66b	111b
July post-harvest	86	108	126	141	115	131	94	115b	61b	109b
ANOVA (P > F)										
Treatment	0.573	0.104	0.280	0.567	0.065	0.779	0.259	0.002	0.012	0.004

ANOVA = analysis of variance.



Table 3. Grain yield response of dryland wheat to a single tillage operation (sweep plow) in a 3-year wheat-sorghum-fallow rotation grown from 2019 to 2022 near Tribune, KS

Tillage	Year				Average 2019-22
	2019	2020	2021	2022	
	----- bu/a -----				
No-tillage	93.4	45.1	68.8	14.1	55.4
In fallow 1×	89.3	40.1	64.5	12.6	51.6
In fallow 2×	88.2	40.3	71.4	11.2	52.8
Post-wheat 1×	88.9	42.3	66.6	13.2	52.8
In fallow and post-wheat 1×	92.4	40.7	69.5	11.1	53.4
ANOVA (P > F)					
Treatment	0.4455	0.1304	0.3286	0.2704	0.0881

Table 4. Grain yield response of dryland sorghum to a single tillage operation (sweep plow) in a 3-year wheat-sorghum-fallow rotation grown from 2019 to 2022 near Tribune, KS

Tillage	Year				Average 2019-22
	2019	2020	2021	2022	
	----- bu/a -----				
No-tillage	132.0	98.9	120.5	75.0	106.6
In fallow 1×	128.7	102.2	109.8	66.0	101.7
In fallow 2×	133.3	95.5	119.9	73.9	105.7
Post-wheat 1×	130.7	94.0	115.3	60.9	100.2
In fallow and post-wheat 2×	132.0	86.3	115.8	64.0	99.5
ANOVA (P > F)					
Treatment	0.8653	0.2590	0.1998	0.7034	0.1986

This is sorghum, after the wheat crop in the W-S-F rotation

Tillage after wheat harvest reduced sorghum yields

TAKE HOME MESSAGE

1

FEW NEW PRODUCTS, LOTS OF NEW REGULATIONS

2

**BE PROACTIVE ABOUT HERBICIDE RESISTANCE
MANAGEMENT ON YOUR FARM**

3

**STRATEGIC TILLAGE MAY BE A VIABLE OPTION
FOR YOUR OPERATION**



LET'S CONNECT



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K-State Weed Science



War Against Weeds podcast

