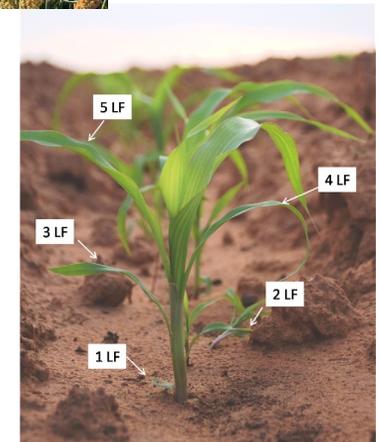


Grain Sorghum Management Colorado, 2025

Brent Bean

United Sorghum Checkoff Agronomist

Funded Project Examples

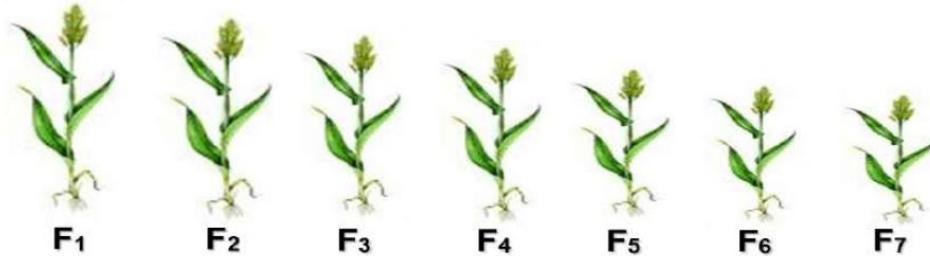


Double Haploid - Corteva

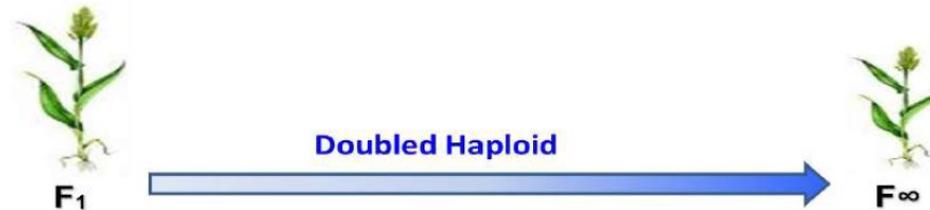
Doubled Haploid – Instant Inbreds



Traditional Breeding
(7 generations)



Doubled Haploid
(2 generations)



Considered high risk with the potential for high reward!

Timeline

2014 – 2016

Discovery of inducer lines

2017 – 2020

- Increase frequency of haploid Induction
- Develop early sorting method of haploids from diploids

2021 – 2024

Improve efficiencies of the entire system, especially sorting

2024 - 2025

- Identify a Service Provider
- Introduce seed companies and others to the system for licensing of technology

Create a trait technology and delivery package for iron deficiency chlorosis tolerance in sorghum – Innovative Seed Solutions

Objective: Deliver to the sorghum industry an IDC tolerance trait package (trait marker, trait donor, trait map).

- Screening lines and hybrids for IDC tolerance
- Protocols for screening for IDC tolerance



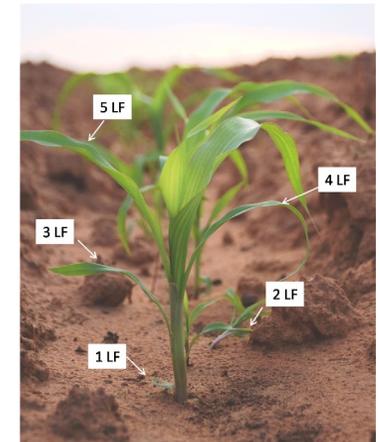
A reappraisal of sorghum growing degree days: a regional approach

PI: Ignacio Ciampitti, K-State

Locations: 3 KS, 3 TX, 1 OK, 1 NE,
1 SD, 1 CO

Duration: 2 Years

Why: To provide an accurate method for predicting sorghum growth stages which is vital for driving models used by industry, academia and growers to make management decisions.



Silage - berry size and processing



ory 4

Figure 1. Forage sorghum harvested without the use of kernel processors (KP; left, 85% of intact berries) and with KP (right, 2% of intact berries and 98% of processed berries).

Other - Mostly small One YR Projects

- Weed control trials
- Seeding rate in multi-cut hay trial
- Optimizing N fertilization in male-sterile sorghum
- Stalk rot studies
- Biologicals

Loyant Herbicide – Broadleaf Weeds

2024 Trials

Lubbock, TX

Amarillo, TX

Fayetteville, ARK

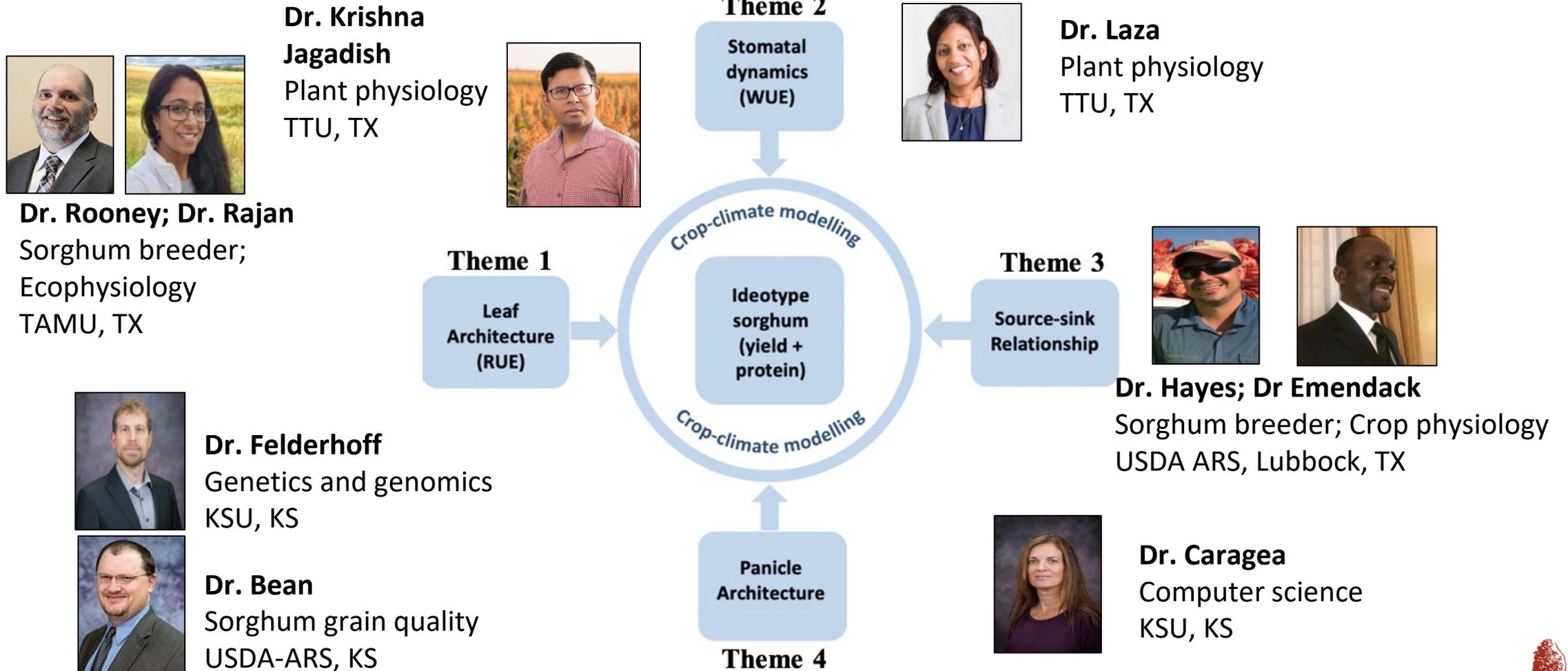
Hays, KS

Hays, KS

Moderate Palmer amaranth
population



Transforming Grain Sorghum Yield Potential Through Trait-based Ideotype Breeding - for Five Year Project 2024 (3rd YR)



AMS Approved

Traits that Increase Yield?

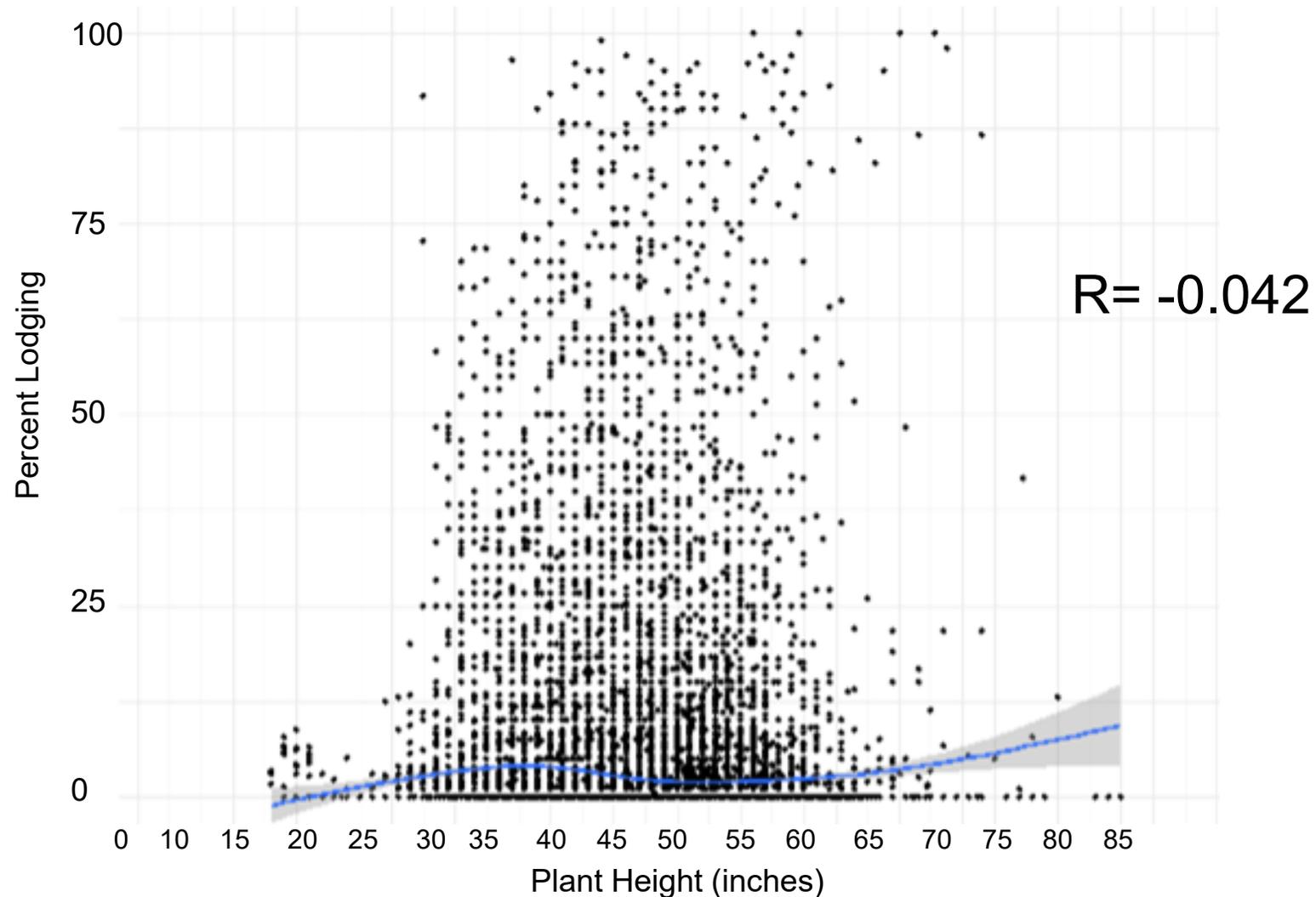


Causes of Lodging

- High Seeding Rate
- High N in Soil
- Late Season Moisture Stress
- Harvest Timing
- Stalk Rot
 - Charcoal rot
 - Fusarium
- Hybrid
 - Lignin (amount and location)
 - Stalk Diameter
 - Height?

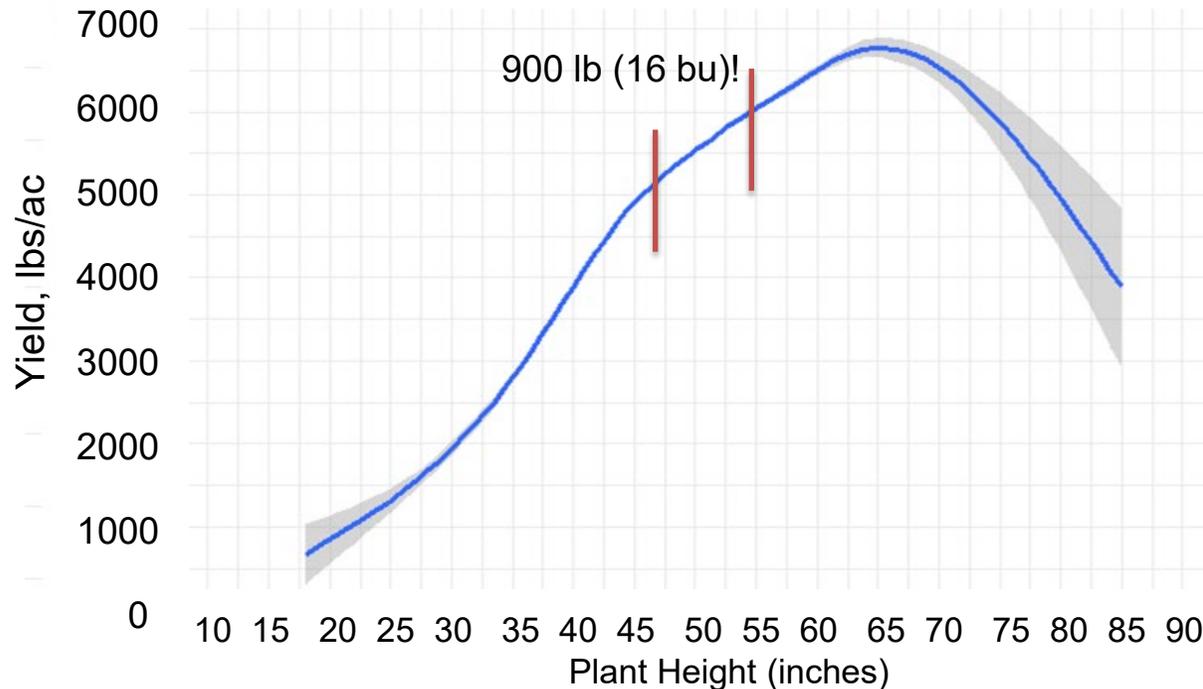
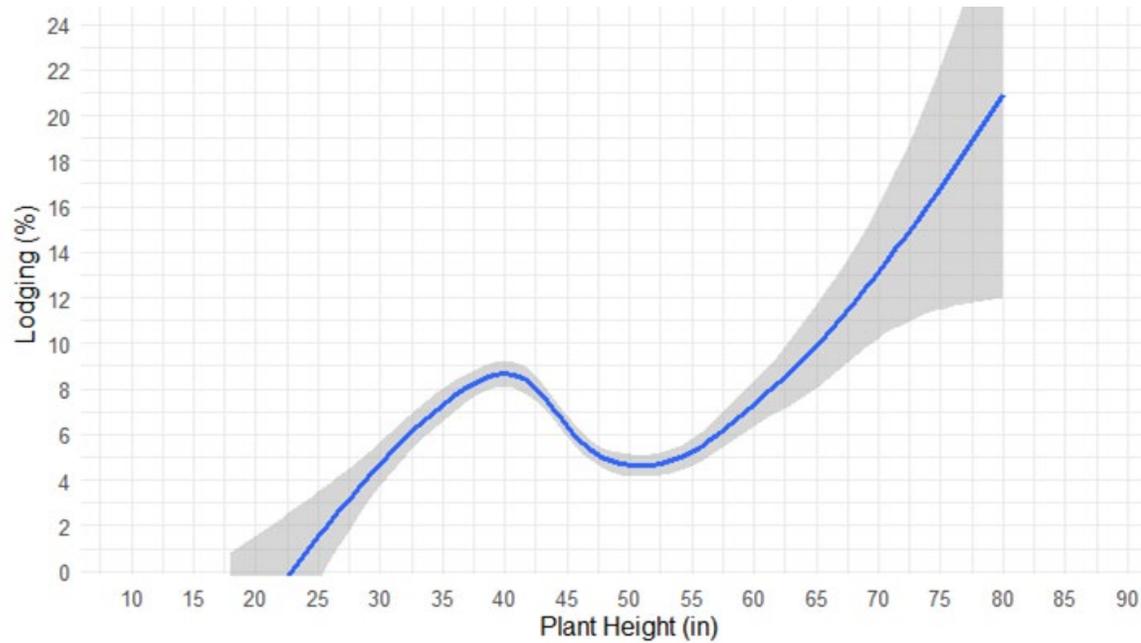


Lodging Correlation to Height – 50 Years of TX Variety Trial Results



Source: Fabian Leon, et al. Crop Science. 2024;64:3014–3027.

Sorghum Height and Lodging



1970 to 2021 Texas Sorghum Variety Trials

- Avg Height 48 in (4 Ft)
- Correlations
 - Yield to Height **0.57**
 - Lodging to Height **-0.024**
 - Yield to Days to Flower
 - Dryland **0.339**
 - Irrigated **0.142**

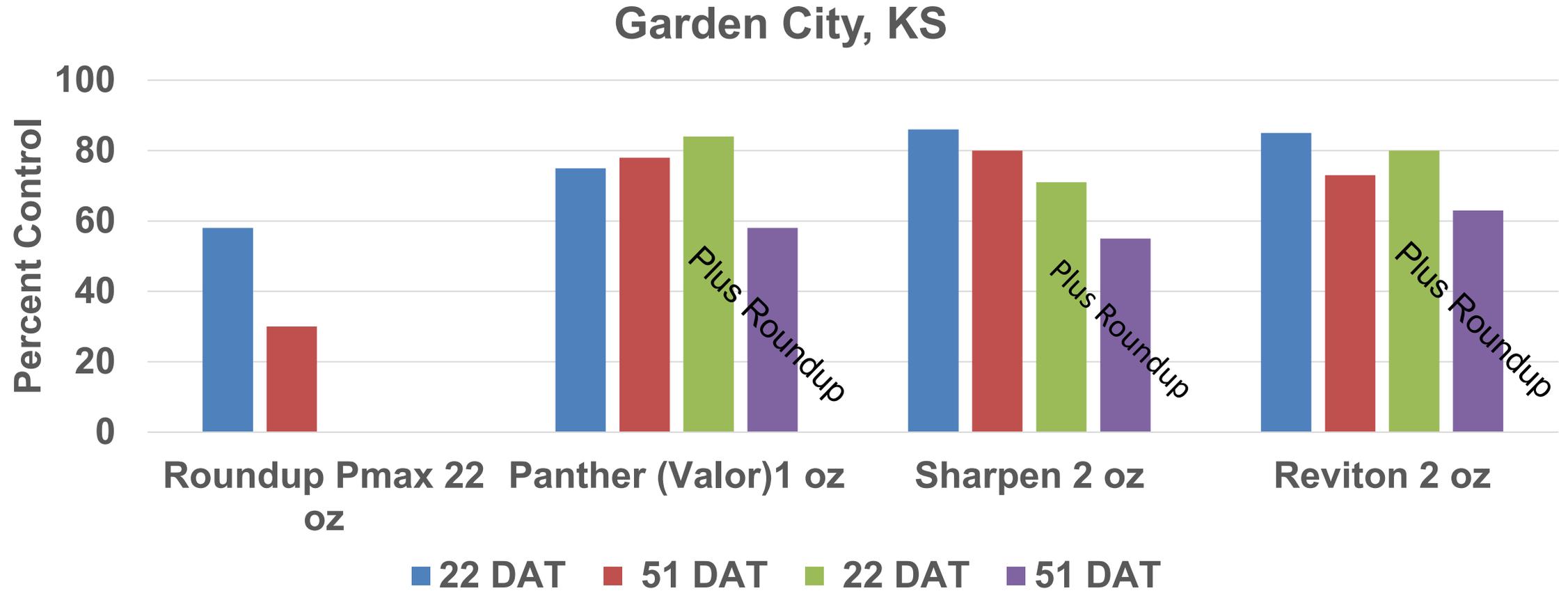
Weed Control in Sorghum



Winter and Early Spring Weed Control

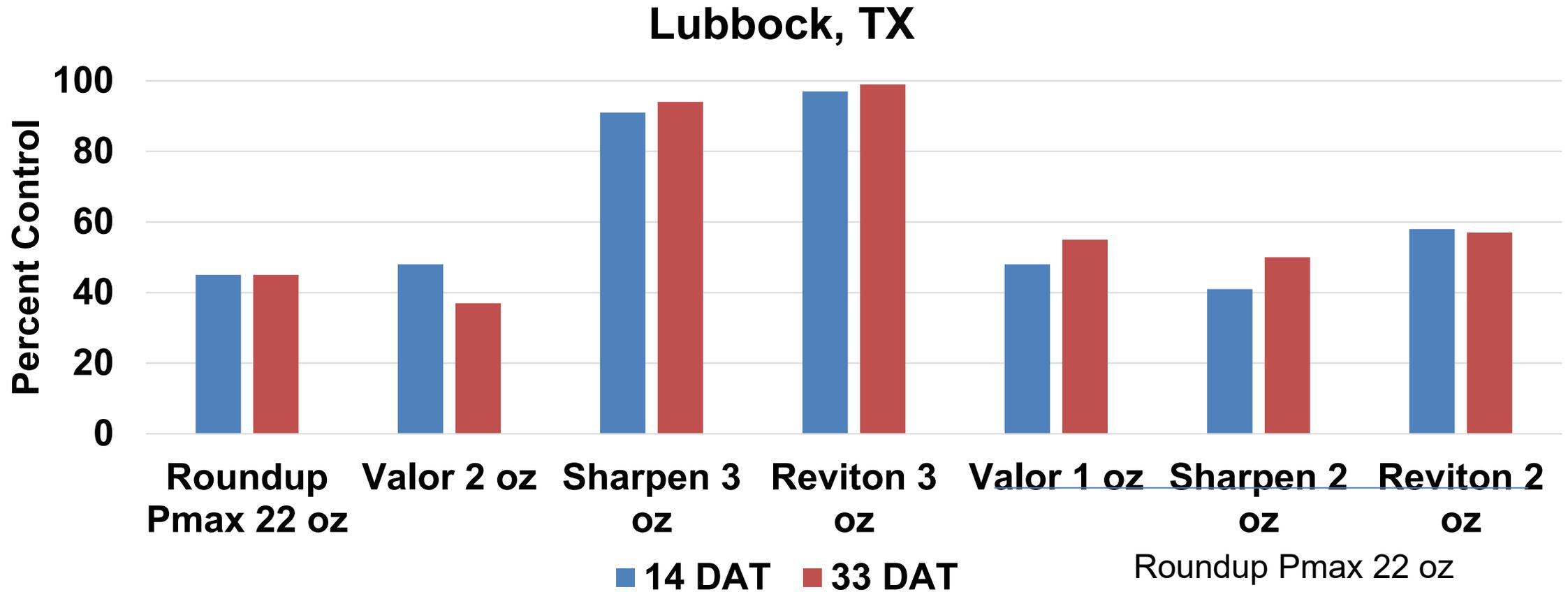
- Atrazine
 - Relatively inexpensive and should be the backbone of most weed control systems. Consider using in the winter and a follow up application at planting
- Dicamba
 - Surprising amount of soil activity under cool conditions and is very water soluble
 - If kochia has emerged add fluroxypyr
- Sharpen
 - Good tank mix partner with dicamba for emerged weeds, especially marestail
- Pixxaro (fluroxypyr + halauxifen)
 - Effective in the late winter or early spring on larger weeds – especially marestail
- Flumioxazin (flumi) (Valor)
 - Popular during the winter or spring. Effective burndown with soil residual
 - Within 21 days of planting reduce rate to 2 oz/A
- Glyphosate
 - Generally, needs to be added to tank mix if grassy weeds are present
- Others – Paraquat, Scoparia – 6 month rotation restriction

PrePlant Burndown Kochia Control W/O Roundup



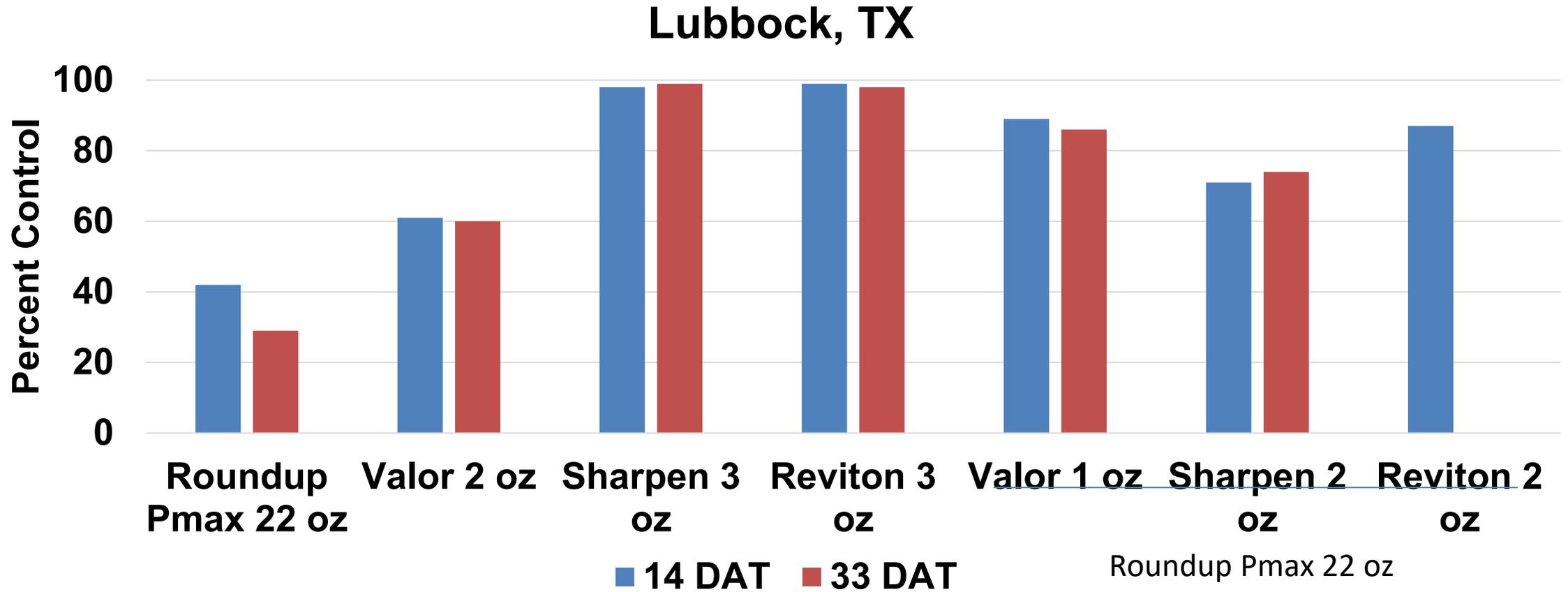
Application: May 29, 2023

PrePlant Burndown Kochia Control



Application: April 27, 2024, AVG 8 inch weeds

PrePlant Burndown Russian Thistle Control



Application: April 27, 2024, AVG 8 inch weeds

Preemergence Herbicides

Active Ingredients (7)

atrazine →

Group 15 herbicides

S-metolachlor →

acetochlor →

dimethenamid →

mesotrione →

saflufenacil →

Imazamox →

Products

Atrazine

Dual, generics

Warrant

Outlook

Callisto, generics

Sharpen

ImiFlex

Premixes

Bicep, generics

atz+metolachlor

Degree Xtra, Fultime NXT

atz+acetochlor

Lumax, Lexar

atz+metol+mesotrione

Verdict

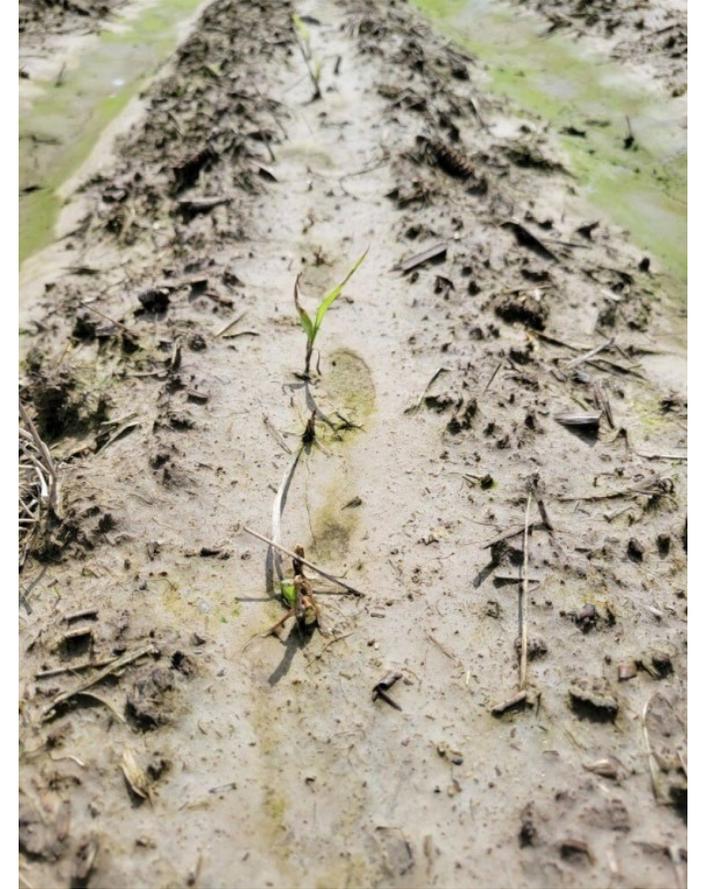
Saflufenacil+dimethenamid

Mesotrione Crop Injury

12 DAT



24 DAT



Mesotrione

Rotation Interval

- Corn and sorghum anytime
- Wheat 4.5 months
- Cotton, peanuts, soybeans the following spring

Soil Type Restrictions

Do not apply to sand, sandy loam or loamy sand soils

Application Timing

- 0 to 21 days prior to planting
- Reduced injury if applied more than 7 days preplant
- Split application – preplant and pre

Rate

Max – 0.19 lb ai or 6 oz Callisto
Most formulations – 0.16 lb ai or 5 oz Callisto equivalent

Bushland TX, TAMU PRE Trial 2019

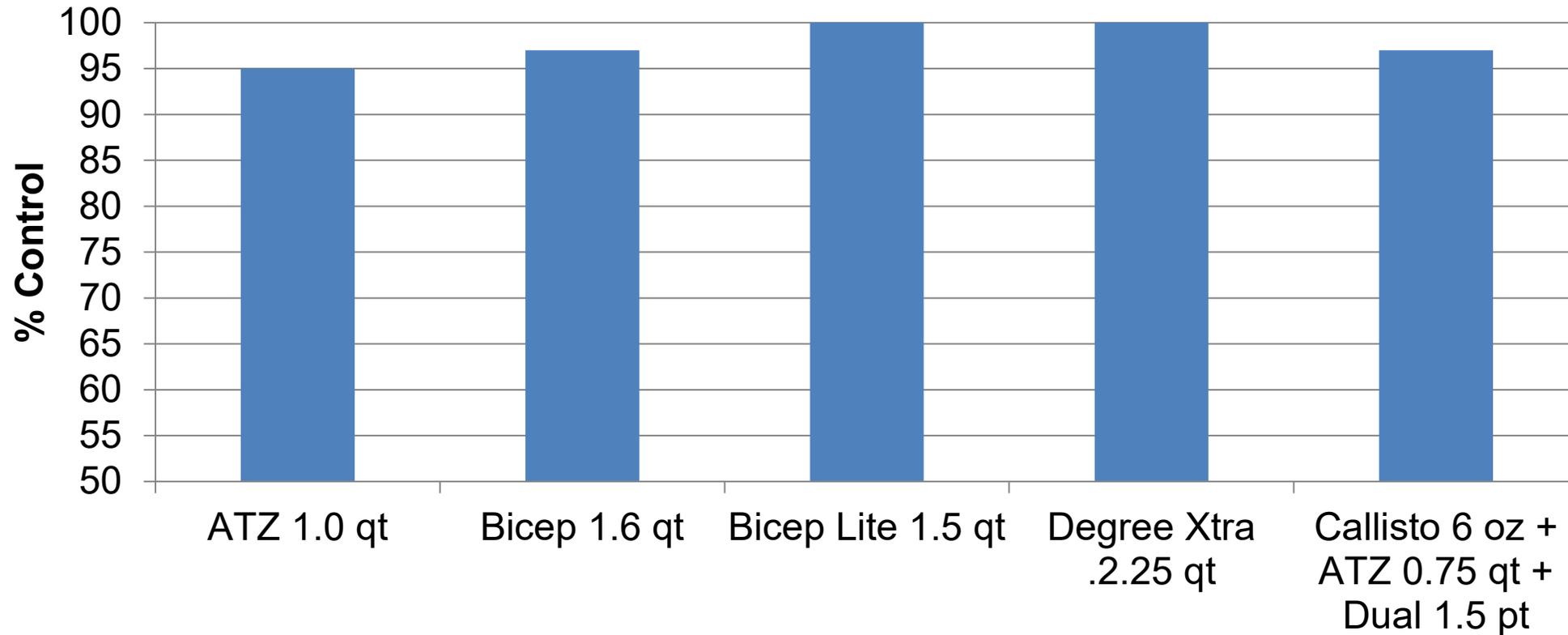


Source: TAMU,
Bell

Atrazine Containing Treatments – Amarillo

Pigweed Control

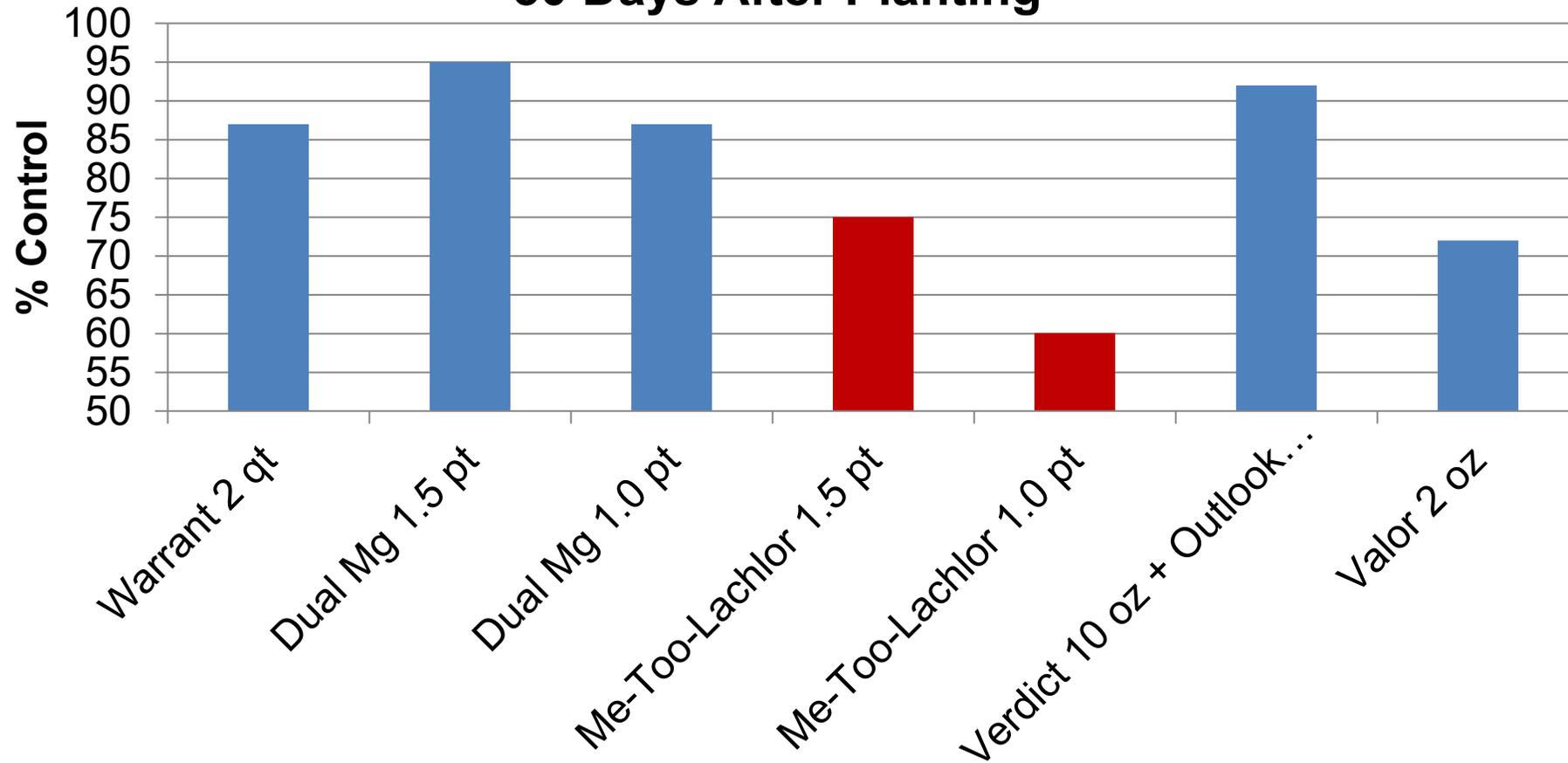
50 Days After Planting



Non ATZ Containing Treatments, Amarillo

Pigweed Control

50 Days After Planting



S-metolachlor vs metolachlor, Amarillo, TX



Dual : S-metolachlor 1.5 pt



Generic metolachlor 1.5 pt

Postemergence Herbicides

Active Ingredients (8)

atrazine →

2,4-D →

dicamba →

Fluroxypyr →

bromoxynil →

prosulfuron →

Metsulfuron+2,4-D →

pyrasulfotole +

bromoxynil + →

fluroxypyr

Product

Atrazine

2,4-D, many

Clarity, Banvel, Others

Starane, StareDown

Moxy, Others

Peak

Ally + 2,4-D

Huskie FX



Much Less Used

carfentrazone – Aim, halosulfuron – Permit, Yukon

AMS Approved

3 Herbicide Technologies

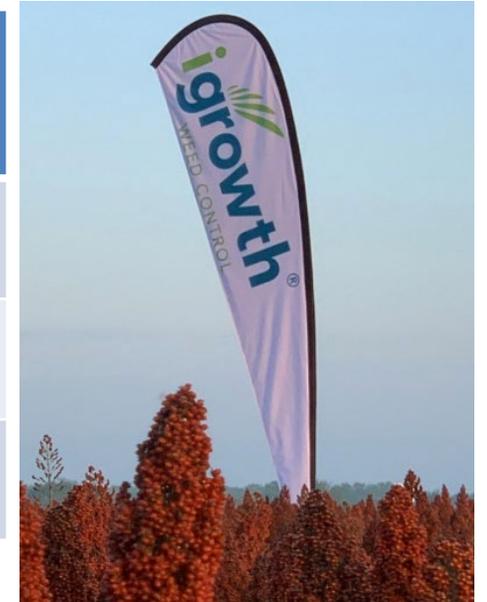
- **Inzen**
(ALS – SU)
- **igrowth (ALS**
(ALS - IMI)
- **Double Team**
(ACCase - Fop)

All non-GMO



igrowth[®] - 2025

	Hybrid	Maturity	Days to Bloom	Grain color	SCA Tol	Notes
Alta	G1120IG	ME	61	Red	MT	No longer produced. Use on dryland and when planting late.
Alta	G2168IG	M	65	Red	HT	Best choice for dryland with proven record
Alta	G2193IG	M	65	Red	HT	Higher yield potential for better ground and limited irrigation



Seed cost ranges from \$272 to \$287 per bag
(600,000 seed)

Double Team™ 2025

AMS Approved

	Hybrid	Maturity	Days to Bloom	Grain Color	SCA Tol	Notes
S&W	SP 30A30 DT	E	55-59	Bronze	S	Good on high pH soils, dryland, small seeds
S&W	SP 45A45 DT	ME	57-61	Bronze	S	Good yield potential, poor head exertion if dry. Susceptible to growth regulators.
S&W	SP 58M85 DT	ME	62-66	Bronze	MT	Large seed, high staygreen
S&W	SP 65B21 DT	M	65-67	Bronze	HT	New. Longer maturity with good yield potential.

\$329 to \$349 Cost per bag (600,000 seed)
Seed size varies greatly, depending on the hybrid.



Inzen™ - 2025

\$326 per bag (600,000 seeds)

Should have decent supply of P 85Z65

	Hybrid	Maturity	Days to Bloom	Grain Color	SCA Tol.	Notes
Pioneer P 85Z65		ML	70	Red	MT	SCA rating of 7



iGrowth and Double Team 2023 Yields

Hybrid	Walsh, CO IRR	Walsh, CO DRY	Rocky FD, CO DRY	Sheridan Lake, CO DRY	Seibert, CO DRY	Wiggins, CO IRR	Akron, CO DRY
ADV G2168IG		37	78	110		102	
ADV G2193IG		40	78	98		127	
SP 30A30DT	93	48		113	54	110	80
SP 45A45DT	97	45		122	56	131	99
SP 58M85 DT						98	
SP 65B21 DT						99	
Test AVG	101	42	93	110	56	121	94

Yellow = Top 50% of trial
 Light Blue = Top 25% of trial

iGrowth and Double Team 2024 Yields

Hybrid	Walsh, CO IRR	Walsh, CO DRY	Sheridan Lake, CO DRY	Akron, CO DRY
ADV G2168IG				
ADV G2193IG				
SP 30A30DT	105	42	46	125
SP 45A45DT	117	45	39	139
SP 58M85 DT	114	51	41	131
SP 65B21 DT	105			
Test AVG	116	47	41	137

Yellow = Top 50% of trial

Light Blue = Top 25% of trial

HT Estimated Seed and Herbicide Cost 2025 over Conventional System*

	igrowth	Double Team	Inzen
Seeding Rate/acre	Cost/acre	Cost/acre	Cost/acre
30,000	\$19.00	\$19.00	\$16.00
50,000	\$23.00	\$24.50	\$22.00
70,000	\$27.00	\$30.00	\$27.00
90,000	\$31.00	\$35.00	\$33.00

*Assuming 10% discount over MSRP for seed and herbicide. Subtracted the cost of conventional seed (\$170/bag 700,000 seed). Does not include application cost or adjuvants. 6 oz ImiFlex, 10 oz FirstAct and 0.68 oz Zest rate.

igrowth[®] - 2025

ImiFlex

- has both grass and broadleaf activity
- Imiflex is an ALS herbicide but in the IMI subclass
- Longer residual than the other two technologies
- PRE rate 9 oz/A, Post rate 6 oz/A



Double Team™ - 2025

FirstAct™

- Quizalofop is a proven over-the-top grass herbicide
- Most common use rate – 10 oz
- **Apply to > 11 inch sorghum for crop safety**
- **Do not apply mixed with other herbicides**



Grass resistance to ACCase is relatively low compared to ALS herbicides

FirstAct Injury



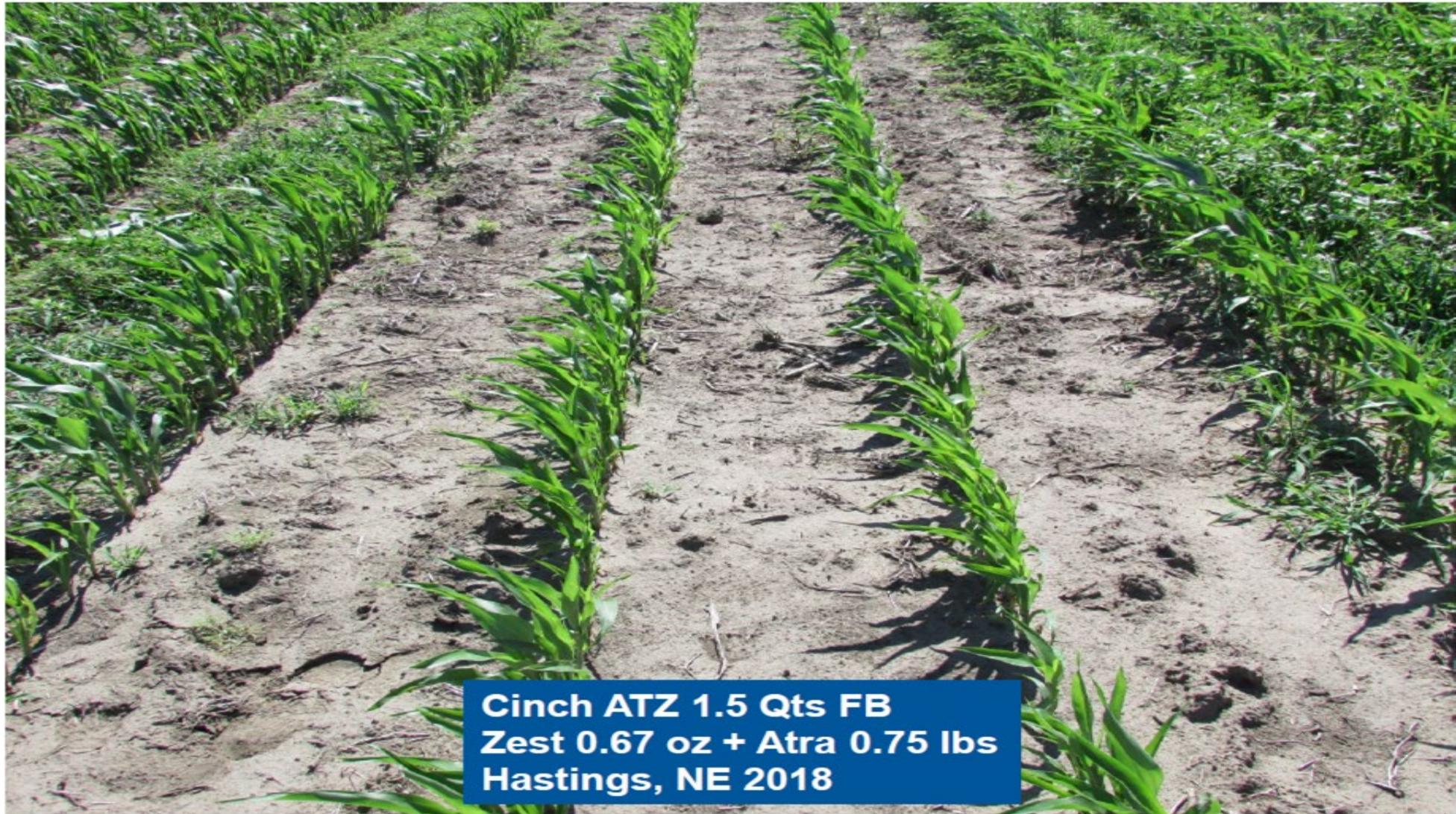


Untreated – Hastings, NE 2018
Crabgrass, Giant Fox, Waterhemp, Puncturevine

Source: Corteva – Jeff Krumm

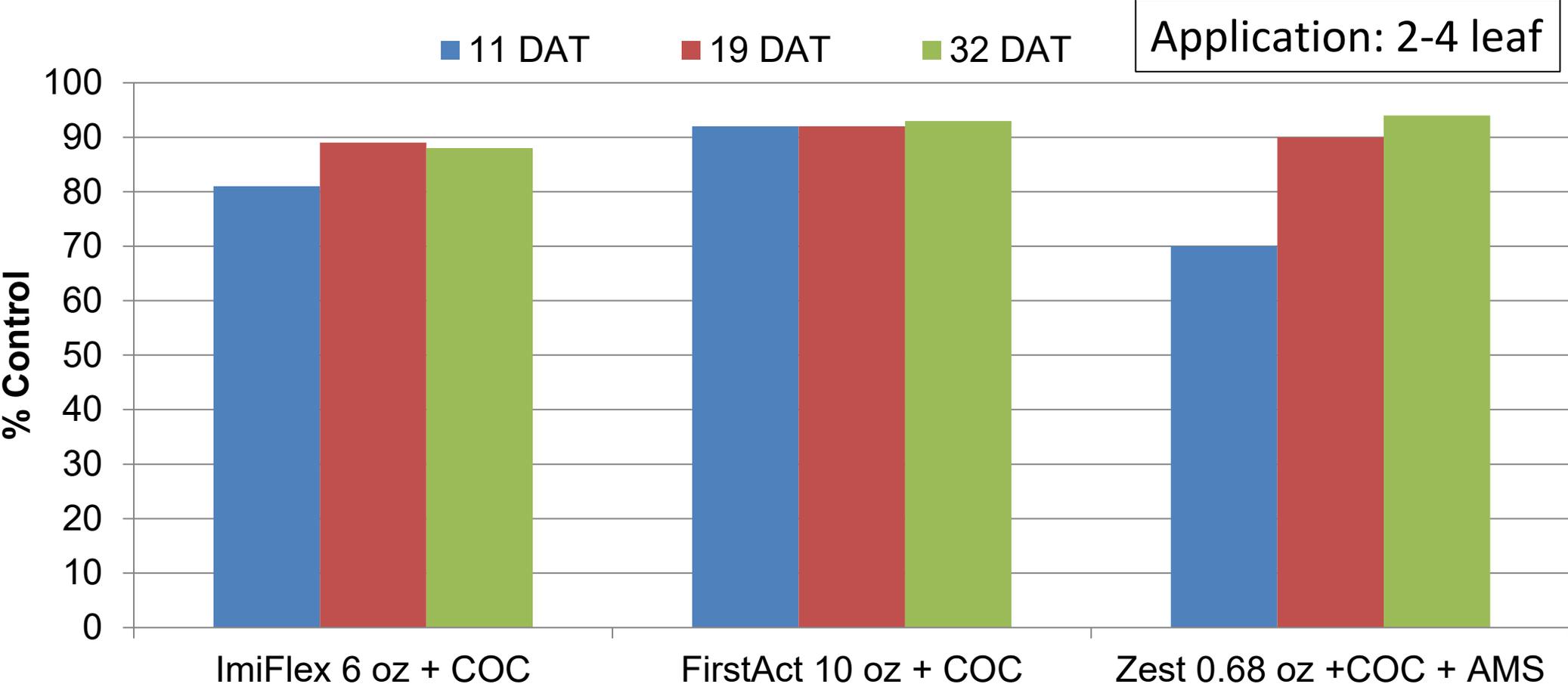


Source: Corteva – Jeff Krumm

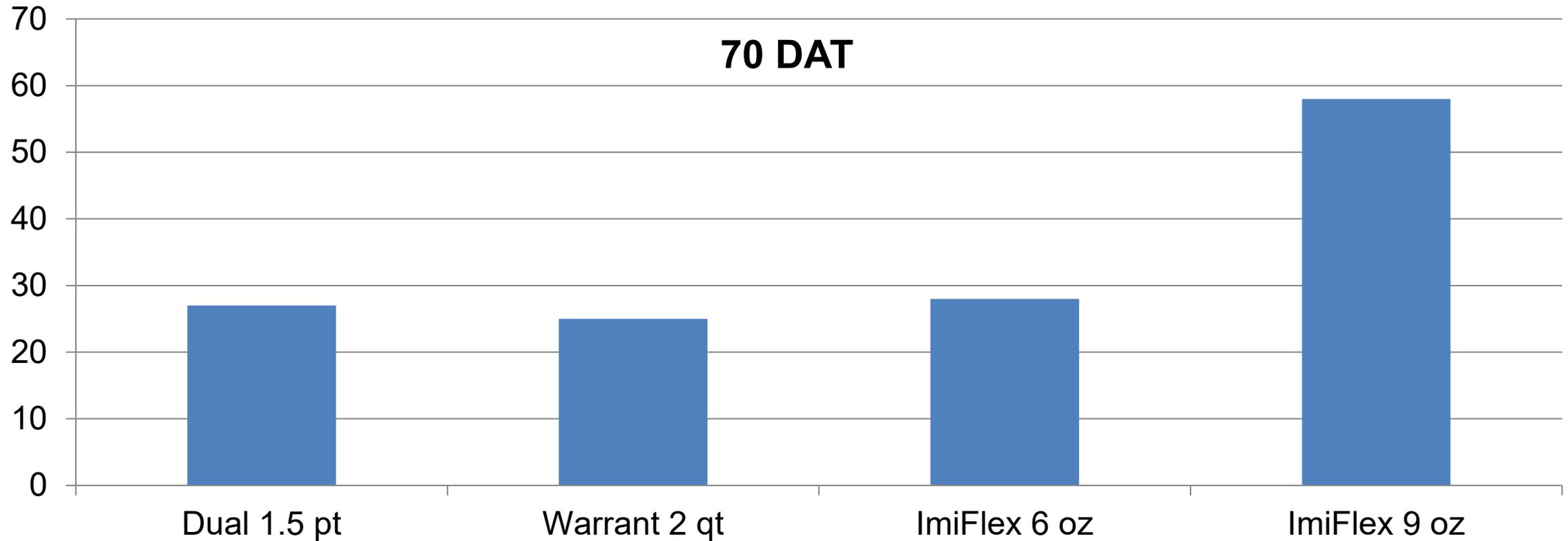


Source: Corteva – Jeff Krumm

Sandbur POST Control near Akron, Colorado 2021



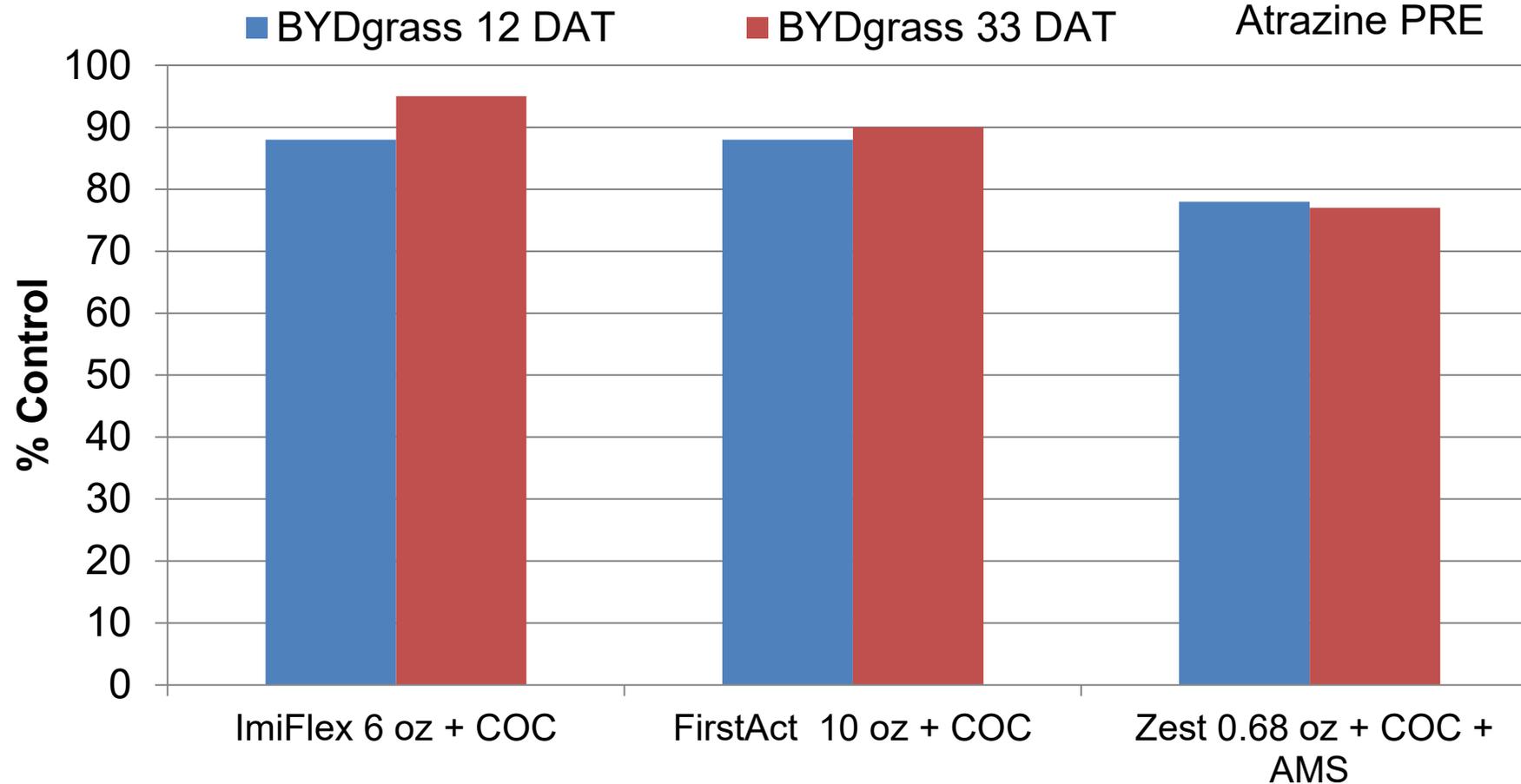
Sandbur PRE Control near Akron, Colorado 2021



ImiFlex, FirstAct and Zest Comparison – POST Control of Junglerice (Barnyardgrass) - 2021

Fort Collins, CO

Application size: 4 inches

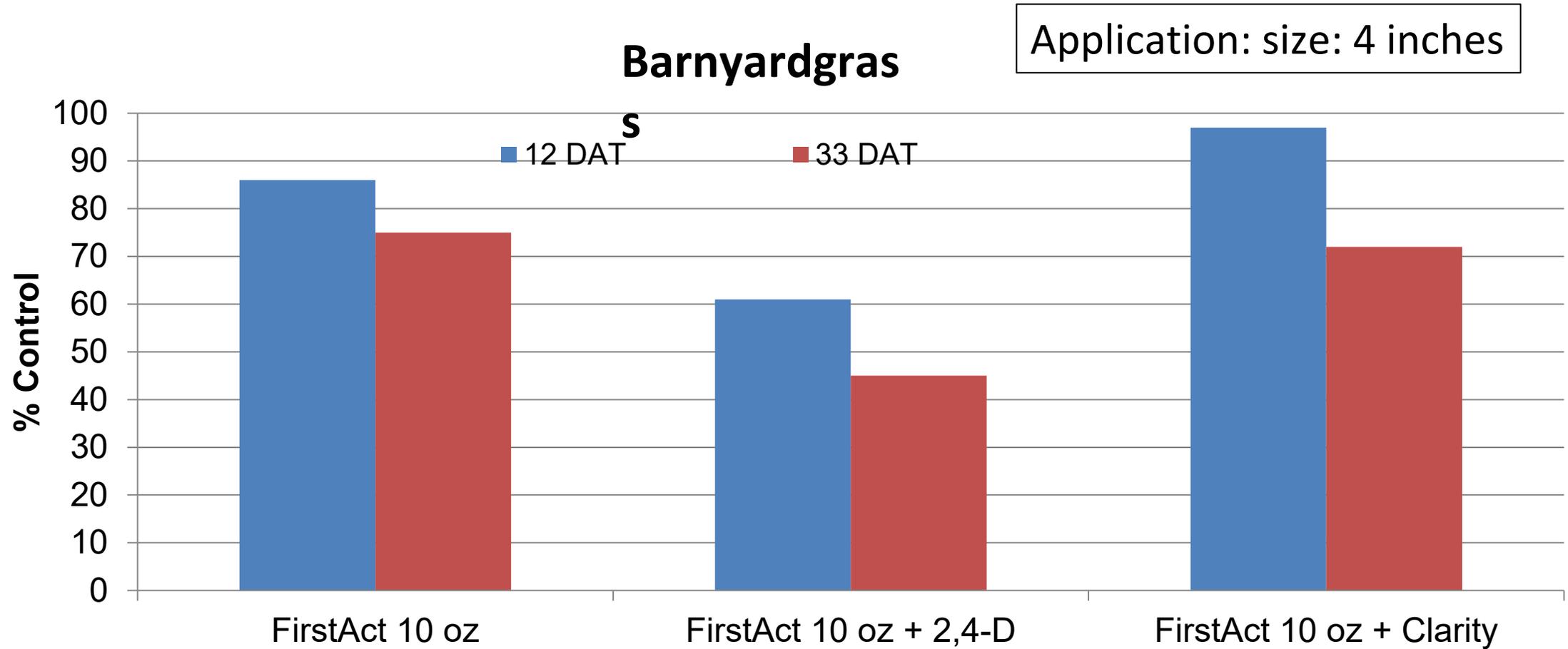


Source: CSU – Eric Westra

AMS Approved



Antagonism with 2,4-D and Clarity near Fort Collins, Colorado - 2021

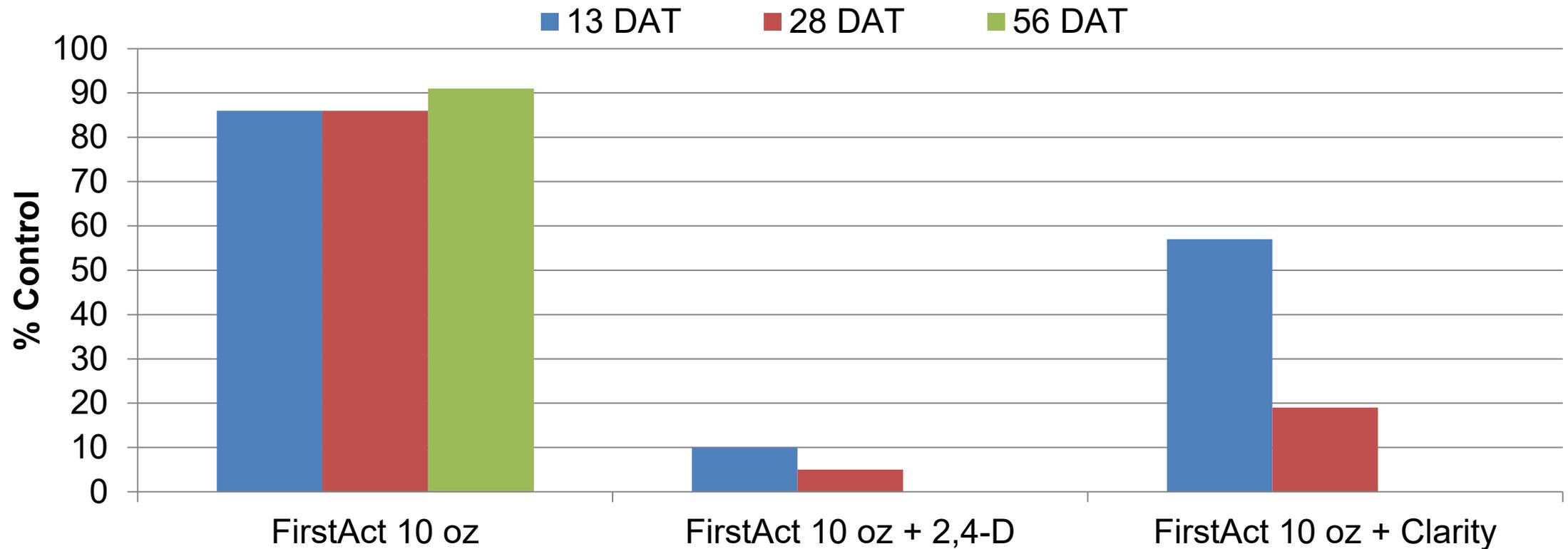


Source: CSU – Eric Westra

Antagonism with 2,4-D and Clarity near Clay Center, NE - 2021

Giant Foxtail

Application size: 4 inch



Source: Imit Jhala

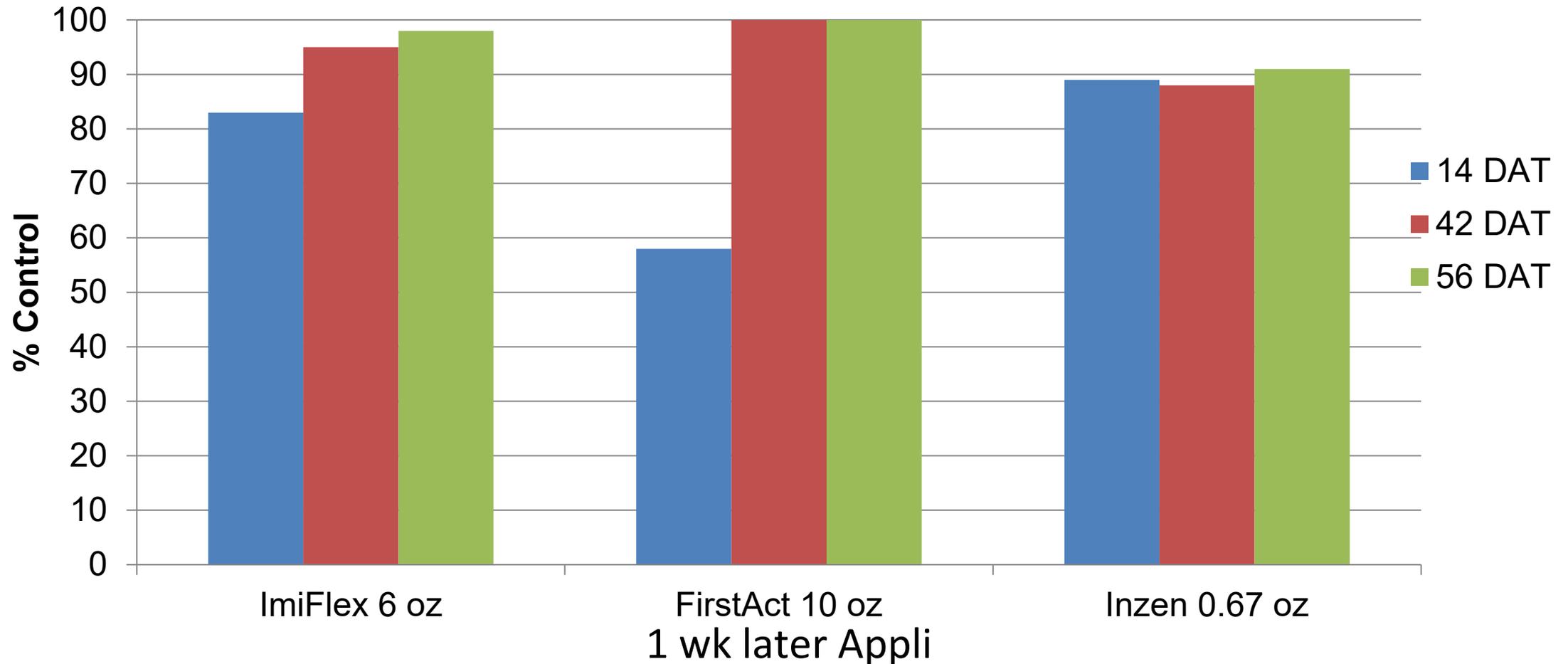
2,4-D and Dicamba Antagonism

- **2,4-D (21 Trials)**
 - 52% of the time decreased grass control was noticeable (10 to 15% decrease)
 - 19% of the time decreased grass control was dramatic
- **Dicamba (25 Trials)**
 - 24% of the time decreased grass control was noticeable (10 to 15% decrease)
 - 8% of the time decreased grass control was dramatic

Data from various locations in 2021 and 2022

Control of Volunteer Sorghum - 2022

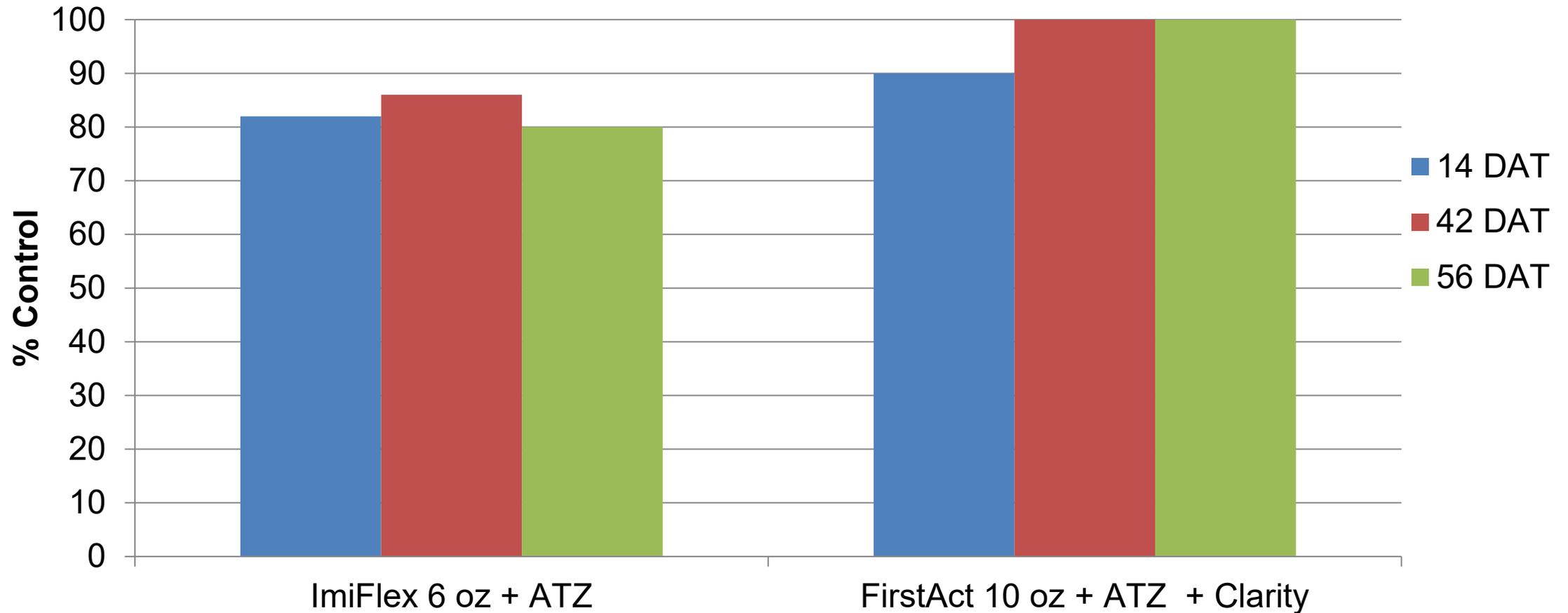
Garden City, KS



Source: Currie and Gier, KSU

ImiFlex and FirstAct Control of Volunteer Corn - 2022

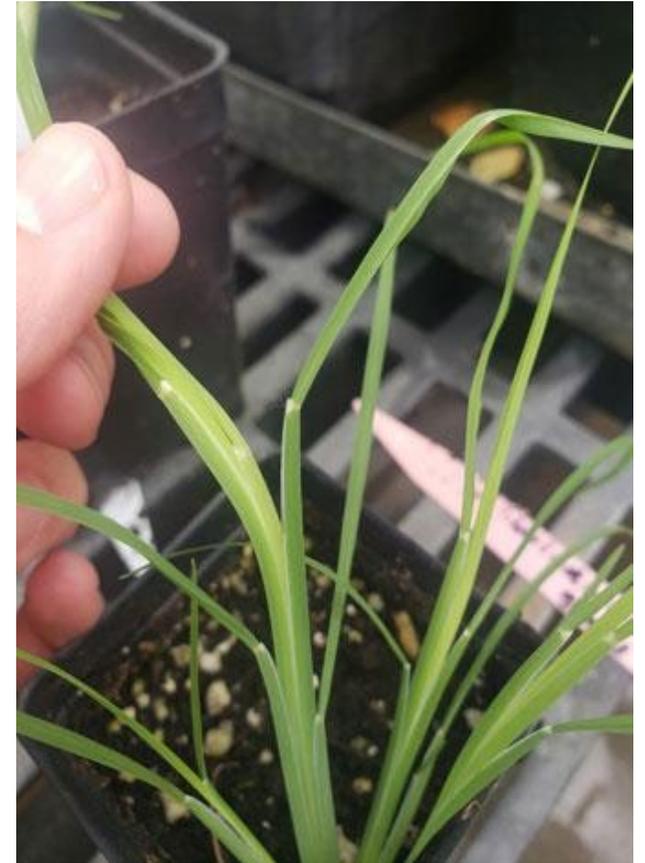
Garden City, KS



Source: Currie and Gier, KSU

Grass Control Expectations

- Good control of most annual grasses – barnyardgrass, crabgrass, sandbur, others
- Fair to good control of Texas panicum
- Likely poor control of tumble windmillgrass



Rotational Restrictions

Product	Corn (Field)	Soybeans	Wheat (winter)	Cotton	Sorghum
Zest	Anytime	15 days	4 months	10 months	10-18 months*
IMIFLEX	8.5 months	Anytime	3 months**	9 months	18 months
FirstAct	4 months	Anytime	4 months	Anytime	4 months***

* Cannot plant sorghum with ALS resistant traits for 18 months

**If < 10 inches of rain/irrigation during the growing season plant back to wheat is 15 months

***Cannot plant Double Team Sorghum in consecutive years





STEWARDSHIP GUIDELINES

Prevent the Development of
Grass Weed Resistance to
igrowth[®], Double Team[™] and
Inzen[™] Sorghum Technologies

SorghumCheckoff.com

THREE HERBICIDE TECHNOLOGIES 4

STEWARDSHIP GUIDELINES FOR
HERBICIDE TOLERANT SORGHUM 7

GENERAL STEWARDSHIP GUIDELINES 14

CROP ROTATION CONSIDERATIONS 15

OTHER INFORMATION 17

REFERENCES & DISCLAIMERS 18



4201 N. Interstate 27
Lubbock, TX 79403
Phone: (806) 687-8727

SorghumCheckoff.com

Questions

Brent Bean
Ph: 806 674 0006
brentb@sorghumcheckoff.com

