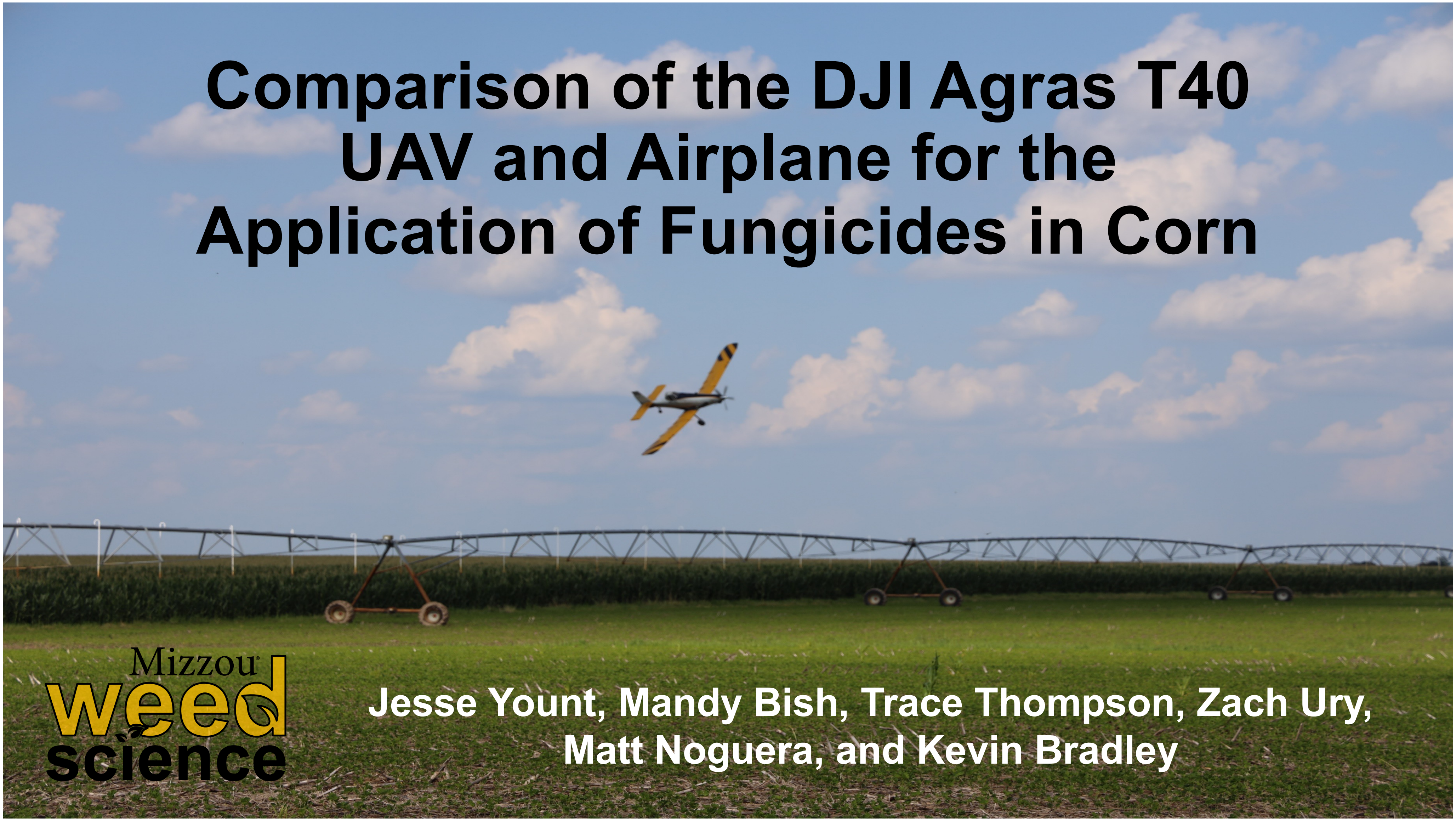
Weed Management Update for 2026 and Beyond

Kevin Bradley, University of Missouri

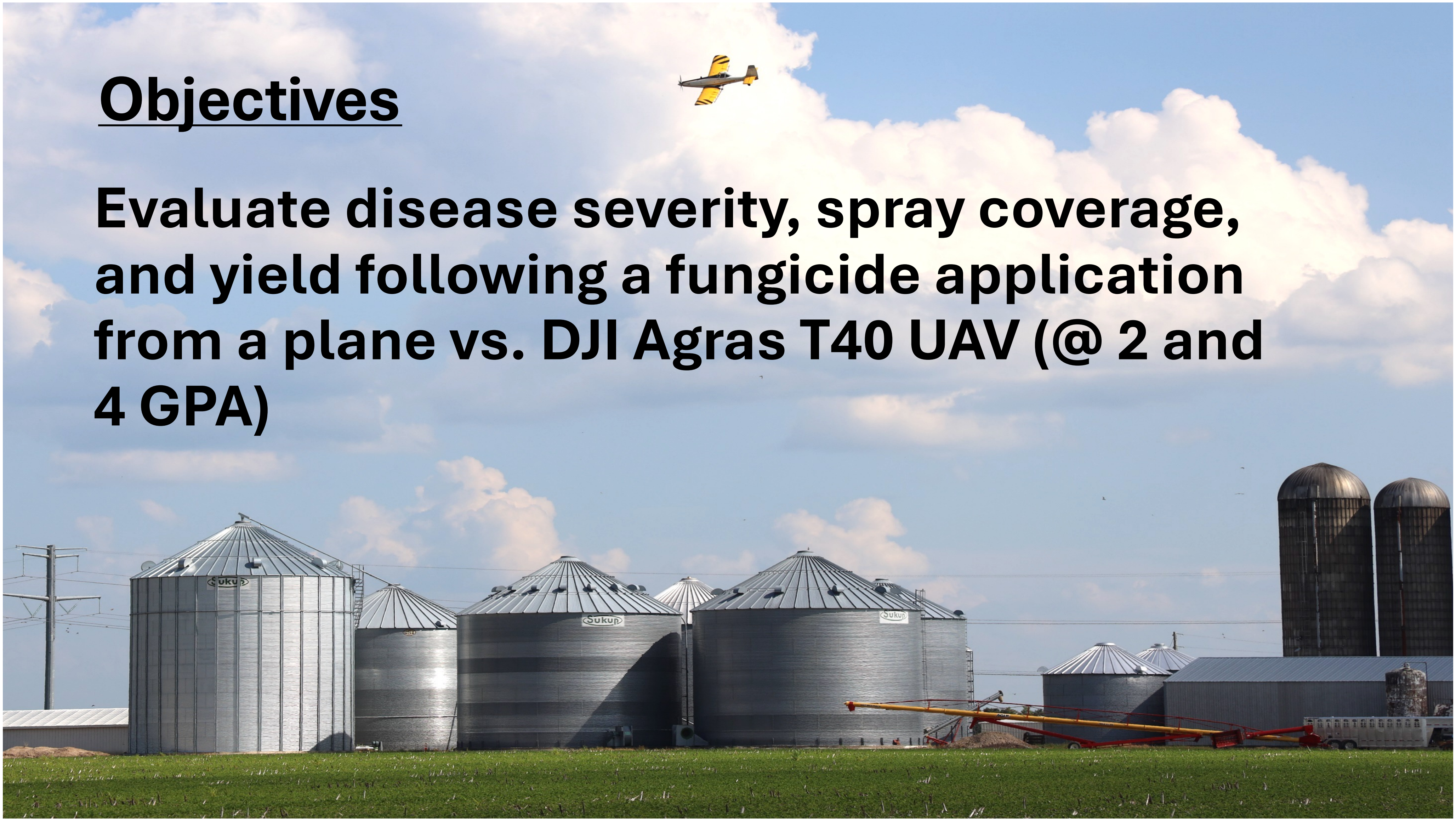
Comparison of the DJI Agras T40 UAV and Airplane for the Application of Fungicides in Corn



Jesse Yount, Mandy Bish, Trace Thompson, Zach Ury, Matt Noguera, and Kevin Bradley

Introduction

- Fungicide applications must be timely and provide uniform coverage
- Unmanned aerial vehicles (UAVs) may have the potential to provide a more timely option for fungicide application
- Few studies have been conducted comparing airplane and UAVs for application of fungicides in a large field setting



Objectives

Evaluate disease severity, spray coverage, and yield following a fungicide application from a plane vs. DJI Agras T40 UAV (@ 2 and 4 GPA)

Materials and Methods

<u>Three locations:</u>

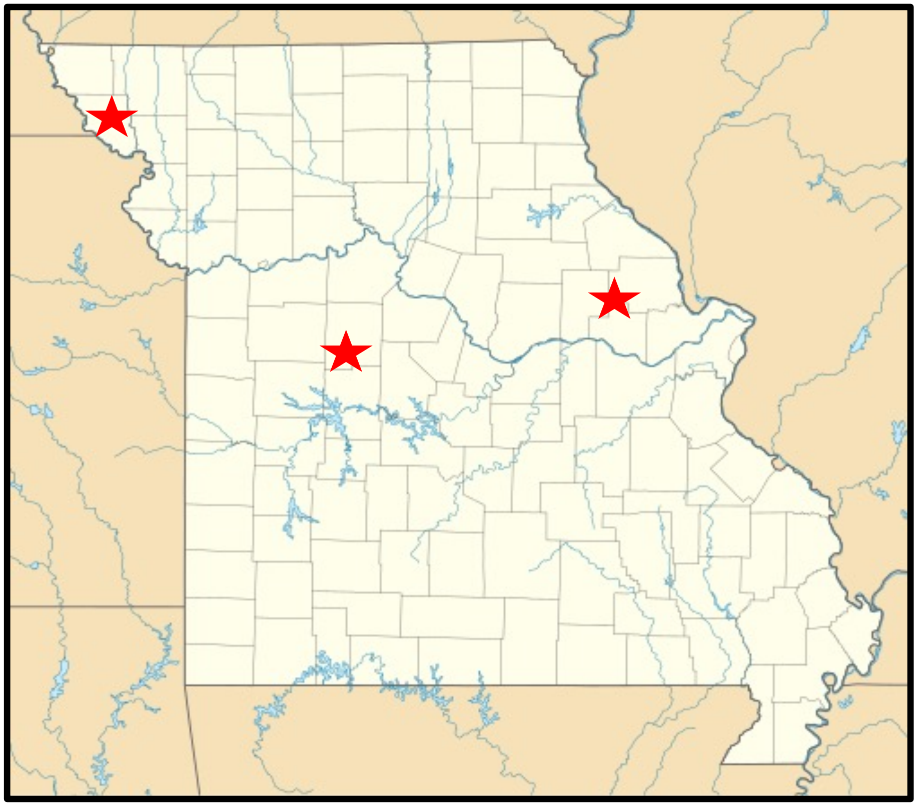
- **Green Ridge**
- **Mound City**
- **Truxton**

Two years of data at each location

Individual plots:

- **60' or 90' wide**
- **1,320 – 2,640 ft long**

4 replications of each treatment at each location

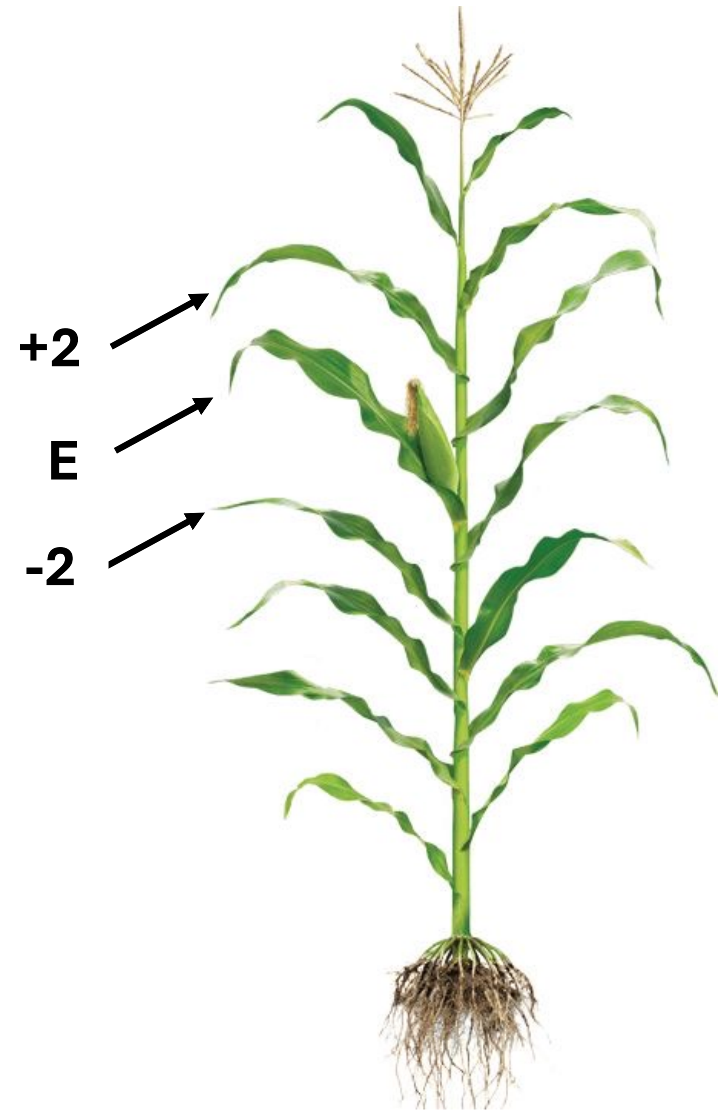


Materials and Methods

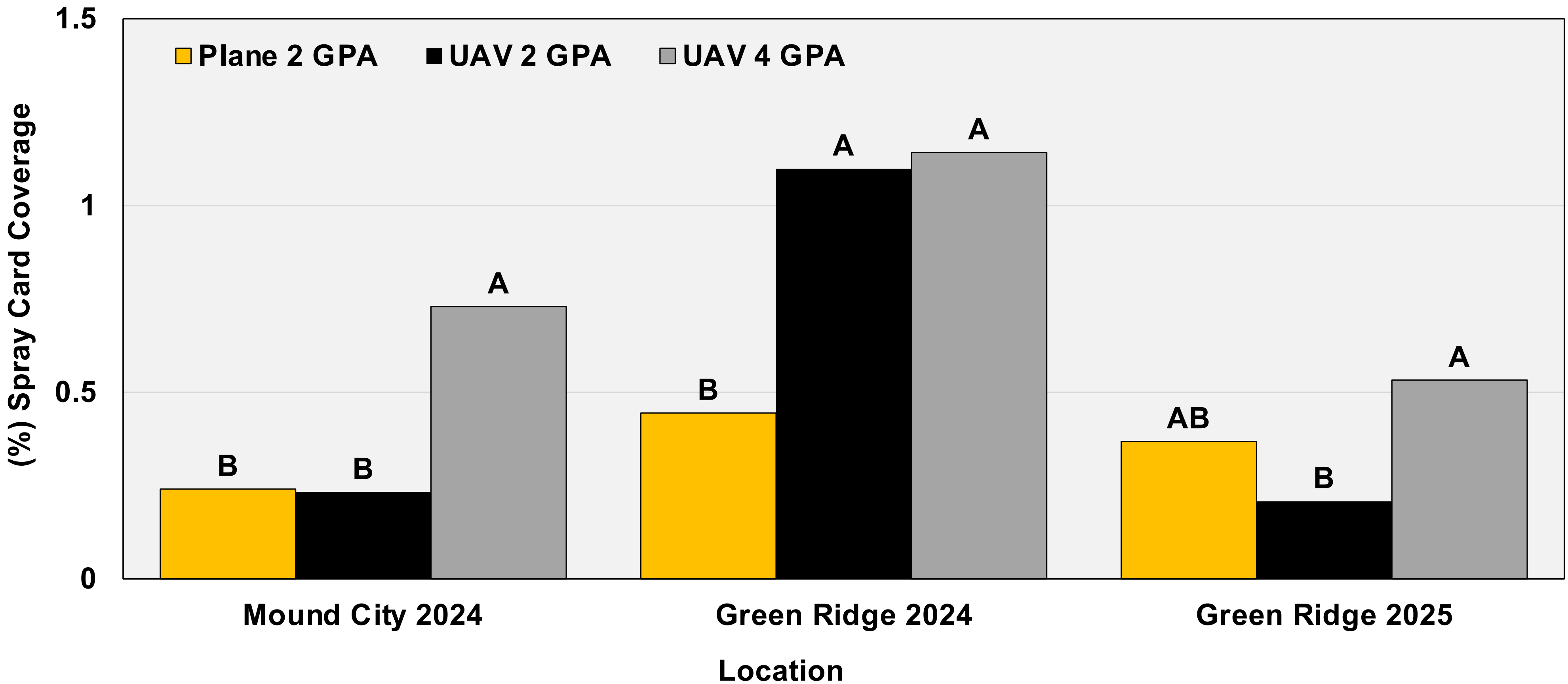
- Cooperator selected products, rate, and timing
- The same fungicide treatment and additives were sprayed by the UAV (DJI Agras T40) and airplane at each location
- Treatments were sprayed by the UAV at 2 and 4 GPA
- Plane sprayed at 2 GPA; model varied by location

Materials and Methods

- Water sensitive cards placed on top and bottom of ear leaf (E), two leaves above the ear leaf (+2), and two leaves below the ear leaf (-2) at application
- Image J software used to determine percent coverage and droplet size
- Disease severity was evaluated at application, R3, and R6

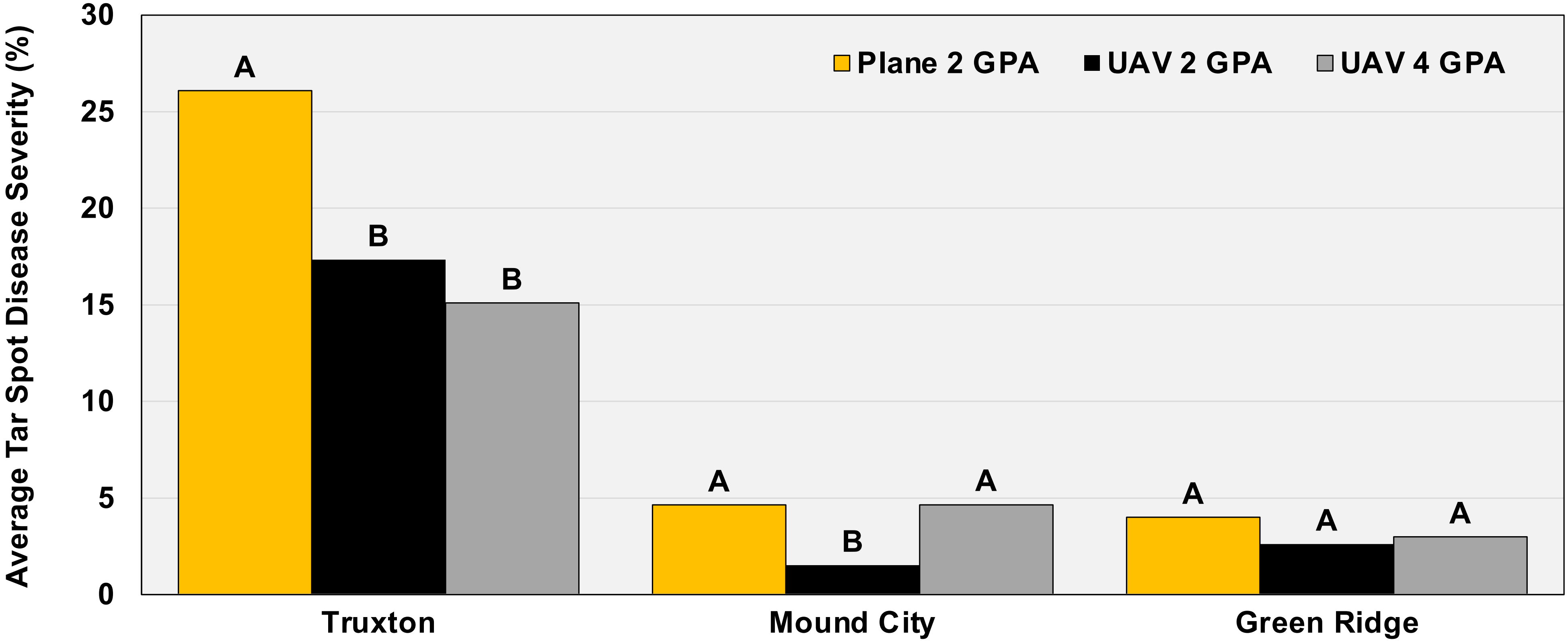


Average Fungicide Spray Coverage Across Top Cards



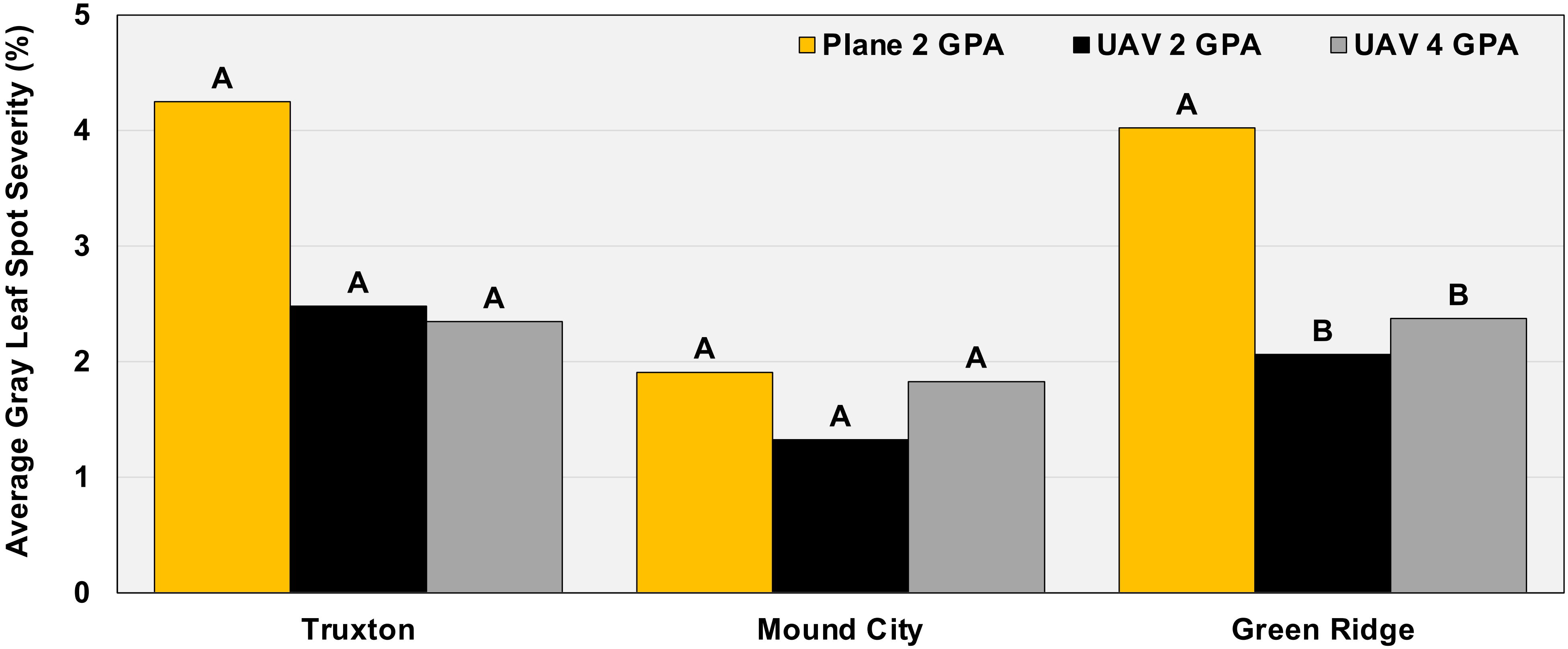
*Bars within a location followed by the same letters are not different, LSD=0.05.

2024 Average Tar Spot Disease Severity at R6



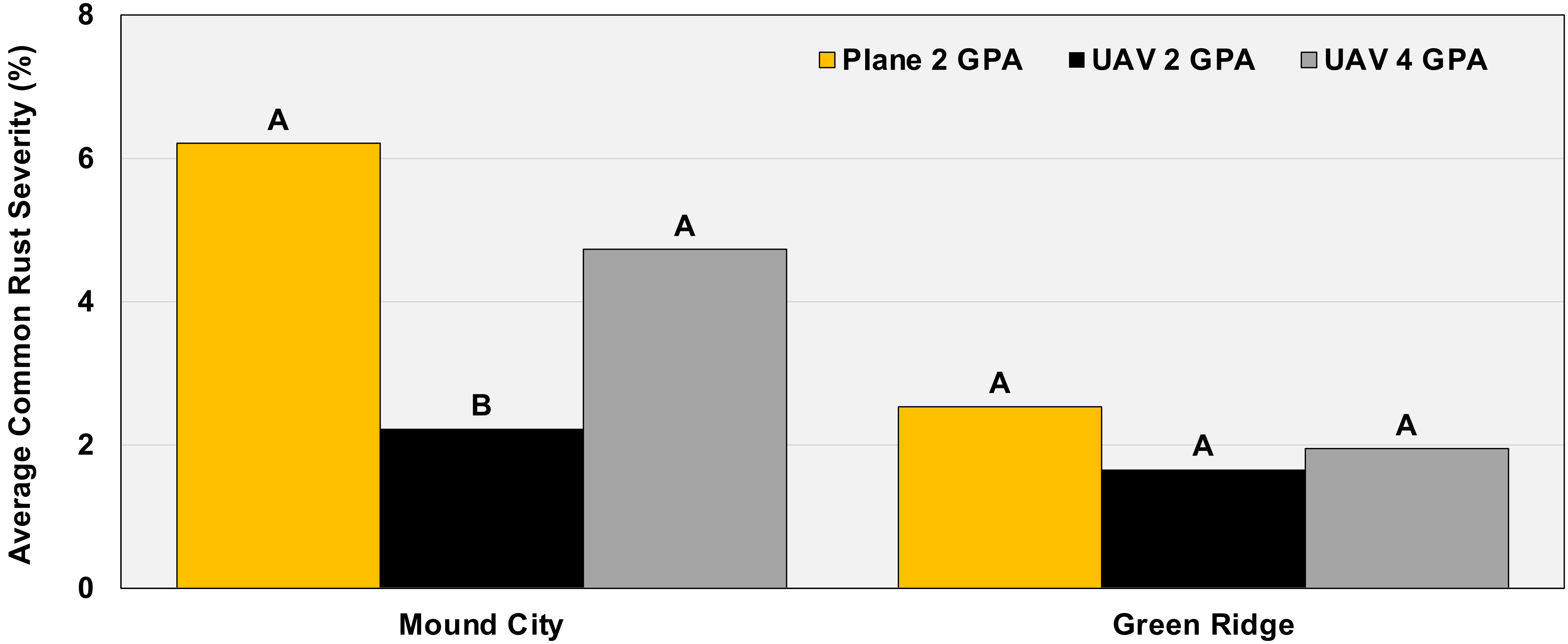
*Bars within a location followed by the same letters are not different, LSD=0.05.

2024 Average Gray Leaf Spot Disease Severity at R6



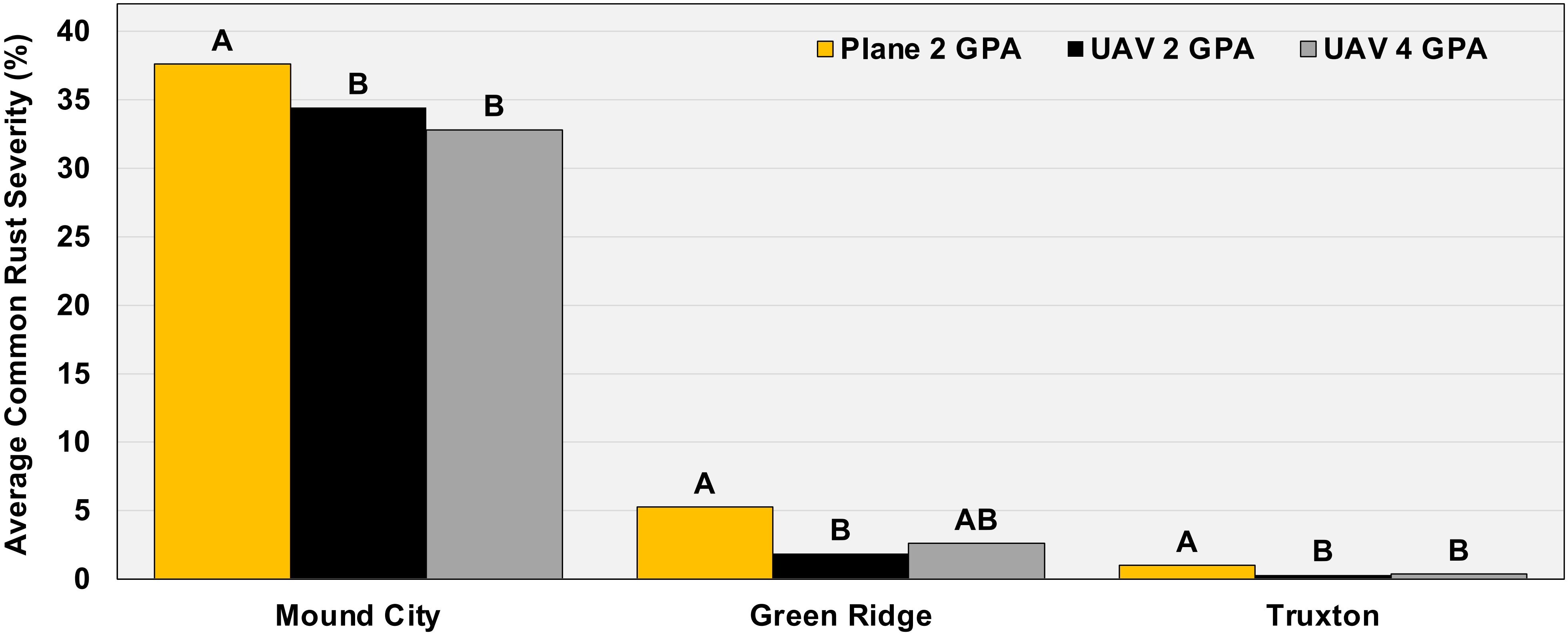
*Bars within a location followed by the same letters are not different, LSD=0.05.

2024 Average Common Rust Disease Severity at R6



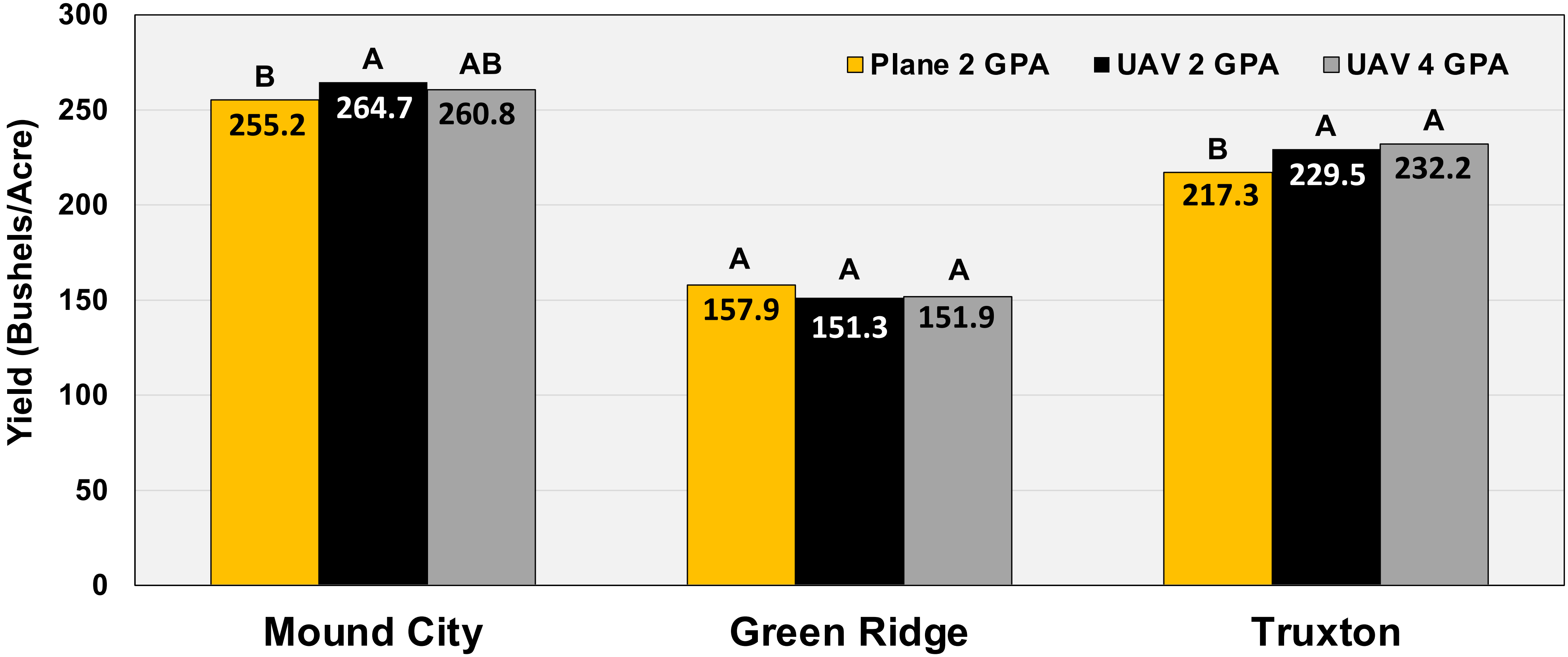
*Bars within a location followed by the same letters are not different, LSD=0.05.

2025 Average Southern Rust Disease Severity at R6



*Bars within a location followed by the same letters are not different, LSD=0.05.

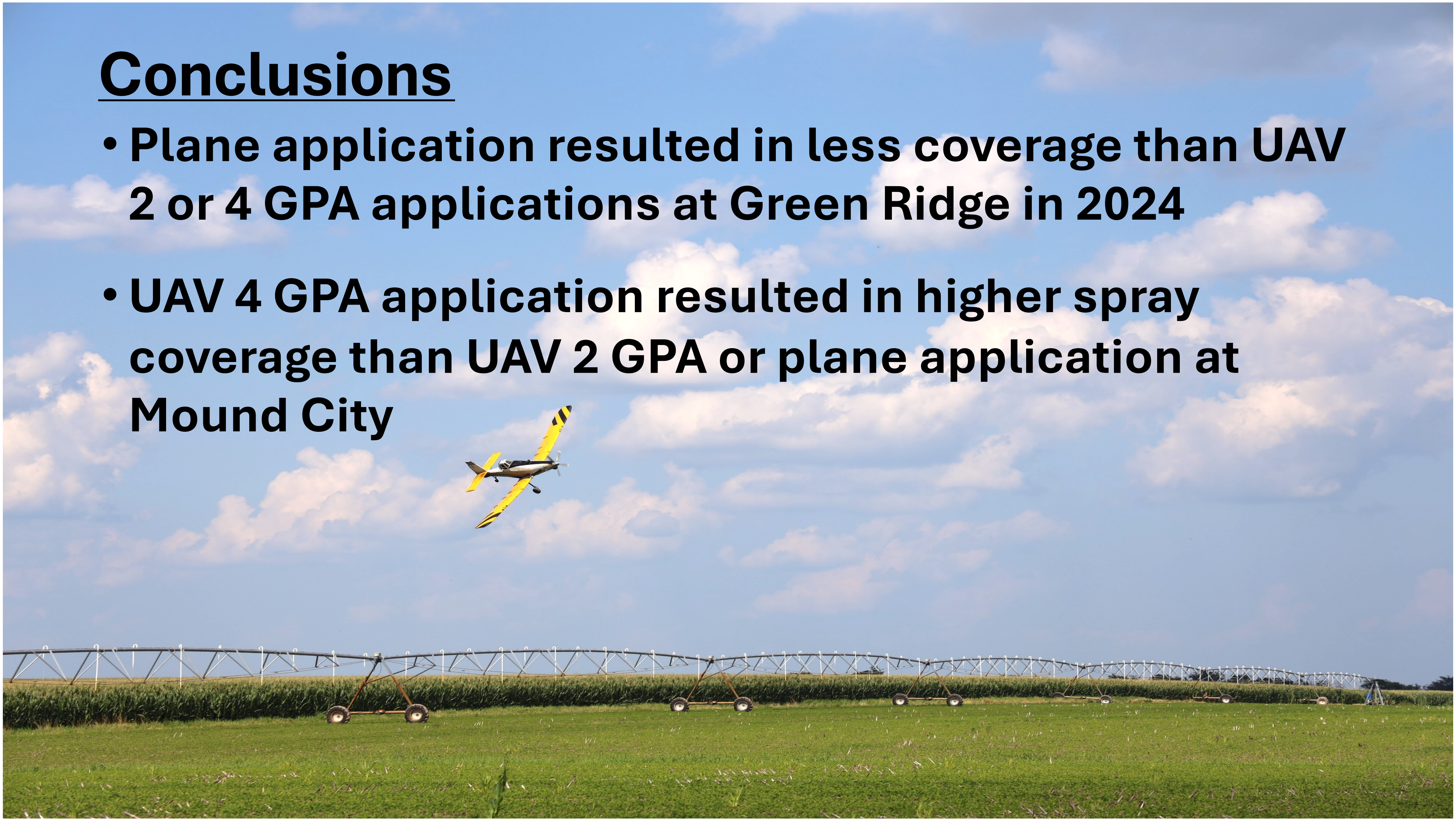
2024 Corn Yield Response to Treatments



*Bars within a location followed by the same letters are not different, LSD=0.1.

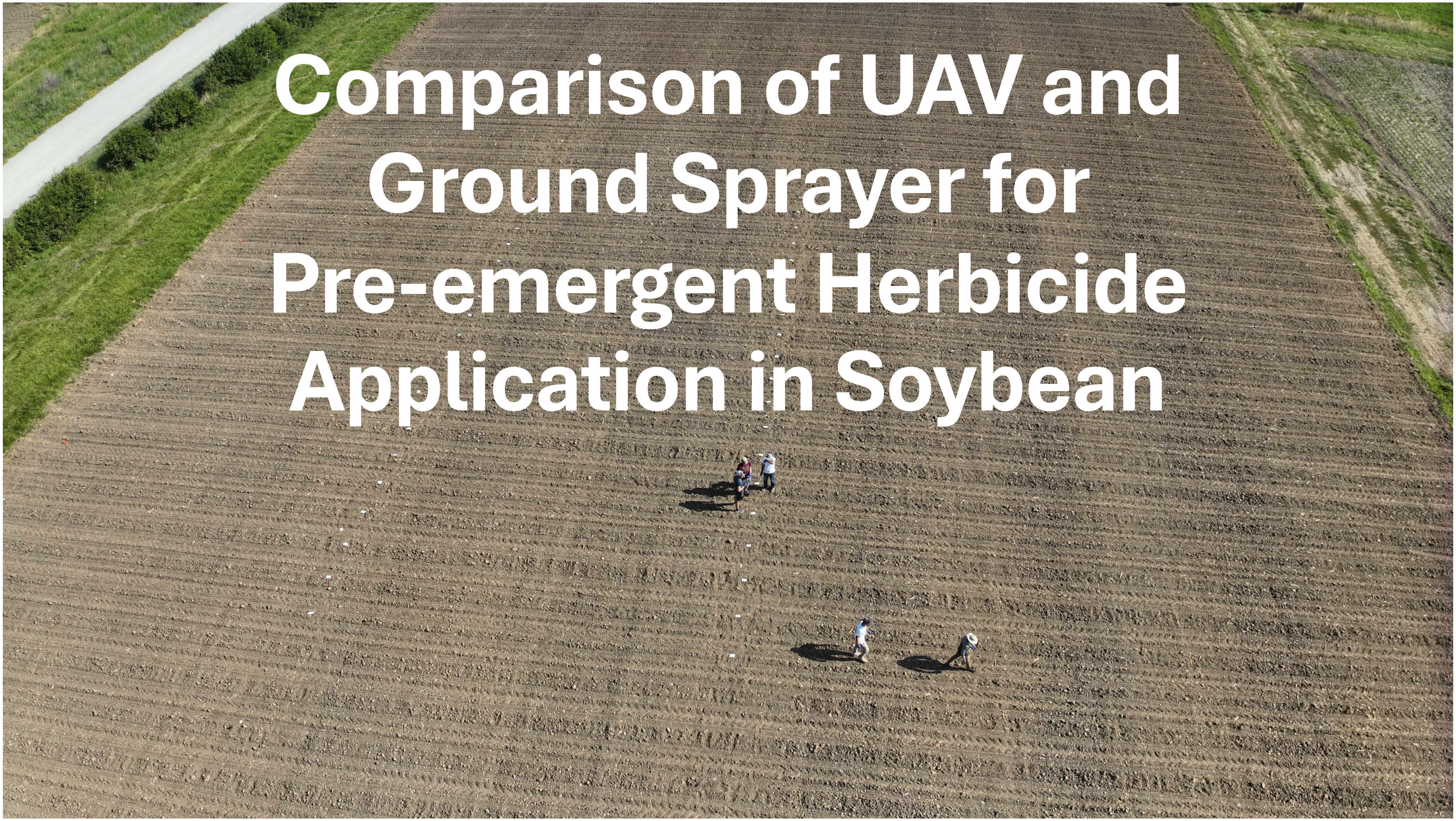
Conclusions

- Plane application resulted in less coverage than UAV 2 or 4 GPA applications at Green Ridge in 2024
- UAV 4 GPA application resulted in higher spray coverage than UAV 2 GPA or plane application at Mound City



Conclusions

- UAV applications resulted in similar or lower disease severity by R6 across all locations both years
- Fungicide application with UAV resulted in higher yields than with plane at Truxton and Mound City (2GPA) but not Green Ridge for 2024


Comparison of UAV and Ground Sprayer for Pre-emergent Herbicide Application in Soybean

Comparison of UAV and Ground Sprayer for Pre-emergent Herbicide Application in Soybean

- Pre-emergent (PRE) herbicide programs are key to effective weed control in soybean production systems
- Unmanned aerial vehicles (UAVs) may have the potential to provide a more timely option for pre-emergent herbicide application in certain adverse weather conditions
- Few studies have been conducted comparing ground sprayer and UAV with PRE herbicide applications


Objectives
• Compare spray coverage, off-target movement, and weed control following a PRE herbicide application made with an Agras T40 UAV and ground sprayer
• Evaluate the effects of application volume and height above canopy on spray coverage, off-target movement, and weed control with the Agras T40 UAV

Materials and Methods

Individual plots:

- 25’ wide x 200’ long
- 4 replications of each treatment
- Three site-years

PRE Herbicide Treatment:

- 6 fl ozs Zidua Pro / acre immediately after soybean planting

UAV Treatments:

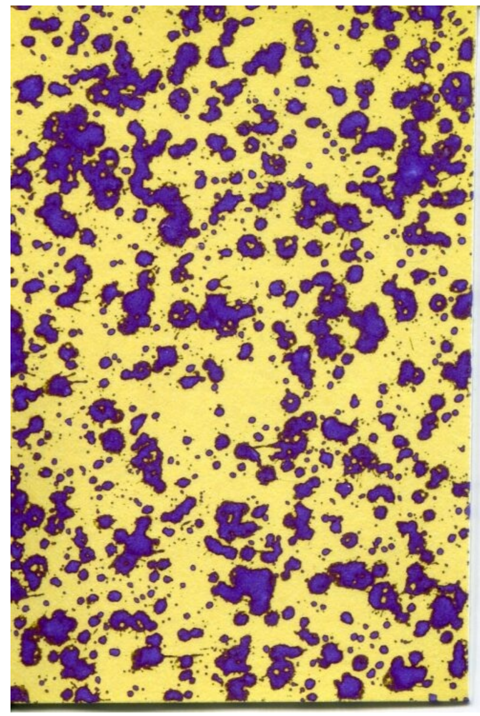
1. 2 GPA, 5’ height
2. 2 GPA, 10’ height
3. 5 GPA, 5’ height
4. 5 GPA, 10’ height

Ground Sprayer Treatments:

- Ground sprayer equipped with AIXR 11005 nozzles, calibrated to deliver 15 GPA at 8 mph and 27” boom height

Materials and Methods

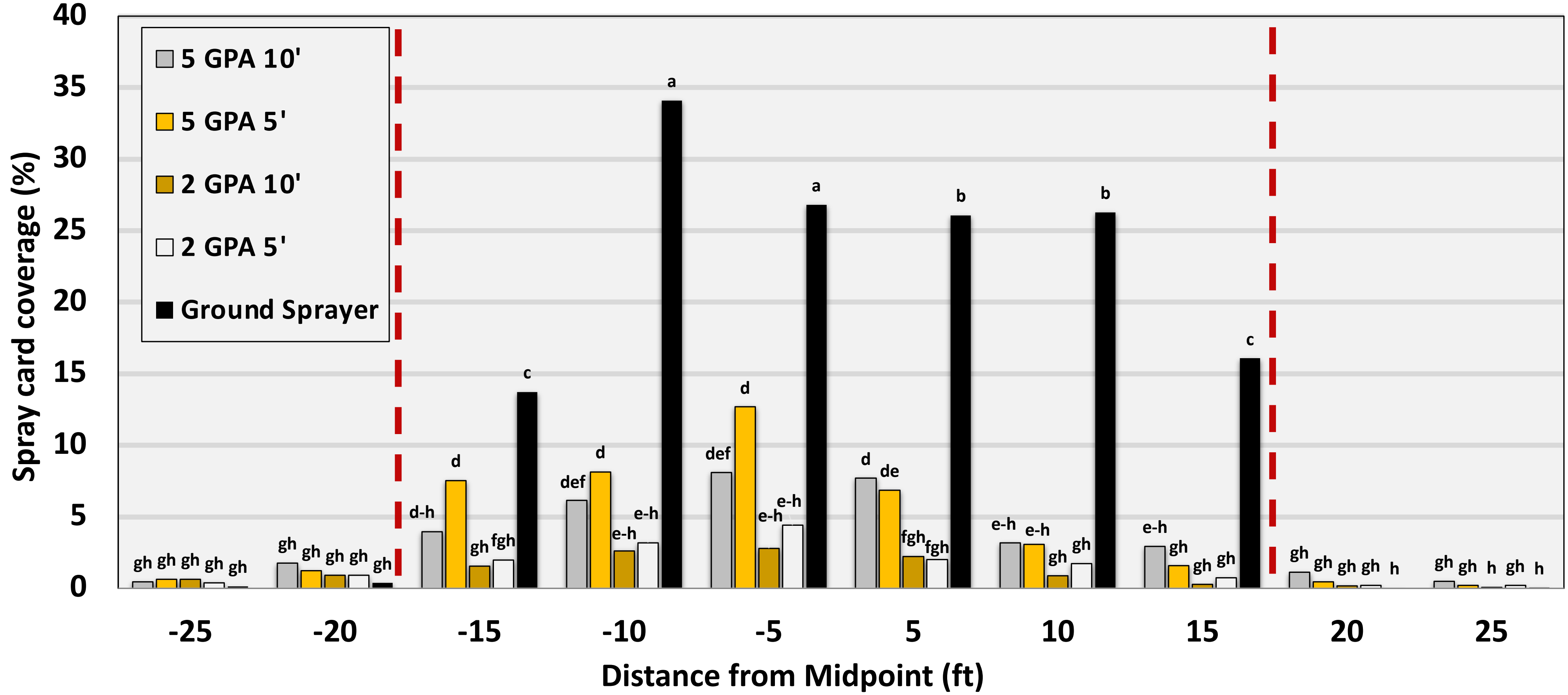
- **Water sensitive cards placed at 5 ft intervals on two lines perpendicular to the length of the plot**
- **Water sensitive cards analyzed using ImageJ software**



Ground Sprayer
15 GPA

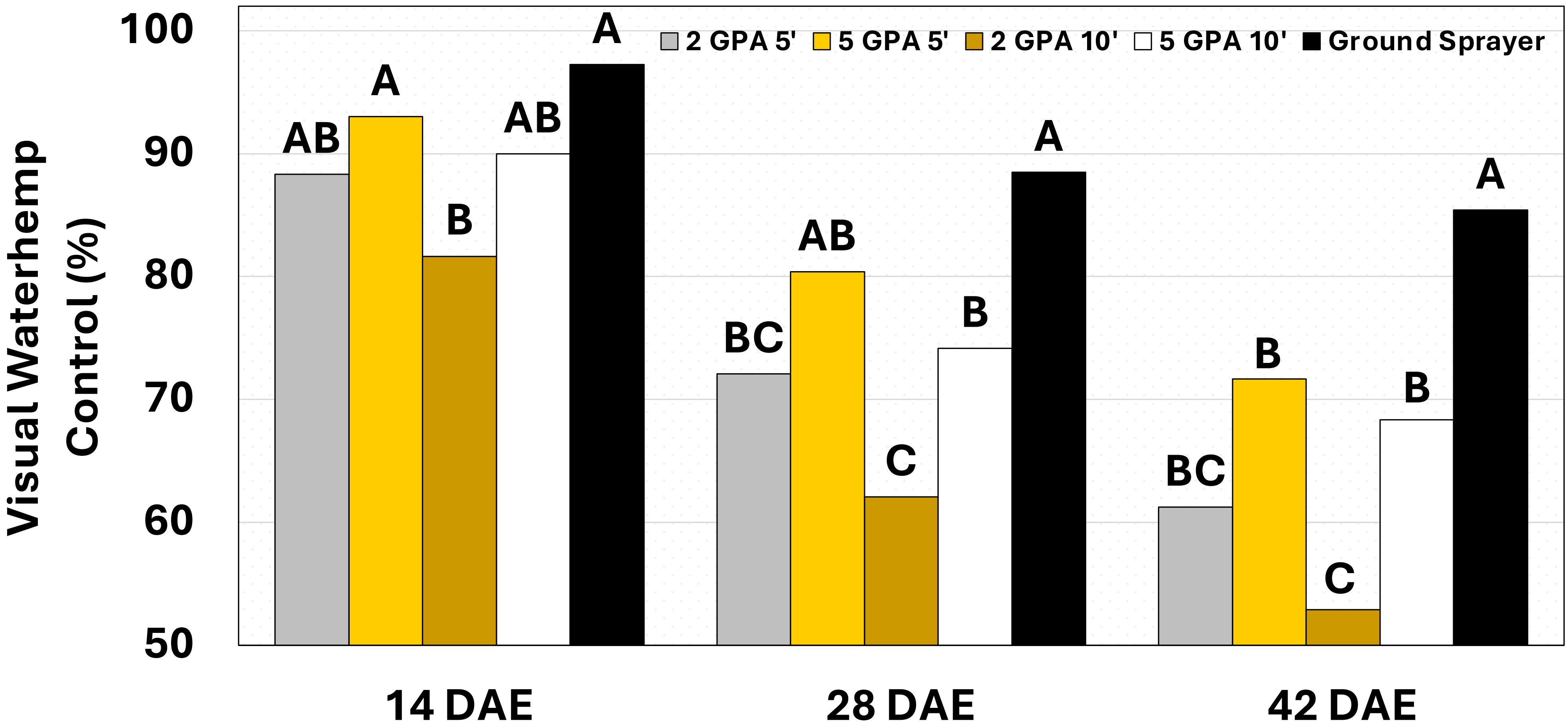
UAV
5 GPA

Spray Coverage by Treatment (Years combined)



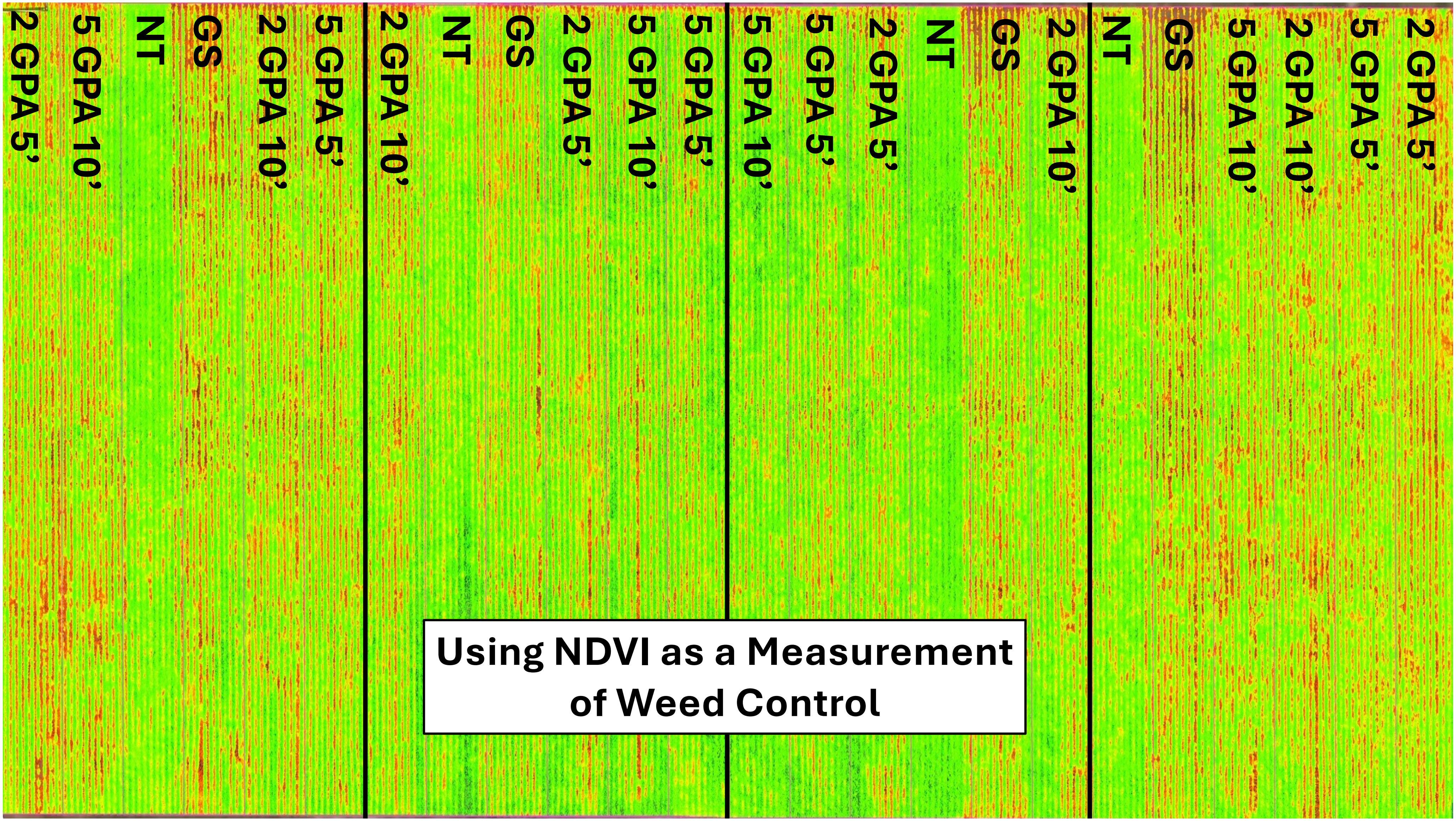
*Bars within location followed by the same lowercase letters are not different, LSD=0.05.

Visual Waterhemp Control (Years Combined)

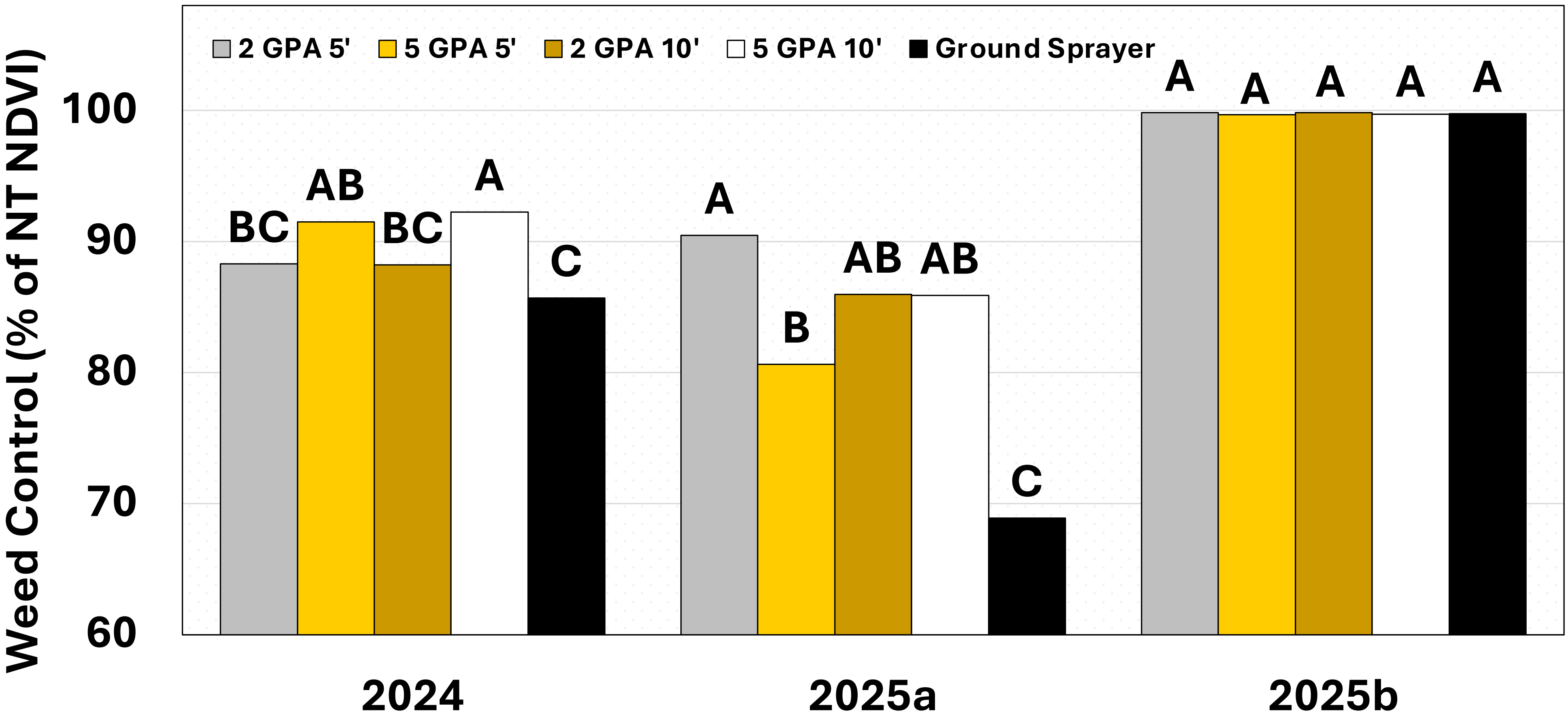


*Bars within timing followed by the same uppercase letters are not different, LSD=0.05.

Using NDVI as a Measurement of Weed Control



NDVI Weed Control by Site-Year



*Bars within site-year followed by the same uppercase letters are not different, LSD=0.05.

Conclusions

- Spray coverage was higher for the ground sprayer compared to any UAV treatment across all locations within the swath width
- There were no differences in off-target movement between the UAV and ground sprayer
- Based on visual weed control, the ground sprayer provided greater weed control up to 42 days after emergence compared to all UAV treatments
- Based on NDVI, greater weed control was achieved with the ground sprayer compared to all UAV treatments in the 2025a location and compared to certain UAV treatments in the 2024 location

Acknowledgements

- Rusty Lee
- Wayne Flanary
- Lyndon Brush
- Kurtz Aviation
- David Drewes
- Sam & Logan Dove
- Roy Cope

Mizzou weed science

Missouri Soybeans

Agri Spray Drones

BRUSH AGRONOMY CONSULTING, INC.

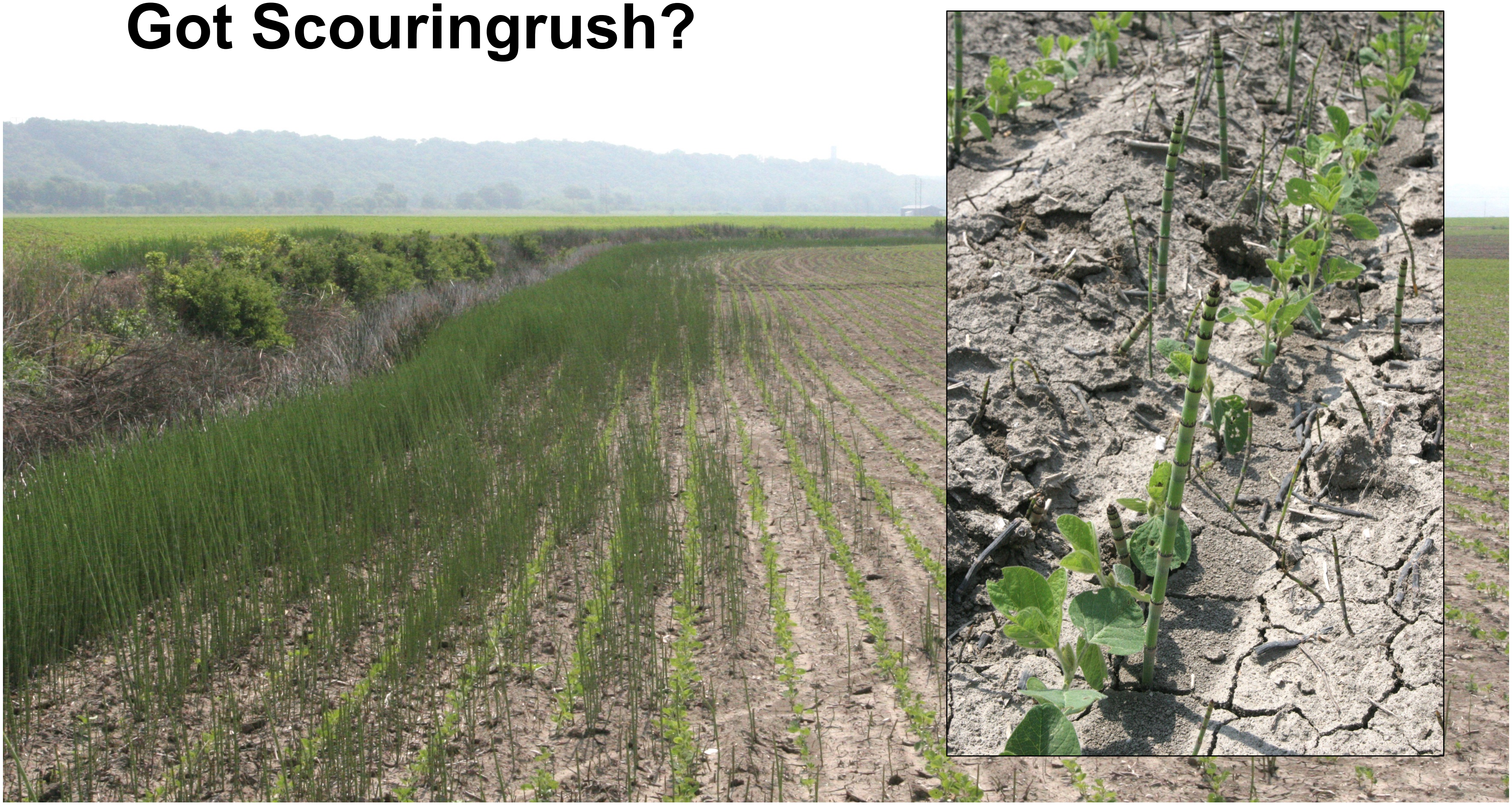
Certified Professional Agronomist

Certified Crop Adviser

MU Extension University of Missouri

Weeds to Watch

Got Scouringrush?



Got Scouringrush?

Details: **Evaluated 3 locations in WA for 3 yrs after the initial application**

Treatment: ½ oz Finesse (chlorsulfuron + metsulfuron) + 2 ¼ lbs glyphosate (60 ozs Roundup Pwrmax 3) per acre

Timing: All treatments applied late-June / early-July

Results: At least 90% stem reduction 3 years after the initial treatment! Glyphosate alone was mostly ineffective; some control at highest rate (3 1/3 lbs/A)

Weed Technology

www.cambridge.org/wet

Research Article

Cite this article: Lyon DJ and Thorne ME (2025) Glyphosate improves long-term control of smooth scouringrush (*Equisetum laevigatum*) with chlorsulfuron + metsulfuron. Weed Technol. **39**(e68), 1–6. doi: 10.1017/wet.2025.10020

Received: 12 February 2025
Revised: 14 April 2025
Accepted: 25 April 2025

Nomenclature:
Chlorsulfuron; glyphosate; metsulfuron; smooth scouringrush, *Equisetum laevigatum* A. Braun EQULA

Keywords:
Horsetail species; perennial weed control; wheat-based cropping systems

Corresponding author:
Drew J. Lyon; Email: drew.lyon@wsu.edu

Glyphosate improves long-term control of smooth scouringrush (*Equisetum laevigatum*) with chlorsulfuron + metsulfuron

Drew J. Lyon[1] and Mark E. Thorne[2]

[1]Professor, Department of Crop and Soil Sciences, Washington State University, Pullman, WA, USA and [2]Associate in Research, Department of Crop and Soil Sciences, Washington State University, Pullman, WA, USA

Abstract

Smooth scouringrush is an herbaceous perennial with an extensive underground rhizome system that has invaded no-till dryland production fields in the inland Pacific Northwest. The objective of this field study was to determine whether there were any short- or long-term benefits to tank-mixing chlorsulfuron + metsulfuron with glyphosate for smooth scouringrush control. Field studies were conducted at three sites across eastern Washington from 2020 to 2024. Glyphosate was applied during fallow periods at 0, 1,260, 2,520, and 3,780 g ae ha^{-1} with and without chlorsulfuron + metsulfuron applied at 21.9 + 4.4 g ai ha^{-1}. Smooth scouringrush stem density was evaluated 1, 2, and 3 yr after treatment. Chlorsulfuron + metsulfuron provided excellent control of smooth scouringrush (<5 plants m^{-2}) for the first 2 yr at all three sites, and there was no observed benefit of tank-mixing with glyphosate. This continued to be the case 3 yr after treatment at two of the sites, but at one site, adding glyphosate at 2,520 or 3,780 g ha^{-1} to chlorsulfuron + metsulfuron decreased stem density compared to chlorsulfuron + metsulfuron applied alone. For treatments containing glyphosate only, the greatest efficacy 3 yr after treatment was achieved at the highest application rate of 3,780 g ha^{-1}. Although no short-term benefit was observed in adding glyphosate to chlorsulfuron + metsulfuron for smooth scouringrush control, at one of three sites the duration of control was increased by at least 1 yr with the addition of glyphosate at a rate of 2,520 g ha^{-1} or more and an organosilicone surfactant as tank-mix partners.

Introduction

Smooth scouringrush is the only *Equisetum* species endemic to North America (Hauke 1960). The aerial stems of smooth scouringrush die back in fall and reemerge in spring. All *Equisetum* species, also known as horsetails, are herbaceous perennials with an extensive underground rhizome system that provides plants the ability to survive environmental disturbances such as plowing, burial, fire, and drought (Husby 2013). *Equisetum* species are commonly found growing in wetlands, ditches, moist woods, and along roadsides with sufficient soil water availability. With the widespread adoption of no-till in the Pacific Northwest (PNW) (Huggins and Reganold 2008), smooth scouringrush has invaded crop production fields across the region.

Bernards et al. (2010) evaluated 24 herbicide active ingredients for their efficacy against scouringrush (*Equisetum hyemale* L.). Chlorsulfuron and dichlobenil were the only two that provided commercially acceptable control of scouringrush. Of these two, only chlorsulfuron is labeled for use in wheat production systems. Kerbs et al. (2019) found chlorsulfuron + MCPA-ester to be a commercially acceptable treatment for smooth and intermediate (*Equisetum* × *ferrissii* Clute) scouringrush control in a cropping system of fallow and winter wheat (*Triticum aestivum* L.) in the PNW.

Unfortunately, chlorsulfuron has a half-life in soil that ranges from 88.5 d at pH 6.2 to 144 d at pH 8.1 at 20 C (Thirunarayanan et al. 1985). This relatively long half-life limits crop rotation flexibility. Unlike chlorsulfuron, glyphosate is rapidly inactivated in soil by adsorption to clay particles and organic matter (Sprankle et al. 1975). Glyphosate's systemic activity provides excellent control of many perennial weeds (Baylis 2000). However, glyphosate has been reported to provide limited control of *Equisetum* species (Bernards et al. 2010; Coupland and Peabody 1981; Kerbs et al. 2019) at rates up to 2.1 kg ae ha^{-1}. Kerbs et al. (2019) did not achieve commercially acceptable control of smooth scouringrush with glyphosate, glyphosate + saflufenacil, or glyphosate + glufosinate when using a maximum glyphosate rate of 1.26 kg ha^{-1}.

Lyon and Thorne (2022) found that high rates of glyphosate (3.78 kg ae ha^{-1}) applied alone or with an organosilicone surfactant provided effective control of smooth scouringrush 1 yr after application compared with a nontreated check. The addition of an organosilicone surfactant improved glyphosate efficacy 1 and 2 yr after treatment compared to glyphosate applied alone.

https://doi.org/10.1017/wet.2025.10020 Published online by Cambridge University Press

Got Scouringrush?

FINESSE®

CEREAL AND FALLOW HERBICIDE

CHLORSULFURON	GROUP	2	HERBICIDE
METSULFURON-METHYL	GROUP	2	HERBICIDE

For Use on Wheat, Barley, Triticale and Fallow

Dry Flowable

Active Ingredient	*By Weight*
Chlorsulfuron	62.5%
Metsulfuron Methyl	12.5%
Other **Ingredients**	25.0%
TOTAL	100%

EPA Reg. No. 279-9610 EPA Est. No. 352-IL-001

NON CEREAL CROPS—ROTATION INTERVALS—IRRIGATED AND NON IRRIGATED LAND

State	Crop	Soil pH	Application Rate (oz/A)	Active Ingredient	Application Rate (Lb. ai/A)	Rotation Interval* (months)
AL, AR, DE, GA, IL, IN, KY, LA, MD, MS, MO, NC, NJ, OH, PA, SC, TN, VA, WV	BOLT® technology soybeans†	7.9 or lower	0.2 to 0.5	Chlorsulfuron	0.0078 to 0.0195	4
				Metsulfuron-methyl	0.0016 to 0.0039	
	STS®& Sulfonylurea Ready soybeans†	7.9 or lower	0.2 to 0.5	Chlorsulfuron	0.0078 to 0.0195	6
				Metsulfuron-methyl	0.0016 to 0.0039	
	Grain Sorghum, Cotton, Soybeans, Field Corn, Rice	7.9 or lower	0.2 to 0.5	Chlorsulfuron	0.0078 to 0.0195	18
				Metsulfuron-methyl	0.0016 to 0.0039	
	Grain sorghum	7.5 or lower	0.2 to 0.4	Chlorsulfuron	0.0078 to 0.0156	4
				Metsulfuron-methyl	0.0016 to 0.0031	

*Rotation intervals are based on normal precipitation/irrigation amounts. If in a water deficit such as a drought, extend rotation intervals until cumulative rainfall/irrigation reaches the normal range. These intervals DO NOT apply to crops grown for seed.

† BOLT® Technology, Sulfonylurea Ready, & STS® soybeans are varieties that have a high degree of crop non-sensitivity to ALS inhibiting and/or sulfonylurea herbicides. Consult seed provider for confirmation. Under certain conditions (such as drought, prolonged cold weather, pH variability in the fields) temporary discoloration and/or crop injury may occur to above listed soybeans with sulfonylurea non-sensitivity traits planted after FINESSE herbicide applications.

ROTATION INTERVAL TO SOYBEANS WITH THE PLENISH® TRAIT

CROP ROTATION

Minimum Rotation Intervals

Labelled crops may be planted at specified time intervals following application of labelled rates of FINESSE herbicide cereal and fallow herbicide. Soybeans with the PLENISH® trait can be planted 6 months after a labelled application of FINESSE herbicide, where soil pH is 7.9 or lower.

BORDER AREA APPLICATIONS

APPLICATION INFORMATION	FINESSE® herbicide	Active Ingredient Equivalent	
	Rate (Oz/A)	Chlorsulfuron (Lb. ai/A)	Metsulfuron-methyl (Lb. ai/A)
FINESSE herbicide may be used for control of broadleaf weeds in field border areas and fence lines. Apply FINESSE herbicide at 0.2 to 0.5 oz per acre.	0.2 to 0.5	0.0078 to 0.0195	0.0016 to 0.0039

Kochia in Missouri?

An issue along railroads and roadsides in western MO for some time.

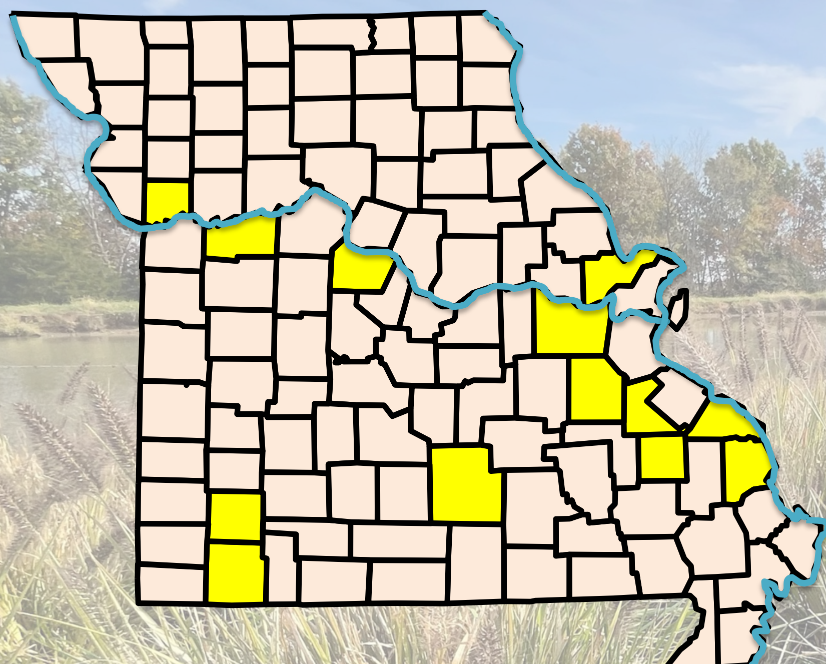
Kochia in Missouri?
But not previously in corn and soybean…

Kochia in Missouri?

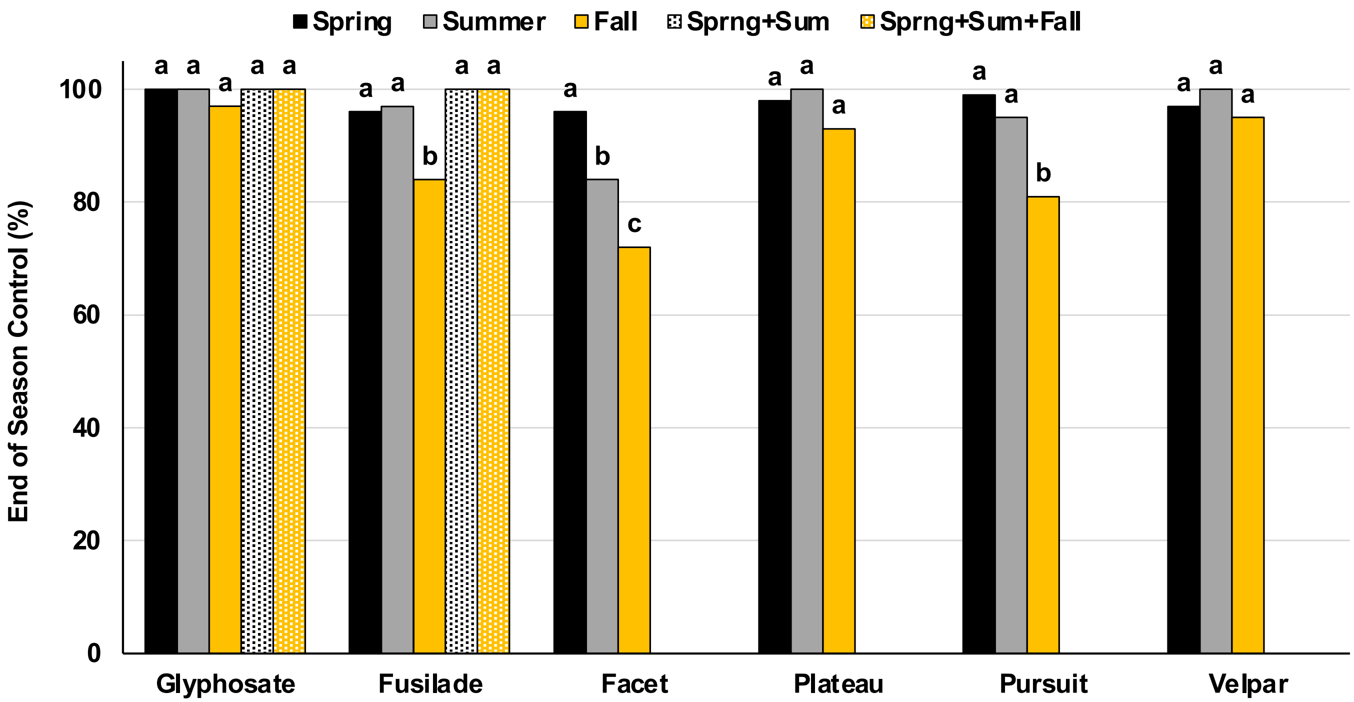
But not previously in corn and soybean…


Chinese Fountain Grass
Pennisetum alopecuroides

Chinese Fountain Grass
Pennisetum alopecuroides

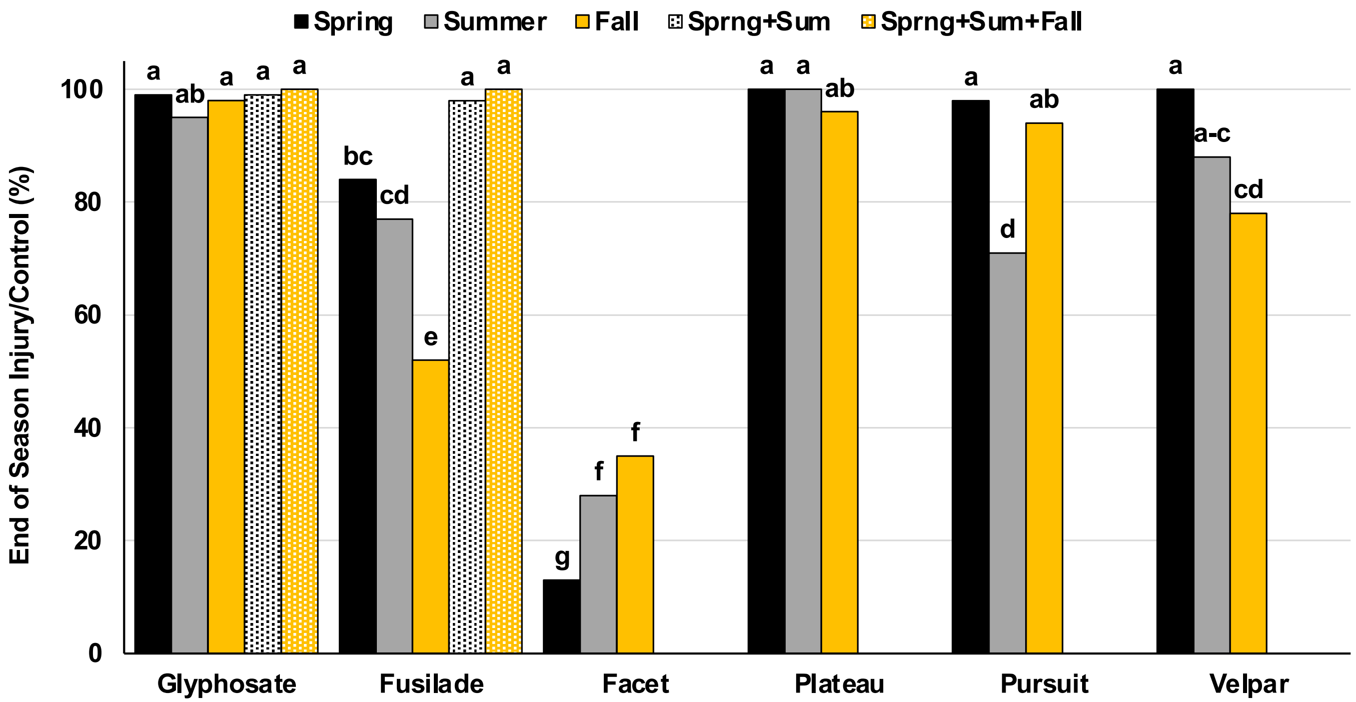


Chinese Fountain grass Control with Spot Spray Herbicide Treatments (Cooper County, 2025)



*All treatments applied as a 1% v/v spot spray treatment.
**Spring applications made on May 9, summer applications on July 7, fall applications on Sep 8.
***Bars followed by the same letter are not different.

Tall Fescue Injury in Response to the Spot Spray Herbicide Treatments (Cooper County, 2025)



*All treatments applied as a 1% v/v spot spray treatment.
**Spring applications made on May 9, summer applications on July 7, fall applications on Sep 8.
***Bars followed by the same letter are not different.

The degree of tall Fescue injury/kill with these treatments will be something to consider…

Spring-applied Plateau

Spring-applied Facet


Early Planted Soybean Systems?

Early Planted Soybean Systems?


Weed Technology

www.cambridge.org/wet

Early-planted soybean weed management as affected by herbicide application rate and timing

Logan R. Miller[1], Christopher A. Landau[2], Martin M. Williams II[3] and Aaron G. Hager[4]

[1]Graduate Research Assistant, Department of Crop Sciences, University of Illinois, Urbana-Champaign, IL, USA; [2]Postdoctoral Research Agronomist, U.S. Department of Agriculture Agricultural Research Service, Urbana, IL, USA; [3]Research Ecologist, U.S. Department of Agriculture Agricultural Research Service, Urbana, IL, USA and [4]Professor, Department of Crop Sciences, University of Illinois, Urbana-Champaign, IL, USA

Research Article

Cite this article: Miller LR, Landau CA, Williams II MM, Hager AG (2025) Early-planted soybean weed management as affected by herbicide application rate and timing. Weed Technol. **39**(e16), 1–7. doi: 10.1017/wet.2024.103

Received: 13 September 2024
Revised: 6 December 2024
Accepted: 8 December 2024

Associate Editor:
Jason Norsworthy, University of Arkansas

Nomenclature:
Glufosinate; glyphosate; metribuzin; pyroxasulfone; *S*-metolachlor; soybean, *Glycine max* (L.) Merr.

Keywords:
Soil-residual herbicide; soybean weed suppression

Corresponding author:
Logan Miller; Email: loganm2@illinois.edu

Abstract

The opportunity to increase soybean yield has prompted Illinois farmers to plant soybean earlier than historical norms. Extending the growing season with an earlier planting date might alter the relationship between soybean growth and weed emergence timings, potentially altering the optimal herbicide application timings to minimize crop yield loss due to weed interference and ensure minimal weed seed production. The objective of this research was to examine various herbicide treatments applied at different timings and rates to assess the effect on weed control and yield in early-planted soybean. Field experiments were conducted in 2021 at three locations across central Illinois to determine effective chemical strategies for weed management in early-planted soybean. PRE treatments consisted of a *S*-metolachlor + metribuzin premix applied at planting or just prior to soybean emergence at 0.5X (883 + 210 g ai ha^{-1}) or 1X (1,766 + 420 g ai ha^{-1}) label-recommended rates. POST treatments were applied when weeds reached 10 cm tall and consisted of 1X rates of glufosinate (655 g ai ha^{-1}) + glyphosate (1,260 g ae ha^{-1}) + ammonium sulfate, without or with pyroxasulfone at a 0.5X (63 g ai ha^{-1}) or 1X (126 g ai ha^{-1}) rate. Treatments comprising both a full rate of PRE followed by a POST resulted in the greatest and most consistent weed control at the final evaluation timing. The addition of pyroxasulfone to POST treatments did not consistently reduce late-season weed emergence. The lack of a consistent effect by pyroxasulfone could be attributed to suppression of weeds by soybean canopy closure due to earlier soybean development. The full rate of PRE extended the timing of POST application 2 to 3 wk for all treatments at all locations except Urbana. Full-rate PRE treatments also reduced the time between the POST application and soybean canopy closure. Overall, a full-rate PRE reduced early-season weed interference and minimized soybean yield loss due to weed interference.

Introduction

Improvements in soybean genetics, seed treatments, and planting technology and equipment have combined to increase soybean yield and profitability over the last several decades. Concomitant with these advances has been a shift to earlier soybean planting. Early soybean planting has become an increasingly common practice with farmers across central Illinois and the U.S. Midwest (USDA-ESMIS 2024). The reason for earlier planting is to increase soybean growth prior to the summer solstice, which can lead to increased yield (Wilcox and Frankenberger 1987). Illinois, the leading soybean-producing state, alone accounted for 15.8% (4.53 million ha) of soybean planted in the United States in 2022 (USDA-NASS 2022, 2023). Considering the economic value and dominance of soybean as a cash crop in Illinois, evaluating weed management in an early-planted soybean environment is prudent.

There are concerns with planting soybean early, such as inadequate crop stands (Oplinger and Philbrook 1992) and increased disease incidence (Hamman et al. 2002). Weed control is another concern, and there are insufficient data to formulate recommendations for managing weeds in early-planted soybean, despite extensive research on weed control practices in soybean (especially chemical options).

PRE herbicides are valuable components of an integrated weed management program. PRE herbicides reduce early-season weed interference and often extend the time available to control weeds later in the growing season with a POST herbicide (Corrigan and Harvey 2000). The commercialization of glyphosate-resistant soybean in 1996 substantially reduced use of PRE herbicides (Shaner 2000). This greatly increased selection pressure on the weed communities with POST herbicides (including glyphosate), which led to the evolution of glyphosate resistance

https://doi.org/10.1017/wet.2024.103 Published online by Cambridge University Press

- **Reducing the rate of the initial PRE herbicide was not an effective strategy.**
- **Delaying the PRE until 2 weeks after planting did not incur any weed management or yield penalty. But…**
- **The layered residual applied with the POST did not affect late-season weed density .**
- **Earlier planted soybean could improve suppression of later-emerging weed species.**

What does University Research say about See & Spray?

What does University Research say about See & Spray?

Details: 4 locations in AR for 2 yrs

Treatment: targeted spray vs. broadcast in soybean

Results:

- Targeted applications provided comparable weed control as broadcast.
- Targeted sprays slightly reduced soybean injury but no differences in yield.
- Targeted sprays saved amount of POST herbicides by 28 to 62%.

Weed Technology

www.cambridge.org/wet

Research Article

Cite this article: Avent TH, Norsworthy JK, Patzoldt WL, Schwartz-Lazaro LM, Houston MM, Butts TR, Vazquez AR (2024) Comparing herbicide application methods with See & Spray™ technology in soybean. Weed Technol. **38**(e74), 1–10. doi: 10.1017/wet.2024.70

Received: 2 May 2024
Revised: 2 August 2024
Accepted: 30 August 2024

Associate Editor:
Rodrigo Werle, University of Wisconsin

Nomenclature:
Dicamba; glufosinate; glyphosate; broadleaf signalgrass, *Urochloa platyphylla* (Munro ex C. Wright) R.D. Webster; morningglory, *Ipomoea* spp.; Palmer amaranth, *Amaranthus palmeri* S. Watson; purslane, *Portulaca* spp.; soybean, *Glycine max* (L.) Merr.

Keywords:
Targeted spray; machine vision; John Deere; herbicide programs

Corresponding author:
Tristen H. Avent; Email: thavent@uark.edu

Comparing herbicide application methods with See & Spray™ technology in soybean

Tristen H. Avent[1], Jason K. Norsworthy[2], William L. Patzoldt[3], Lauren M. Schwartz-Lazaro[4], Michael M. Houston[5], Thomas R. Butts[6] and Alan R. Vazquez[7]

[1]Senior Graduate Research Assistant, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, USA; [2]Distinguished Professor and Elms Farming Chair of Weed Science, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, USA; [3]Senior Principal Agronomist, Blue River Technology, Santa Clara, CA, USA; [4]Senior Agronomist, Blue River Technology, Santa Clara, CA, USA; [5]Research Agronomist, Blue River Technology, Greenville, MS, USA; [6]Assistant Professor and Extension Weed Scientist, Department of Crop, Soil, and Environmental Sciences, University of Arkansas System Division of Agriculture, Lonoke, AR, USA and [7]Research Professor, School of Engineering and Sciences, Tecnologico de Monterrey, Monterrey, NL, Mexico

Abstract

New machine-vision technologies like the John Deere See & Spray™ could provide the opportunity to reduce herbicide use by detecting weeds and target-spraying herbicides simultaneously. Experiments were conducted for 2 yr in Keiser, AR, and Greenville, MS, to compare residual herbicide timings and targeted spray applications versus traditional broadcast herbicide programs in glyphosate/glufosinate/dicamba-resistant soybean. Treatments utilized consistent herbicides and rates with a preemergence (PRE) application followed by an early postemergence (EPOST) dicamba application followed by a mid-postemergence (MPOST) glufosinate application. All treatments included a residual at PRE and excluded or included a residual EPOST and MPOST. Additionally, the herbicide application method was considered, with traditional broadcast applications, broadcasted residual + targeted applications of postemergence herbicides (dual tank), or targeted applications of all herbicides (single tank). Targeted applications provided comparable control to broadcast applications with a ≤1% decrease in efficacy and overall control ≥93% for Palmer amaranth, broadleaf signalgrass, morningglory species, and purslane species. Additionally, targeted sprays slightly reduced soybean injury by at most 5 percentage points across all evaluations, and these effects did not translate to a yield increase at harvest. The relationship between weed area and targeted sprayed area also indicates that nozzle angle can influence potential herbicide savings, with narrower nozzle angles spraying less area. On average, targeted sprays saved a range of 28.4% to 62.4% on postemergence herbicides. On the basis of these results, with specific machine settings, targeted application programs could reduce the amount of herbicide applied while providing weed control comparable to that of traditional broadcast applications.

Introduction

Producers face economic and environmental pressure to reduce herbicide use, and the increasing occurrence of herbicide-resistant weeds threatens the options for successful chemical control. Weeds compete with crops for resources, reducing yield and harvest efficiency (Klingaman and Oliver 1994; Spitters and Van Den Bergh 1982). Palmer amaranth has become the most troublesome weed for row-crop producers across the United States (Van Wychen 2020, 2022). A single Palmer amaranth plant per meter of row reduced soybean yield by 32% and can produce up to 600,000 seeds (Keeley et al. 1987; Klingaman and Oliver 1994). Additionally, Palmer amaranth has evolved resistance to nine different sites of action, seven of which are utilized for postemergence (POST) control of the weed (Brabham et al. 2019; Foster and Steckel 2022; Heap 2023; Jones 2022; Priess et al. 2022a; Randell-Singleton et al. 2024). Additionally, ensuring that weeds do not set seed by the end of the season is paramount to preventing the evolution of herbicide resistance (Bagavathiannan and Norsworthy 2012; Norsworthy et al. 2012).

The spatial distribution of weeds is not uniform across agricultural fields (Cardina et al. 1997; Metcalfe et al. 2019; Rew and Cousens 2001; Stafford and Miller 1993; Wiles et al. 1992). Often weeds emerge in clumps or patches, creating an opportunity to target herbicide applications to the patches or individual weeds, reducing the amount of chemical applied to a field and thereby improving environmental stewardship. In the United States, from 2017 to 2022, the total cost of production for row-crop farms increased by 26.6%, and chemicals accounted for an average of

What does University Research say about See & Spray?

Details: 1 field in AR for 3 yrs

Treatment: targeted spray with low and high sensitivity settings vs. broadcast in soybean

Results:

- Lowest sensitivity settings resulted in higher weed density
- Relative to broadcast, targeted sprays resulted in average herbicide cost savings of $17.50 to $52.28 per acre and reduced the area sprayed by ~40-50%.

Potential New Product:
Diflufenican (Convintro)

Group 12, phenyl ether class of herbicides. Sonar (fluridone) and Zorial also in this group.

Inhibits phytoene desaturase (PDS), a key enzyme in the carotenoid biosynthesis pathway. A “bleaching” herbicide.

Has been registered in Europe (cereal and pulse crops) since the 1990s. Under review with EPA.

Would represent a new MOA not currently used in corn or soybean.

Convintro®

Potential New Product:
Diflufenican (Convintro)

Pre-emergence waterhemp Control 4 wks after treatment averaged across 5 trials:

Diflufenican	**79%**
Balance + Atrazine	**98%**
Acuron	**100%**

Weed Technology

www.cambridge.org/wet

Research Article

Cite this article: Soltani N, Willemse C, Sikkema PH (2024) Biologically effective dose of diflufenican applied preemergence for the control of multiple herbicide–resistant waterhemp in corn. Weed Technol. **38**(e69), 1–5. doi: 10.1017/wet.2024.42

Received: 27 March 2024
Revised: 2 May 2024
Accepted: 22 May 2024

Associate Editor:
Kevin Bradley, University of Missouri

Nomenclature:
Diflufenican; isoxaflutole + atrazine; *S*-metolachlor/mesotrione/bicyclopyrone/atrazine; Palmer amaranth; *Amaranthus palmeri* S. Watson; waterhemp; *Amaranthus tuberculatus* (Moq.) J.D. Sauer.; corn; *Zea mays* L.

Keywords:
Preemergence herbicides; corn injury; corn yield; waterhemp control; waterhemp biomass; waterhemp density

Corresponding author:
Nader Soltani; Email: soltanin@uoguelph.ca

WSSA
WEED SCIENCE SOCIETY OF AMERICA

Biologically effective dose of diflufenican applied preemergence for the control of multiple herbicide–resistant waterhemp in corn

Nader Soltani[1], Christian Willemse[2] and Peter H. Sikkema[1]

[1]Adjunct Professor, University of Guelph, Ridgetown, ON, Canada and [2]Former Graduate Student, University of Guelph, Ridgetown, ON, Canada

Abstract

Waterhemp is a dioecious species with wide genetic diversity which has enabled it to evolve resistance to several commonly used herbicide groups in North America. Five field trials were established in Ontario to ascertain the biologically effective doses of diflufenican, a new Group 12 herbicide applied preemergence for control of multiple herbicide–resistant (MHR) waterhemp in corn. Based on regression analysis, the predicted diflufenican doses to elicit 50%, 80%, and 95% MHR waterhemp control were 99, 225, and 417 g ai ha^{-1}, respectively, at 2 wk after application (WAA); 73, 169, and 314 g ai ha^{-1}, respectively, at 4 WAA; and 76, 215, and — (meaning the effective dose was beyond the set of doses in this study) g ai ha^{-1}, respectively, at 8 WAA. The predicted diflufenican doses that would cause a 50%, 80%, and 95% decreases in MHR waterhemp density were 42, 123, and — g ai ha^{-1}; and MHR waterhemp biomass were 72, 167, and 310 g ai ha^{-1}, respectively, at 8 WAA. Diflufenican applied preemergence at 150 g ai ha^{-1} controlled MHR waterhemp by 64%, 79%, and 73% at 2, 4, and 8 WAA, respectively. Isoxaflutole + atrazine applied preemergence at 105 + 1,060 g ai ha^{-1} controlled MHR waterhemp by 98%, 98%, and 97% at 2, 4, and 8 WAA, respectively; and *S*-metolachlor/mesotrione/bicyclopyrone/atrazine applied preemergence at 1,259/140/35/588 g ai ha^{-1} controlled MHR waterhemp by 100%, 100%, and 99% at 2, 4, and 8 WAA, respectively. Diflufenican applied preemergence reduced MHR waterhemp density and biomass by 83%; in contrast, isoxaflutole + atrazine and *S*-metolachlor/mesotrione/bicyclopyrone/atrazine reduced MHR waterhemp density and biomass by 99%. All treatments evaluated caused either no, or minimal, corn injury and resulted in corn yield that was similar with the weed-free control. Results indicate that diflufenican applied alone preemergence does not provide superior MHR waterhemp control over the commonly used herbicides isoxaflutole + atrazine or *S*-metolachlor/mesotrione/bicyclopyrone/atrazine; however, there is potential for using diflufenican as part of an integrated weed management strategy for the control of MHR waterhemp control in corn.

Introduction

Corn is an important agricultural product in Canada and contributes substantially to the nation's economy. Canada ranks 11th in global corn production, with nearly 1.5 billion kg of grain corn produced annually (Statista 2024). Nearly 65% of Canadian grain corn is produced in Ontario (OMAFRA 2023). In 2022, Ontario corn growers seeded approximately 1 million ha and produced approximately 9.4 billion kg of grain corn with farm cash receipts of nearly Can$2 billion (OMAFRA 2024). In 2022, the amount of corn exported to other markets (mainly Ireland, Spain, and other European countries) amounted to nearly 1 billion kg, valued at Can $375 million (McCulloch 2023). The continuous increase in corn consumption globally necessitates improving corn productivity so that supply meets demand. One of the most impeding factors in corn productivity is yield loss due to weed interference, especially recently confirmed multiple herbicide–resistant (MHR) weed biotypes such as waterhemp.

Waterhemp is a dioecious weed with wide genetic diversity that has enabled it to evolve resistance to several herbicide groups (groups 2, 4, 5, 9, 14, 15, and 27 as categorized by the Weed Science Society of America [WSSA]) (Bell and Tranel 2010; Cordes et al. 2004; Heap 2024). A recent WSSA survey has placed waterhemp among the most problematic weed species in the United States (Van Wychen 2016). Waterhemp biotypes in Ontario have evolved resistance to herbicides in WSSA groups 2, 5, 9, 14, and/or 27 (Benoit et al. 2019a; Heap 2024; Symington et al. 2022). MHR waterhemp has been found in 17 Ontario counties spanning more than 800 km across the southern portion of the province (Soltani et al. 2022). A recent metadata analysis has estimated that MHR waterhemp exists in 1% of field crop hectares in Ontario. If left uncontrolled MHR waterhemp caused an average of 19% reduction in corn yield with a farm cash receipts value of Can$3.1 million annually (Soltani et al. 2022). Steckel and Sprague (2004) observed as much as 74% corn yield loss from waterhemp interference. No new herbicide mode

https://doi.org/10.1017/wet.2024.42 Published online by Cambridge University Press

Check for updates

Potential New Product:
Diflufenican (Convintro)

Pre-emergence waterhemp control 8 wks after treatment averaged across 5 trials:

Diflufenican (0.16 lb/A)	**85%**
Fierce	**98%**
Metribuzin (0.25 lb/A)	**69%**

Journal of Agricultural Science; Vol. 16, No. 8; 2024
ISSN 1916-9752 E-ISSN 1916-9760
Published by Canadian Center of Science and Education

Biologically Effective Dose of Diflufenican for the Control of Multiple Herbicide-Resistant Waterhemp in Soybean

Nader Soltani[1], Christian Willemse[1] & Peter H. Sikkema[1]

[1] Department of Plant Agriculture, University of Guelph Ridgetown Campus, Ridgetown, ON, Canada

Correspondence: Nader Soltani, University of Guelph Ridgetown Campus, 120 Main St. East, Ridgetown, ON, N0P 2C0, Canada. E-mail: soltanin@uoguelph.ca

Received: May 3, 2024 Accepted: June 7, 2024 Online Published: July 15, 2024
doi:10.5539/jas.v16n8p42 URL: https://doi.org/10.5539/jas.v16n8p42

Abstract

Waterhemp biotypes have evolved resistance to Weed Science Society of America (WSSA) Herbicide Groups 2, 5, 9, 14, and 27 in Ontario Canada, are present in 15 counties, spanning a distance of 800 km across southern Ontario, and cause an average soybean yield loss of 42%. Five field experiments were established in growers' fields in southwestern Ontario to determine the biologically effective doses of diflufenican (Group 12) applied preemergence (PRE) to control multiple herbicide-resistant waterhemp in soybean. The calculated diflufenican doses to elicit 50, 80, and 95% control of MHR waterhemp were 71, 164, and 304 g ai ha^{-1} at 2 weeks after herbicide application (WAA); 50, 115, and 214 g ai ha^{-1} at 4 WAA; and 69, 158, and 294 g ai ha^{-1} at 8 WAA, respectively. The calculated diflufenican doses that caused a 50, 80, and 95% reduction in MHR waterhemp density were 28, 70, and Non-est. g ai ha^{-1} and the doses that caused a 50, 80, and 95% reduction in MHR waterhemp biomass were 44, 109, and Non-est. g ai ha^{-1}, respectively. The calculated diflufenican doses that resulted in 50, 80, and 95% of the soybean yield of the industry standard herbicide (flumioxazin/pyroxasulfone) were 3, 12, and 57 g ai ha^{-1}, respectively. Diflufenican (180 g ai ha^{-1}) PRE controlled MHR waterhemp 89, 92, and 85%; metribuzin (300 g ai ha^{-1}) PRE controlled MHR waterhemp 94, 84, and 69%; and flumioxazin/pyroxasulfone (105/134 g ai ha^{-1}) PRE controlled MHR waterhemp 100, 99, and 98% at 2, 4, and 8 WAA, respectively. Diflufenican, metribuzin, and flumioxazin/pyroxasulfone applied PRE reduced MHR waterhemp density 96, 84, and 100% and biomass 93, 67, and 99%, respectively at 8 WAA. Diflufenican, metribuzin, and flumioxazin/pyroxasulfone applied PRE caused 9, 0, and 4% visible soybean injury, respectively but the injury was transient and caused no adverse effect on seed moisture content or seed yield of soybean. This study concludes that diflufenican and metribuzin applied PRE provide comparable MHR waterhemp control; however, control was lower than flumioxazin/pyroxasulfone.

Keywords: diflufenican, flumioxazin/pyroxasulfone, metribuzin, waterhemp, *Amaranthus tuberculatus* (Moq.) J.D. Sauer, soybean, *Glycine max* (L.) Merr.

1. Introduction

Soybean is the third most widely grown field crop and contributes nearly $3 billion annually to the economy of Canada (Soy Canada, 2023). Ontario producers grow most of the soybean produced in Canada. In Ontario, soybean was seeded on approximately 1.2 million hectares; total production was nearly 4 million tonnes with a farmgate value of around $2 billion in 2020 (OMAFRA, 2024). Controlling weeds, especially the recently confirmed glyphosate-resistant (GR) and multiple herbicide-resistant (MHR) waterhemp is critical for profitable soybean production.

Waterhemp is a dioecious species with a wide genetic diversity which has enabled it to evolve resistance to Weed Science Society of America (WSSA) Herbicide Groups 2, 4, 5, 9, 14, 15, and 27 (Bell & Tranel, 2010; Heap, 2024). Waterhemp biotypes in Ontario have evolved resistance to Groups 2, 5, 9, 14, and/or 27 (Benoit et al., 2019; Heap, 2024; Symington et al., 2022). MHR waterhemp has been confirmed in 15 Ontario counties and spans a distance of over 800 km (Soltani et al., 2016, 2022). A recent study has estimated that uncontrolled MHR waterhemp is present in 1% of field crop hectares in Ontario and causes an average 42% yield soybean loss resulting in a monetary loss of $7.1 million in the province annually (Soltani et al., 2022). Crop producers in Ontario need new herbicide modes of action that have an adequate margin of crop safety in soybean and provide control of MHR waterhemp.

Potential New Product:
Diflufenican (Convintro)

Details: 6 locations in AR and MI

Treatments: 1) Boundary, 2) Fierce MTZ, 3) Warrant, 4) metribuzin, 5) diflufenican + metribuzin + flufenacet premix

Results: By 28 days after treatment, similar Palmer amaranth and waterhemp control was achieved with Boundary, Fierce MTZ and the diflufenican-containing premix

Weed Technology

www.cambridge.org/wet

Research Article

Cite this article: Woolard MC, Norsworthy JK, Roberts TL, Thrash BC, Barber LT, Sprague CL, Avent TH (2025) Comparison of a diflufenican-containing premixture to current commercial standards for residual Palmer amaranth (*Amaranthus palmeri*) and waterhemp (*Amaranthus tuberculatus*) control. Weed Technol. **39**(e5), 1–7. doi: 10.1017/wet.2024.89

Received: 16 July 2024
Revised: 16 September 2024
Accepted: 31 October 2024

Associate Editor:
Prashant Jha, Lousiana State University

Nomenclature:
Acetochlor; dicamba; diflufenican; flufenacet; flumioxazin; metribuzin; pyroxasulfone; Palmer amaranth, *Amaranthus palmeri* (S.) Wats.; waterhemp, *Amaranthus tuberculatus*; soybean, *Glycine max* (L.) Merr.

Keywords:
Group 12; weed density; residual control

Corresponding author:
Matthew C. Woolard;
Email: mawoolar@ttu.edu

Comparison of a diflufenican-containing premixture to current commercial standards for residual Palmer amaranth (*Amaranthus palmeri*) and waterhemp (*Amaranthus tuberculatus*) control

Matthew C. Woolard[1], Jason K. Norsworthy[2], Trenton L. Roberts[3], Benjamin C. Thrash[4], L. Tom Barber[5], Christy L. Sprague[6] and Tristen H. Avent[1]

[1]Graduate Research Assistant, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, USA; [2]Distinguished Professor, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, USA; [3]Professor, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, USA; [4]Assistant Professor, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Lonoke, AR, USA; [5]Professor, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Lonoke, AR, USA and [6]Professor, Department of Plant, Soil, and Microbial Sciences, Michigan State University, East Lansing, MI, USA

Abstract

With Palmer amaranth and waterhemp evolving resistance to nine and six different sites of action (SOAs) globally, soybean producers continue to search for new options to control these problematic weeds. Bayer CropScience has announced its intentions to launch a Convintro™ brand of herbicides, one being a three-way premixture for preemergence use in soybean. The premixture will contain diflufenican (WSSA Group 12), metribuzin (WSSA Group 5), and flufenacet (WSSA Group 15), adding a new SOA for soybean producers throughout the United States. With the anticipated launch of the premixture, research is needed to evaluate the length of residual control provided by the new herbicide. Research trials were conducted in Fayetteville and Keiser, AR, and Morrice, MI, in 2022 and 2023. A 0.17:0.35:0.48 ratio of a diflufenican:metribuzin:flufenacet (DFF)-containing premixture was applied alone and in combination with additional metribuzin and dicamba. Also, metribuzin, acetochlor, a *S*-metolachlor:metribuzin premixture, and a flumioxazin:pyroxasulfone:metribuzin premixture were applied preemergence. The DFF-containing premixture was more effective in reducing Palmer amaranth/waterhemp emergence than acetochlor in four of six trials at 28 d after treatment (DAT). Palmer amaranth and waterhemp densities in plots treated with the DFF-containing premixture exhibited similar results to plots treated with the *S*-metolachlor:metribuzin premixture and the flumioxazin:pyroxasulfone:metribuzin premixture at 28 DAT. By 56 DAT, Palmer amaranth and waterhemp densities were comparable or superior in plots with the DFF-containing premixture than in those treated with acetochlor and metribuzin, and the *S*-metolachlor:metribuzin premixture at five of six sites. The addition of dicamba or metribuzin to the DFF-containing premixture did not reduce Palmer amaranth or waterhemp density compared to the DFF-containing premixture at 28 or 56 DAT. Overall, the DFF-containing premixture generally provided greater or comparable control over several standard herbicides, providing growers a new product for preemergence control of *Amaranthus* species in soybean fields.

Introduction

Palmer amaranth and waterhemp are the two most problematic weeds in soybean production in the United States (Van Wychen 2022). Characteristics of *Amaranthus* species that make them problematic include high seed production, rapid growth, extended germination periods, and drought tolerance (Horak and Loughin 2000; Jha et al. 2009; Keeley et al. 1987; Sellers et al. 2003), resulting in a high degree of interference with a wide array of crops (Monks and Oliver 1988). Yield reductions of up to 60% have been reported in cotton (MacRae et al. 2013), 91% in corn (Massinga et al. 2001), and 78% in soybean (Bensch et al. 2003) from Palmer amaranth interference.

With the introduction of the glyphosate-resistant soybean, producers across the United States began to adopt the technology, quickly shifting management strategies and relying upon sequential postemergence applications of glyphosate to control weeds such as Palmer amaranth and waterhemp (Duke 2014; Powles 2008). With the heavy reliance on glyphosate to control weeds, herbicide diversity decreased, leading to the evolution of glyphosate resistance in weeds

https://doi.org/10.1017/wet.2024.89 Published online by Cambridge University Press

Potential New Product:
Diflufenican (Convintro)

Details: 6 locations in AR and MI

Treatments: diflufenican + metribuzin + flufenacet premix followed by different POST treatments and timings

Results: By 28 days after treatment, "the diflufenican-containing premixture provided >90% control of Palmer amaranth and prickly sida. However, common ragweed, common lambsquarters, morningglory species, and annual grass control was <80% at this timing."

Weed Technology

www.cambridge.org/wet

Research Article

Cite this article: Woolard MC, Norsworthy JK, Roberts TL, Barber LT, Thrash BC, Sprague CL, Godar AS (2025) Performance of a diflufenican-containing premixture in dicamba-resistant soybean systems. Weed Technol. **39**(e36), 1–9. doi: 10.1017/wet.2024.92

Received: 22 July 2024
Revised: 26 September 2024
Accepted: 5 November 2024

Associate Editor:
Amit Jhala, University of Nebraska, Lincoln

Nomenclature:
Acetochlor; dicamba; diflufenican; flufenacet; glufosinate; glyphosate; metribuzin; annual grasses, *Poaceae* spp.; common lambsquarters, *Chenopodium album* L.; common ragweed, *Ambrosia artemisiifolia* L.; morningglory spp., *Ipomoea* ssp.; Palmer amaranth, *Amaranthus palmeri* (S.) Wats.; prickly sida, *Sida spinosa* L.; soybean; *Glycine max* (L.) Merr

Keywords:
Convintro; Group 12; weed control; preemergence; postemergence

Corresponding author:
Matthew C Woolard; Email: mawoolar@ttu.edu

Performance of a diflufenican-containing premixture in dicamba-resistant soybean systems

Matthew C. Woolard[1], Jason K. Norsworthy[2], Trenton L. Roberts[3], L. Tom Barber[4], Benjamin C. Thrash[5], Christy L. Sprague[6] and Amar S. Godar[7]

[1]Graduate Research Assistant, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, USA; [2]Distinguished Professor, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, USA; [3]Professor, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, USA; [4]Professor, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Lonoke, AR, USA; [5]Assistant Professor, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Lonoke, AR, USA; [6]Professor, Department of Plant, Soil, and Microbial Sciences, Michigan State University, East Lansing, MI, USA and [7]Post Doctoral Fellow, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, USA

Abstract

Weeds belonging to the *Amaranthus* family are most problematic for soybean producers. With Palmer amaranth evolving resistance to multiple herbicides labeled for use in soybean, producers seek new sites of action to integrate into season-long herbicide programs. Bayer CropScience plans to launch a Convintro™ brand of herbicides, one being a premixture that will include diflufenican (categorized as a Group 12 herbicide by the Weed Science Society of America [WSSA]), metribuzin (WSSA Group 5), and flufenacet (WSSA Group 15), for use preemergence in soybean. Research trials were conducted in Fayetteville and Keiser, AR, and Holt, MI, in 2022 and 2023, to evaluate the premixture in a season-long program in a dicamba-resistant soybean system. A 0.17:0.35:0.48 ratio of a premixture of diflufenican:metribuzin:flufenacet (DFF-containing premixture) was applied preemergence with different combinations of glyphosate, glufosinate, dicamba, and acetochlor at 28 (early postemergence) and 42 (late postermergence) days after planting (DAP). At the early postemergence timing, the DFF-containing premixture provided >90% control of Palmer amaranth and prickly sida. However, common ragweed, common lambsquarters, morningglory ssp., and annual grass control was ≤80% at this timing. When the late postemergence applications occurred, treatments that had already received an early postemergence application controlled prickly sida, morningglory ssp., Palmer amaranth, and annual grasses to a greater extent than those that had not, indicating the preemergence application of the DFF-containing premixture was not sufficient to provide control of the weed spectrum through 42 DAP. By 70 DAP, all programs provided ≥93% control of all weeds evaluated. Herbicide programs that included the DFF-containing premixture preemergence followed by (fb) EPOST fb LPOST common ragweed, common lambsquarters, morningglory ssp., and annual grasses to a greater than the one-pass postemergence systems. In addition, all herbicide programs evaluated in this study reduced Palmer amaranth seed production by >99%. However, producers who plan to use the DFF-containing premixture may need two postemergence herbicide applications to obtain high levels of weed control throughout the growing season.

Introduction

One of the most frequent problems that soybean producers face is control of weeds throughout the growing season. Palmer amaranth, morningglories, barnyardgrass [*Echinochloa crus-galli* (L.) Beauv.], horseweed [*Conyza canadensis* (L.) Cronquist], common lambsquarters, ragweed species, waterhemp [*Amaranthus tuberculatus* (Moq.) J.D. Sauer, *Amaranthus rudis* Sauer], and kochia (*Bassia scoparia* L.) have been listed as some of the most troublesome weeds in soybean (Van Wychen 2022; Riar et al. 2013). Uncontrolled weeds are detrimental to soybean yields because of competition with the crop for light, water, and nutrients (Regnier and Stoller 1989). For example, Palmer amaranth at a density of one plant per meter of row reduces soybean yields by 32% (Klingaman and Oliver 1994). Similarly, common cocklebur (*Xanthium strumarium* L.) reduces soybean yields by 18% at a density of 3,300 plants ha^{-1} (Barrentine 1974). Due to the potential for weeds to impact yields, production efforts often focus on maintaining a weed-free environment throughout the growing season.

The introduction of the glyphosate-resistant soybean in 1996 quickly shifted management strategies for producers across the United States. Producers rapidly adopted the technology

Dicamba in 2026?

Proposed Changes:

- 240 ft downwind buffer
- Spray solution must include an approved drift reduction agent and pH buffering volatility reduction agent added to the tank in higher percentages as temperatures increase
- No applications at temperatures about 95 F

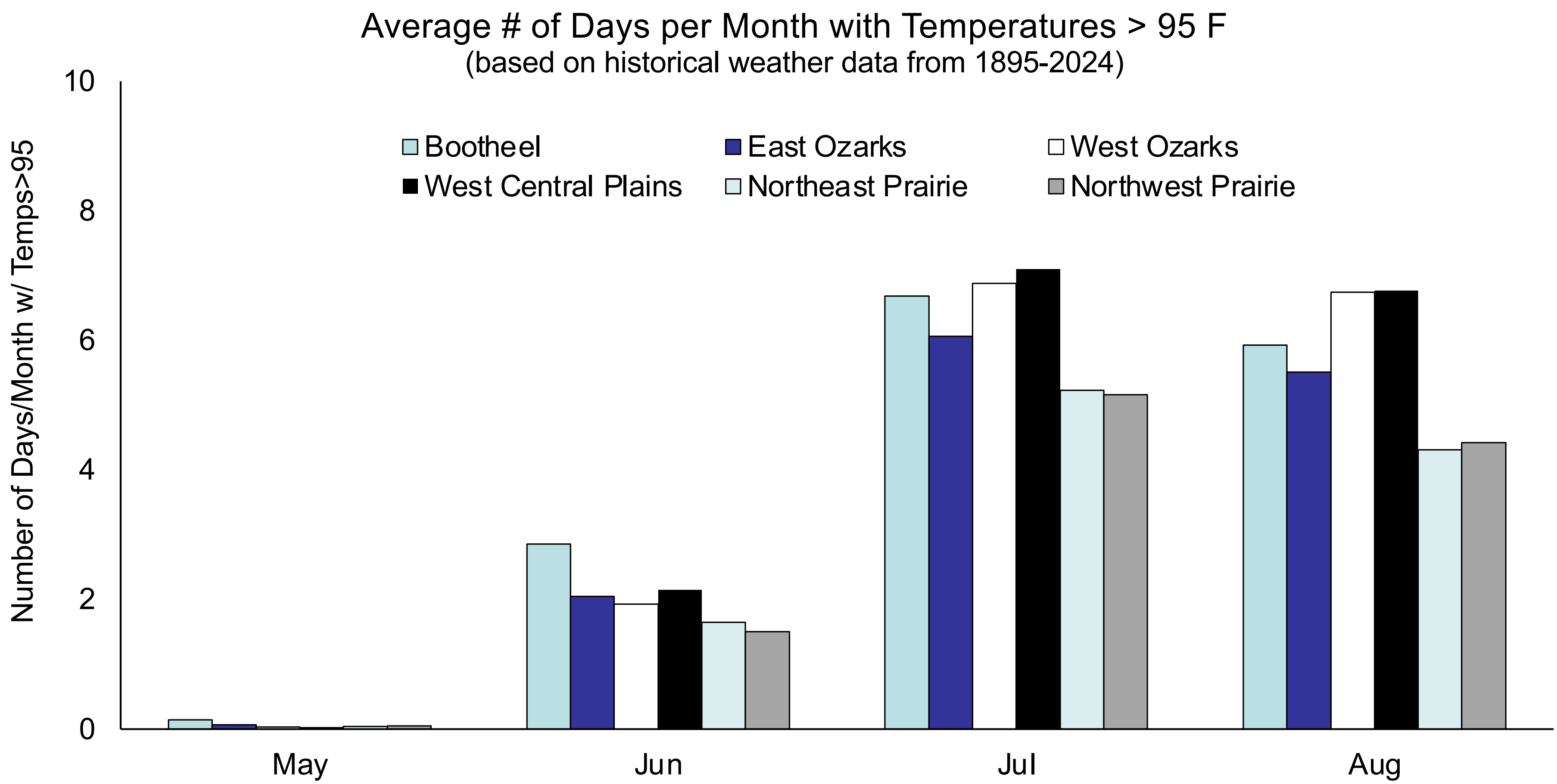
EPA expects to re-approve dicamba for herbicide-resistant crops

Published 8:22 am Friday, July 25, 2025

By Mateusz Perkowski

The EPA has proposed registering three types of dicamba to control weeds in soybeans and cotton that have been genetically modified to withstand the herbicide, finding that "mitigation" measures will sufficiently reduce the likelihood of harm to other crops. (Capital Press file photo)

Dicamba in 2026?



Email: bradleyke@missouri.edu
Phone: 573-882-4039

weedscience.missouri.edu

App: ID Weeds (free download)

Facebook: Mizzou Weed Science

Twitter: @ShowMeWeeds