

Alternatives to Paraquat for Weed Burndown in Alfalfa



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Burndown



No paraquat



paraquat



EPA's updated safety measures for paraquat



- Limiting aerial applications and requiring residential buffers
- Prohibiting pressurized handgun and backpack sprayer applications
- Requiring enclosed cabs or respirators for ground applications
- Increasing the restricted entry interval

Objectives



- Evaluate the efficacy of alternative burndown herbicides
 - Assess the impacts of these herbicides on the yield and quality of alfalfa, and
 - Quantify the economics of using alternative burndown herbicides on alfalfa.
-

Materials and methods



Established/old stands of glyphosate-resistant alfalfa

Study locations:

Kimberly, ID

Greenville, UT

2023 & 2024 field seasons



Herbicide treatments



No.	Treatment	rate (g ai /ha)
1	nontreated	-
2	paraquat (Gramoxone [®] SL 2.0)	280
3	carfentrazone (Aim [®] EC)	17.5
4	carfentrazone (Aim [®] EC)	35
5	saflufenacil (Sharpen [®])	25
6	saflufenacil (Sharpen [®])	50
7	pyraflufen (Vida [®])	1.82
8	pyraflufen (Vida [®])	3.64
9	tiafenacil (Reviton [®])	24.8
10	tiafenacil (Reviton [®])	49.6
11	diuron + hexazinone (Velpar [®] AlfaMax Gold)	1900
12	diuron + hexazinone (Velpar [®] AlfaMax Gold)	3800
13	glyphosate (Roundup PowerMax)	1260

Materials and methods



- Weekly height measurements
- Weed control efficacy
 - flixweed (*Descurainia sophia*)
 - dandelion (*Taraxacum officinale*)
 - shepherd's-purse *Capsella bursa-pastoris*)
- Forage accumulation (yield)
- Nutritive value using NIRS (FOSS, Hilleroed, Denmark)

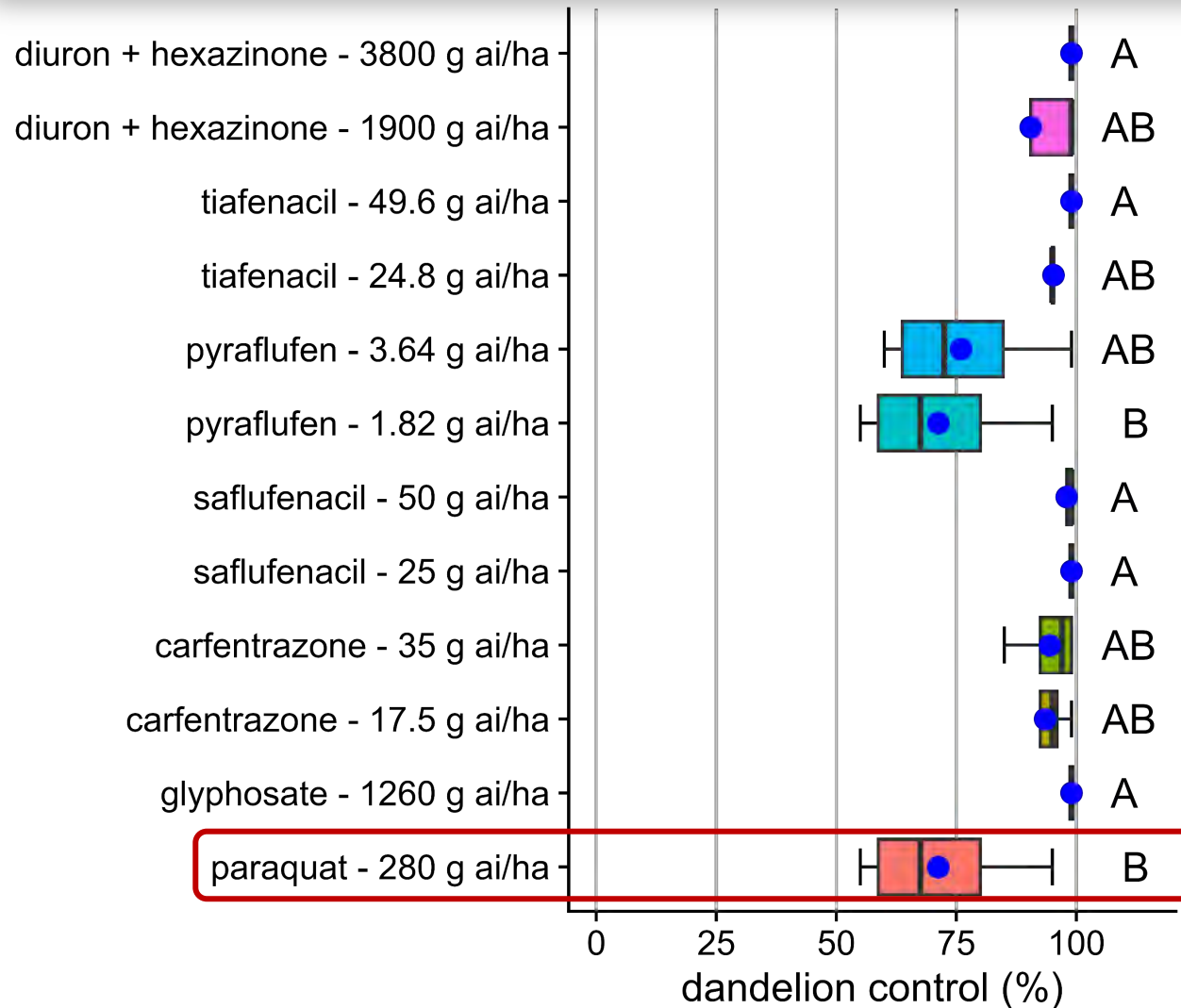
Data analysis

- ANOVA in R Software
- Mean separation: Tukey's HSD at $\alpha = 0.05$



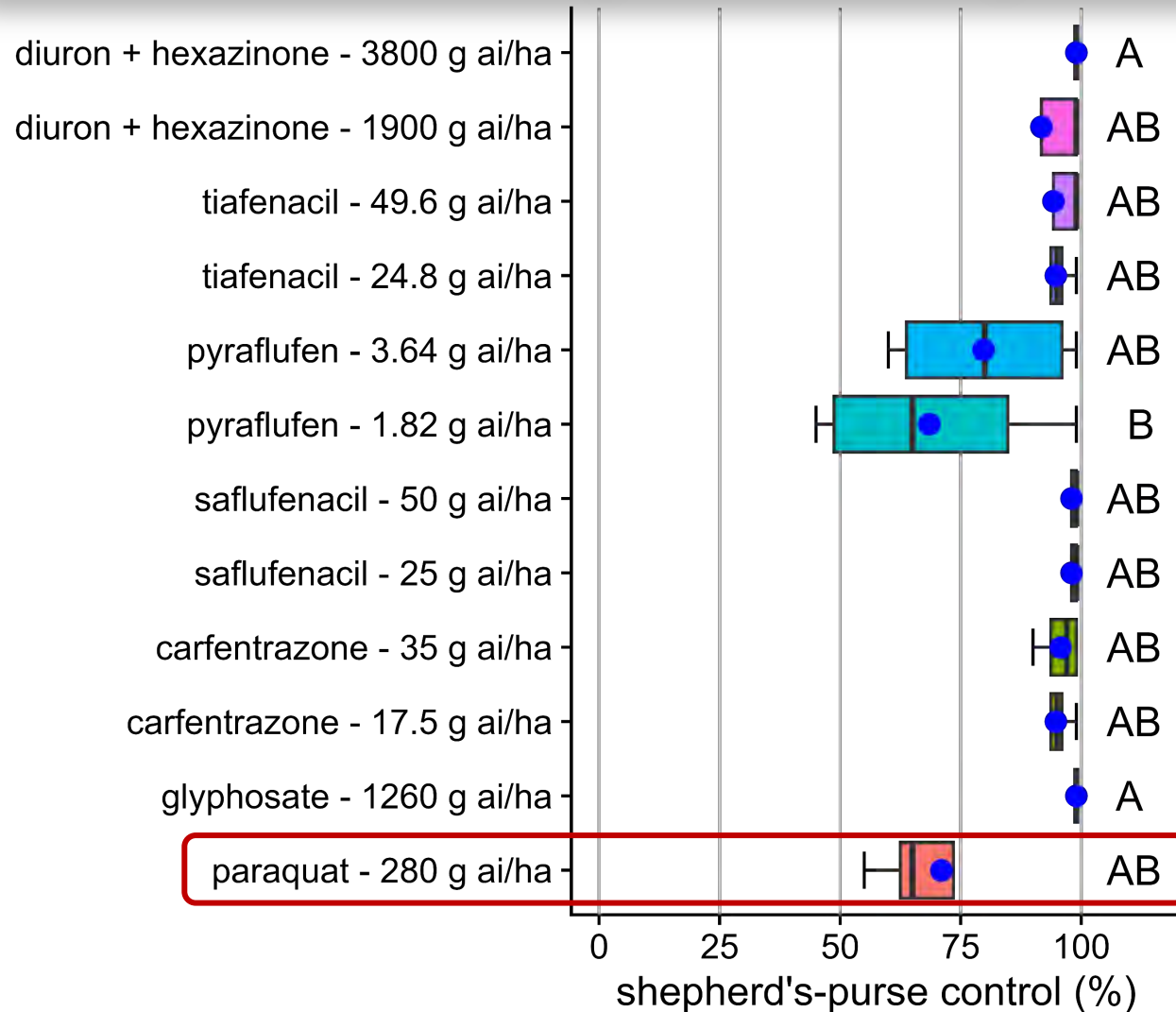
Results

Dandelion control



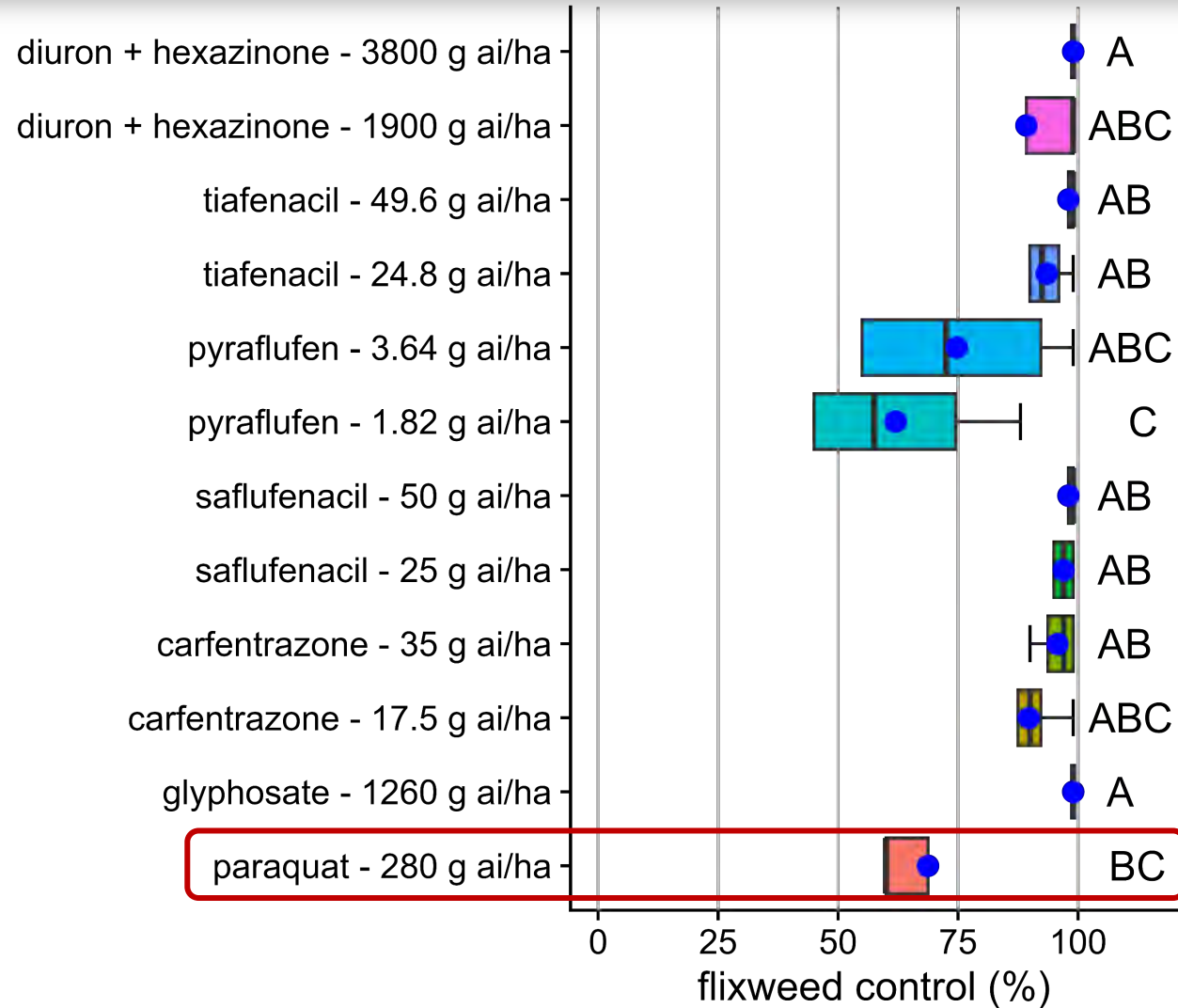
shepherd's-purse control

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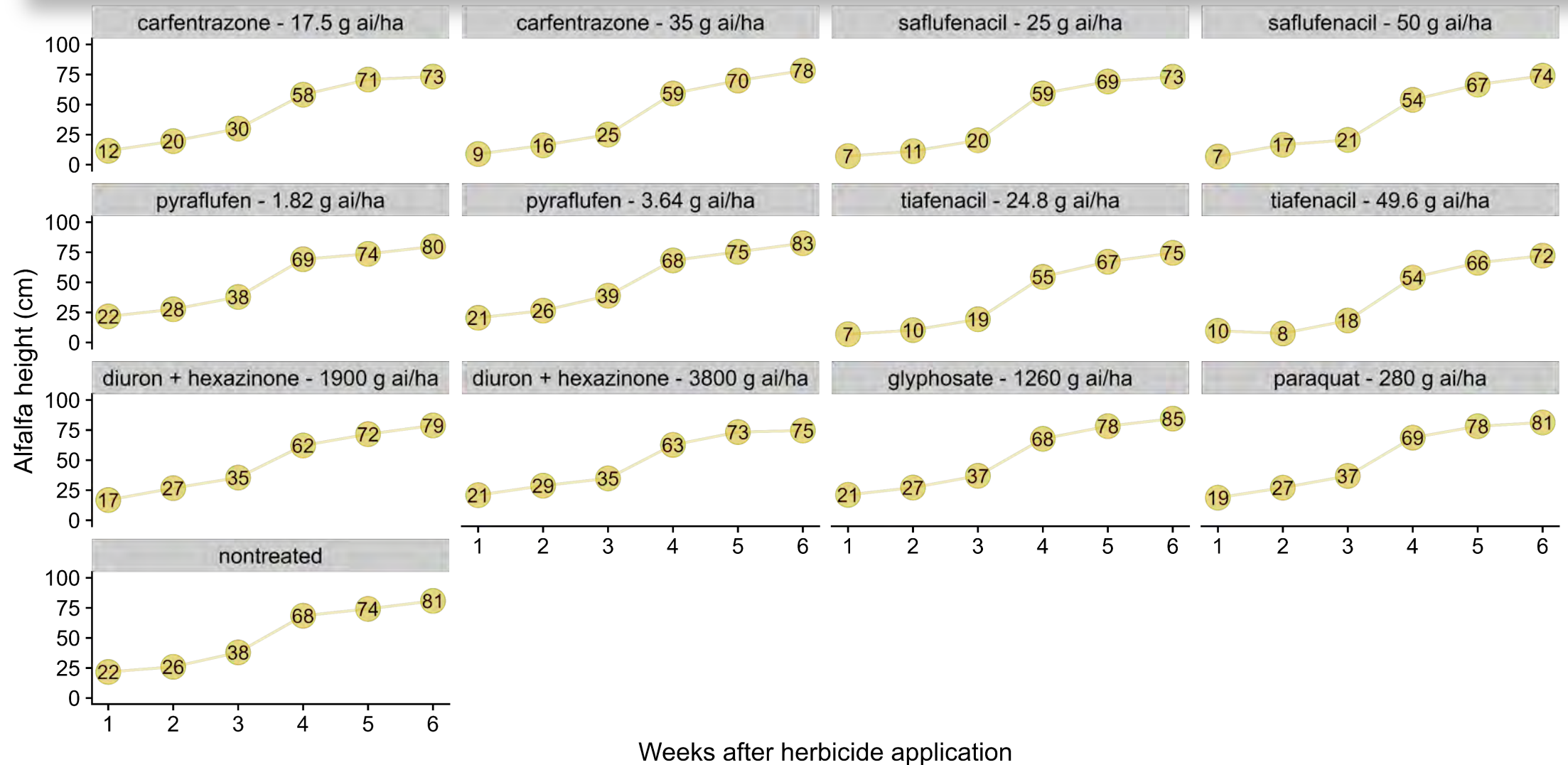


flixweed control

I



Alfalfa height – Kimberly ID



Alfalfa regrowth (saflufenacil at 50 g ai/ha)



1 week



2 wat



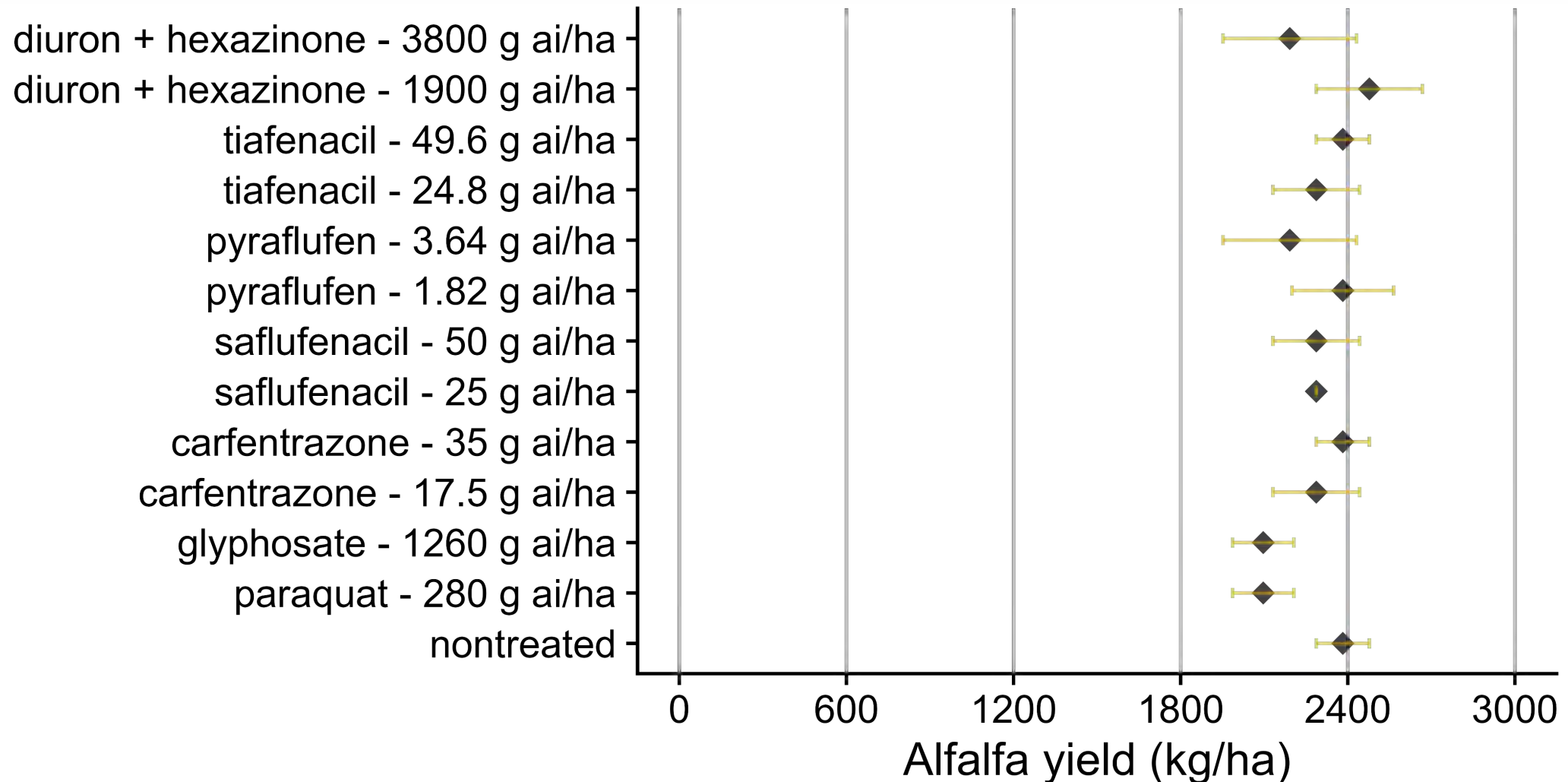
3 wat



6 wat

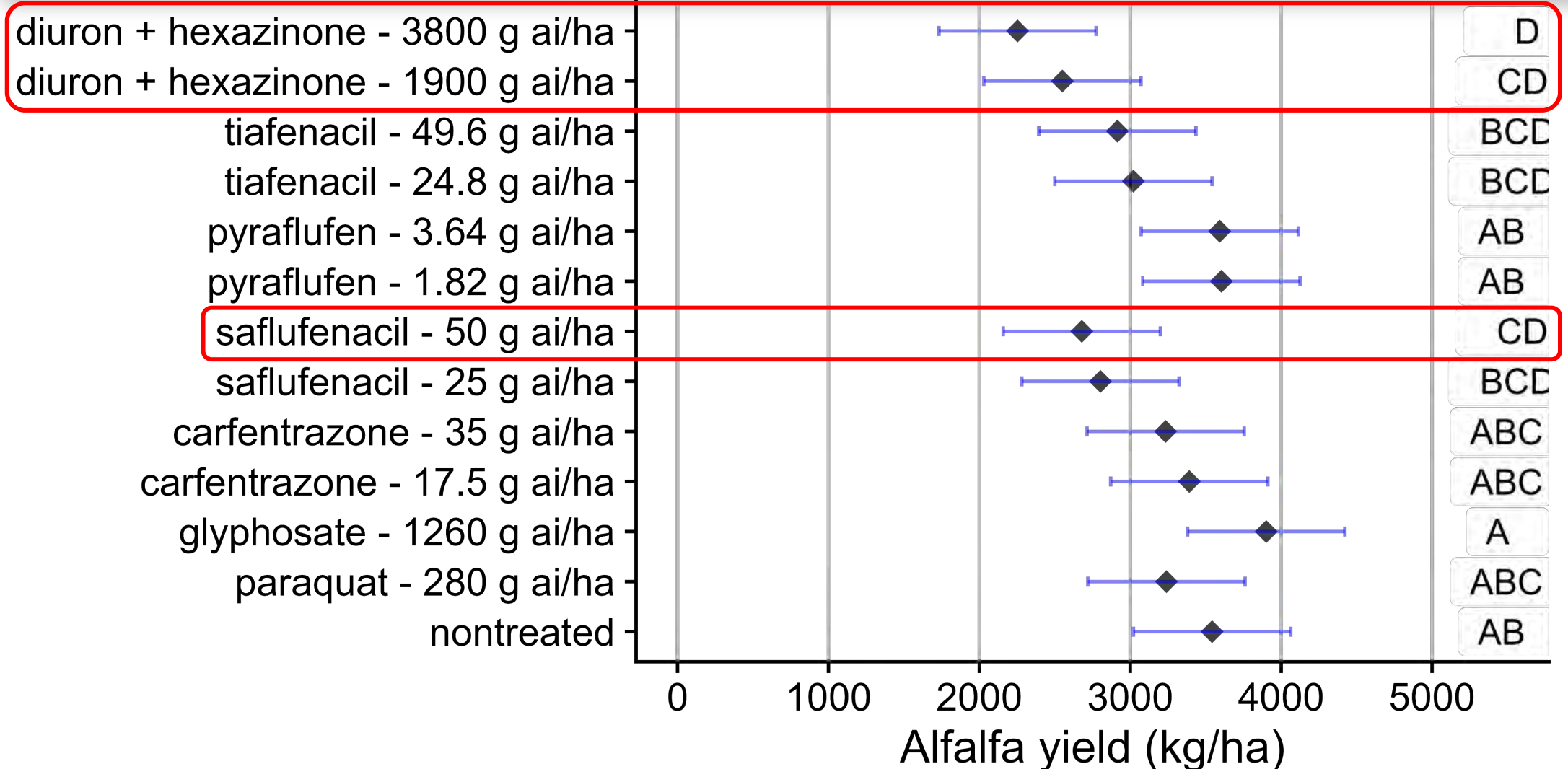


Alfalfa forage yield – Kimberly ID



Alfalfa forage yield – Greenville UT

I



Summary



- Alternative herbicides evaluated were as effective or more effective than paraquat
 - Alfalfa recovered very quickly after injury from burndown herbicides
 - Little to no alfalfa yield reduction from herbicide injury
 - Alfalfa nutritive value was mostly not affected by herbicide treatments
 - Paraquat remained the cheapest option for spring weed burndown, but pyraflufen, tiafenacil, saflufenacil, and carfentrazone may be good viable alternatives
-

Acknowledgment



- Funding for this study was provided by the U.S. Alfalfa Farmer Research Initiative of the National Alfalfa & Forage Alliance.
- UI and USU weed science crew





Alfalfa value-added characteristics: Screening cultivars for biochemical compounds

2026 NAAIC

July 15th, 2026

Drs. Jo Heuschele & Zhanyou Xu





Objective 1:

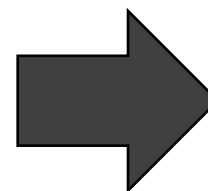


Protein Profiles:

- Leaf
- Seed



Vitamins
Dietary Fiber
Anti-nutrients
Amino Acids
Fatty Acids
Mineral Content



- Vitamin A, B1, C and E alfalfa herbage than soybean herbage.
- Vitamin B9, B12, and K overall

Objective 2:

- Vitamin B9, **B12**, **iron** and **K**
- **Saponins**



X 50

Improving Alfalfa Weevil Management in the Central High Plains:

Resistance Screening, Overwinter Survival, and Population Monitoring

Pin-Chu Lai, Ph.D.

Field Crop Entomologist & Extension Specialist

University of Nebraska-Lincoln

Panhandle Research, Extension, and Education Center

July 15, 2026

NAAIC: NAFA Checkoff Lightening Presentation

Alfalfa Weevil Life Cycle

Adults back in the fall;
overwinter as adults (mostly)

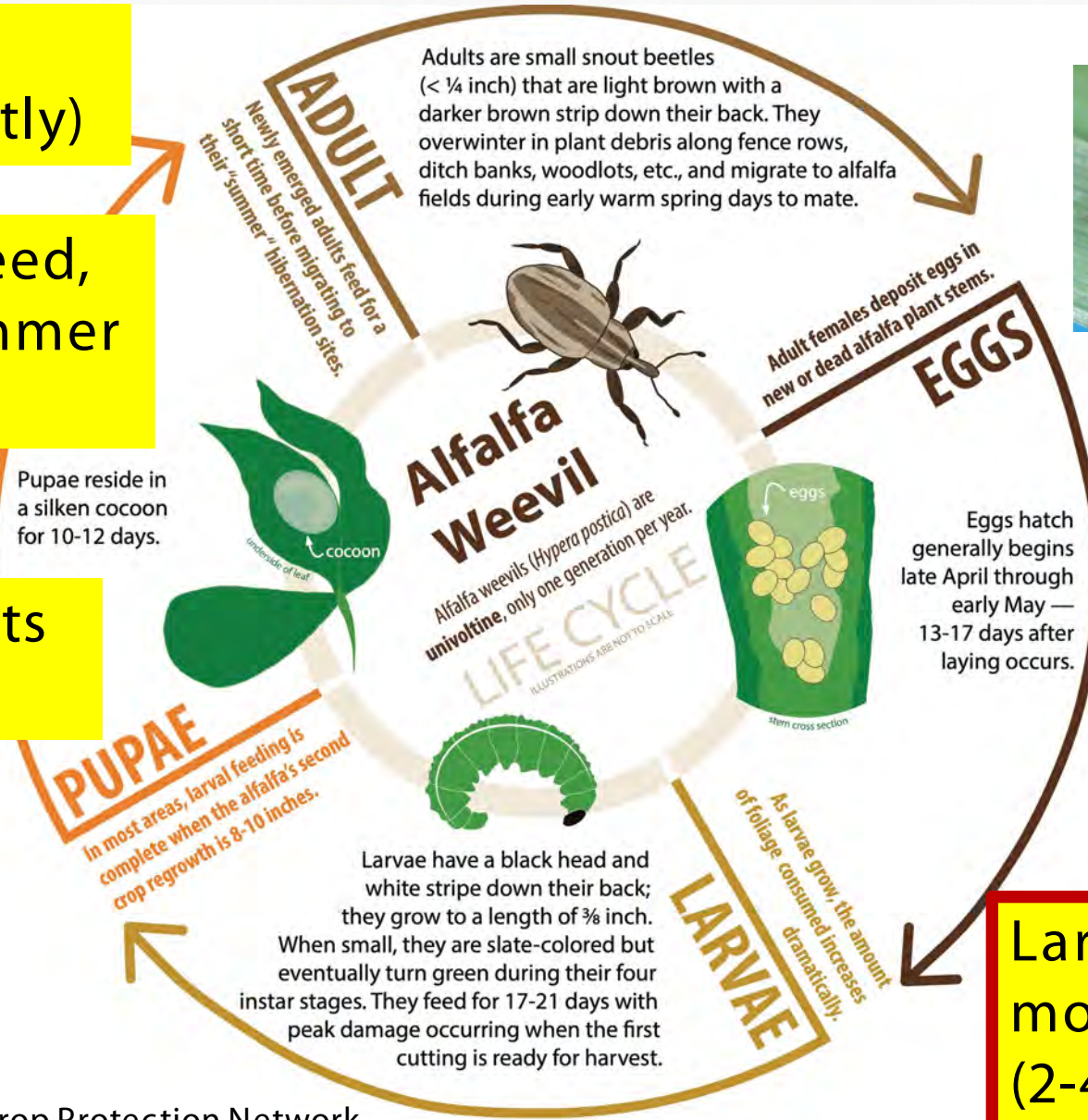
Adults emerge, feed,
and leave for summer
hibernation

Pupate in plants
(1-2 wk)



D. Owens, U. Delaware

Crop Protection Network



Eggs in stems
(1-2 wk)



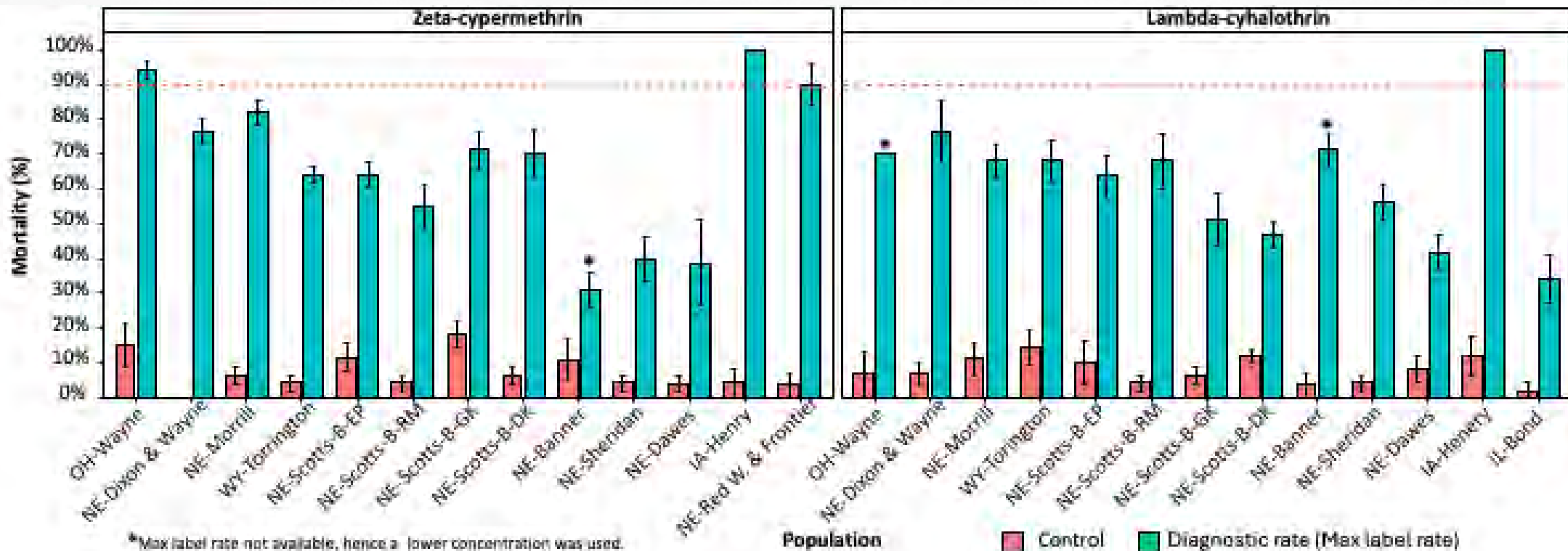
J. Bradshaw

Large larvae cause
most feeding damage
(2-4 wk)

Control Failure Challenges

- Insecticide resistance?

- Pyrethroids resistance in western U.S. (AZ, CA, MT, OR, WA, WY)
- Resistance status unclear in the Midwest



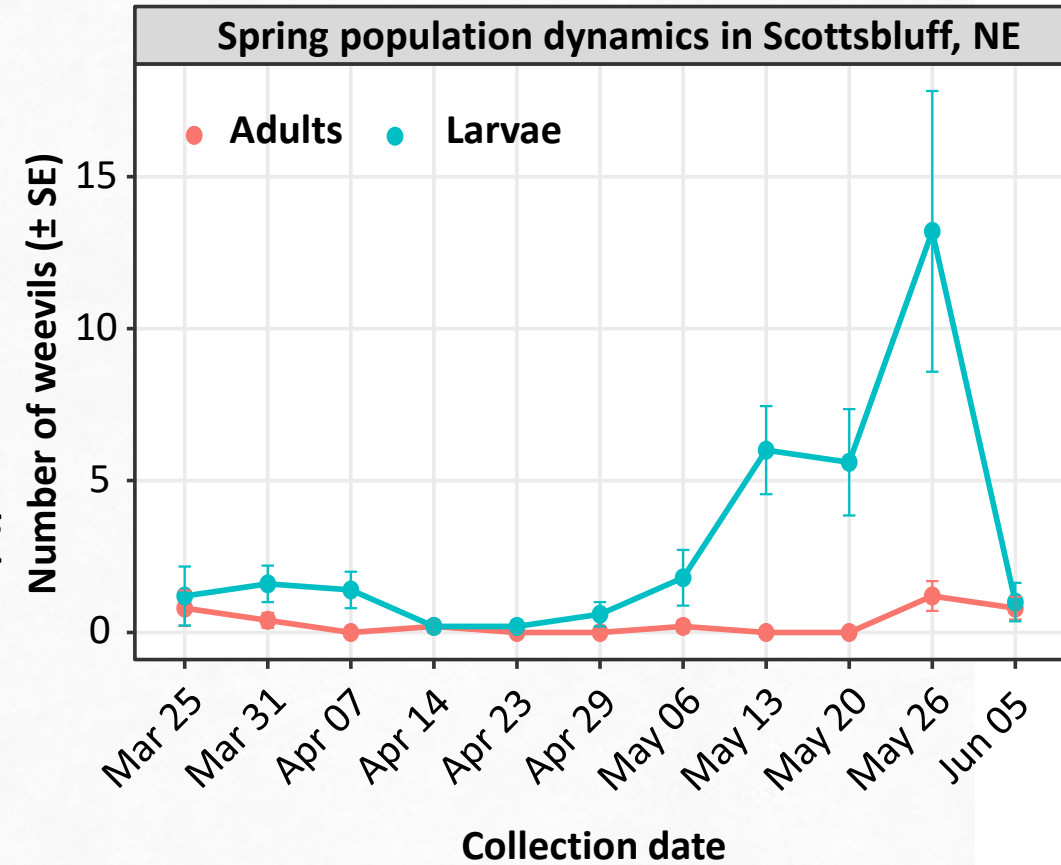
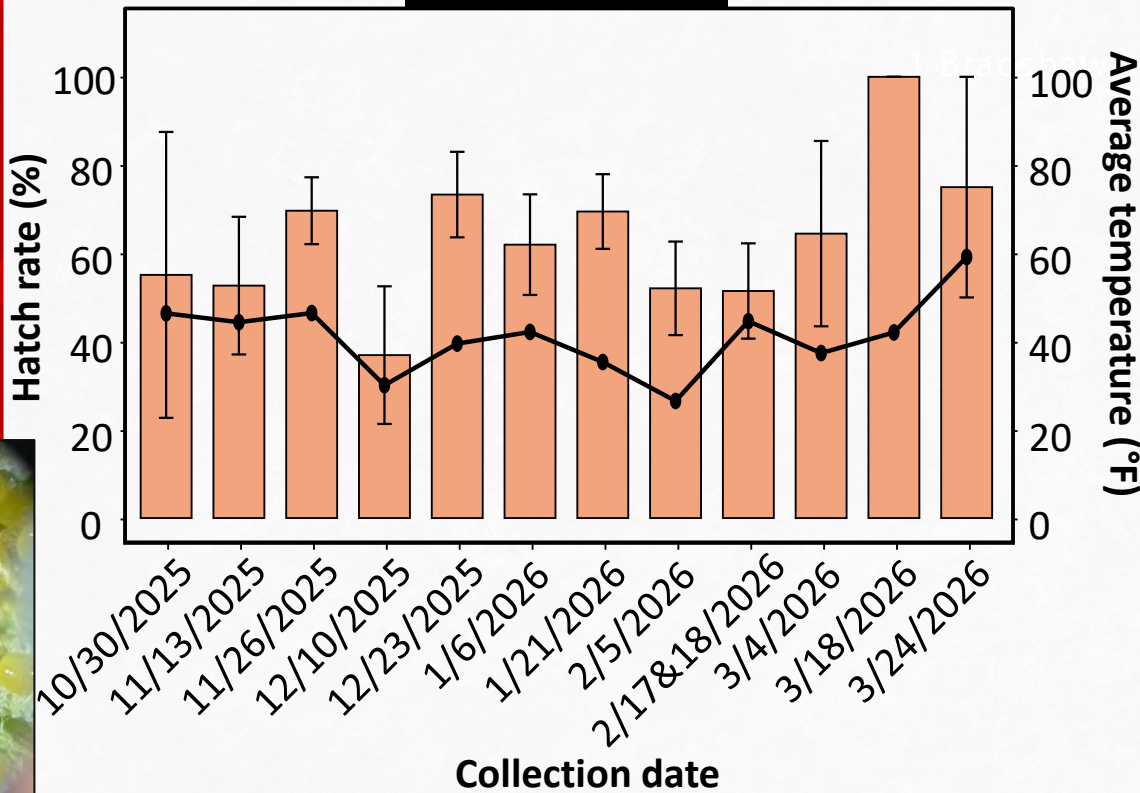
Populations in the Midwest might be losing susceptibility to pyrethroids

Control Failure Challenges

- **Changes in phenology?**
 - Eggs overwinter survival increased in central Midwest?
 - Extended larval feeding window?

Maybe?

37-100%



N



Summary & research projects

1. Insecticide resistance in the Midwest?

- Testing multiple pyrethroids in NE, IA, IL, OH, WY, CO
- Compare susceptibility (LC 50/90) to populations in the west

2. Changes in phenology

- Avg. 60% eggs survived last mild winter in western NE
- Adjust/update IPM tools: degree-day models

3. Strains composition

4. Parasitoid population

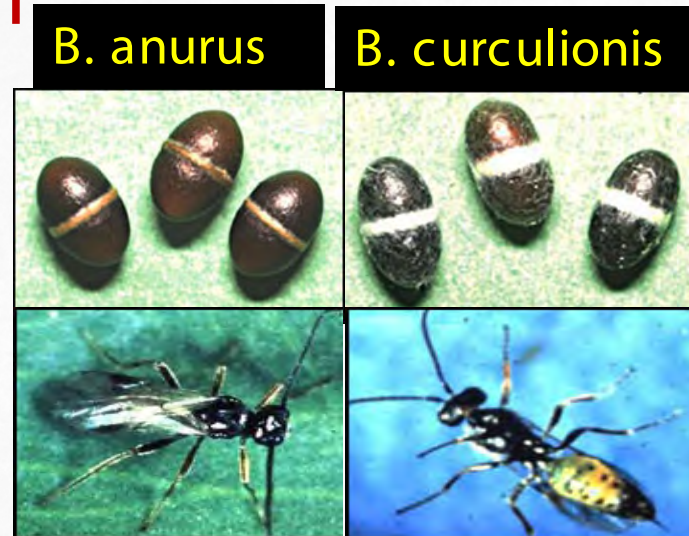


Photo: USDA-ARS



Tennyson Bilinkhinyu Nkhoma

*Ph.D. Graduate Research Assistant
Department of Entomology*



2026-2028 U.S. Alfalfa Farmer Initiative funded project

A multi-state effort to evaluate if alfalfa can eliminate herbicide resistant *Amaranthus* weed seed production and reduce the seedbank to near zero

Sarah Kezar, John Wallace, Mark Marsalis, Leslie Beck & Mark Renz



WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON

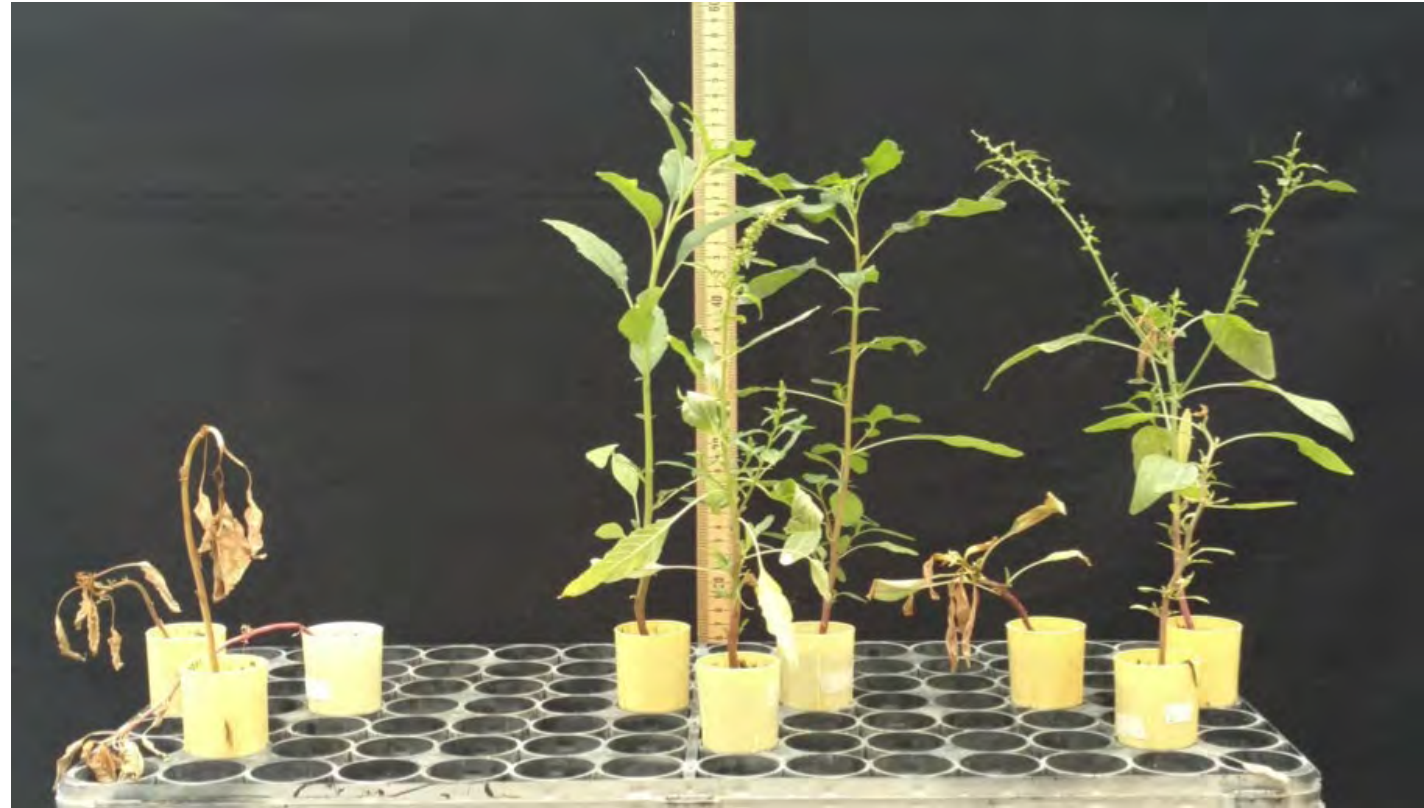


PennState



Herbicide resistance is a major problem in agriculture!

- Weed populations are developing resistance to herbicides
 - Increases costs to manage (\$30-100 / A)
- Amaranthus species are the most problematic
 - Waterhemp, Palmer amaranth
 - Populations common that are resistant multiple SOA



Alfalfa may help with long-term management

- effective weed management tool
- Amaranthus species are sensitive
 - short longevity in the soil
 - development

Questions

1. Can alfalfa reduce Amaranthus spp seedbanks?
 - To what degree?
 - Does effective management in the establishment year enhance?
 - Do gametocides enhance reduction?



Methods and measurements

- Locations
 - Wisconsin (Lancaster)
 - Pennsylvania (Rock Springs)
 - New Mexico (Los Lunas)
- Established plots in spring
 - Applied 3 of 4 treatments
- Measurements
 - Weed
 - Alfalfa
- Comparing seedbank results with 6 on-farm locations (WI)

TRT	AI	Timing
NTC	-	-
Warrant	Acetochlor	Alfalfa emergence
Butyrac	2,4-DB	2 inch tall weeds
Butyrac+ Prowl H20	2,4-DB + Pendimethalin	2 inch tall weeds
Pursuit	imazethapyr	August

Initial results (Wisconsin only)



Table 2: Alfalfa cover prior to 1st cut*

treatment	6/9	6/18	7/2	
NTC	33	34 c	40c	
Warrant	43	55 b	60b	
Butyrac	41	68 a	83a	
Butyrac + Prowl	41	67 a	85a	
P value	0.124	<0.001	<0.001	



Alfalfa Disease Survey and Fungicide Seed Treatments Trials in the Dakotas

Wade Webster, Ph.D.

Assistant Professor and Extension Pathologist

Department of Plant Pathology, Microbiology, and
Biotechnology

North Dakota State University

July 15th, 2026

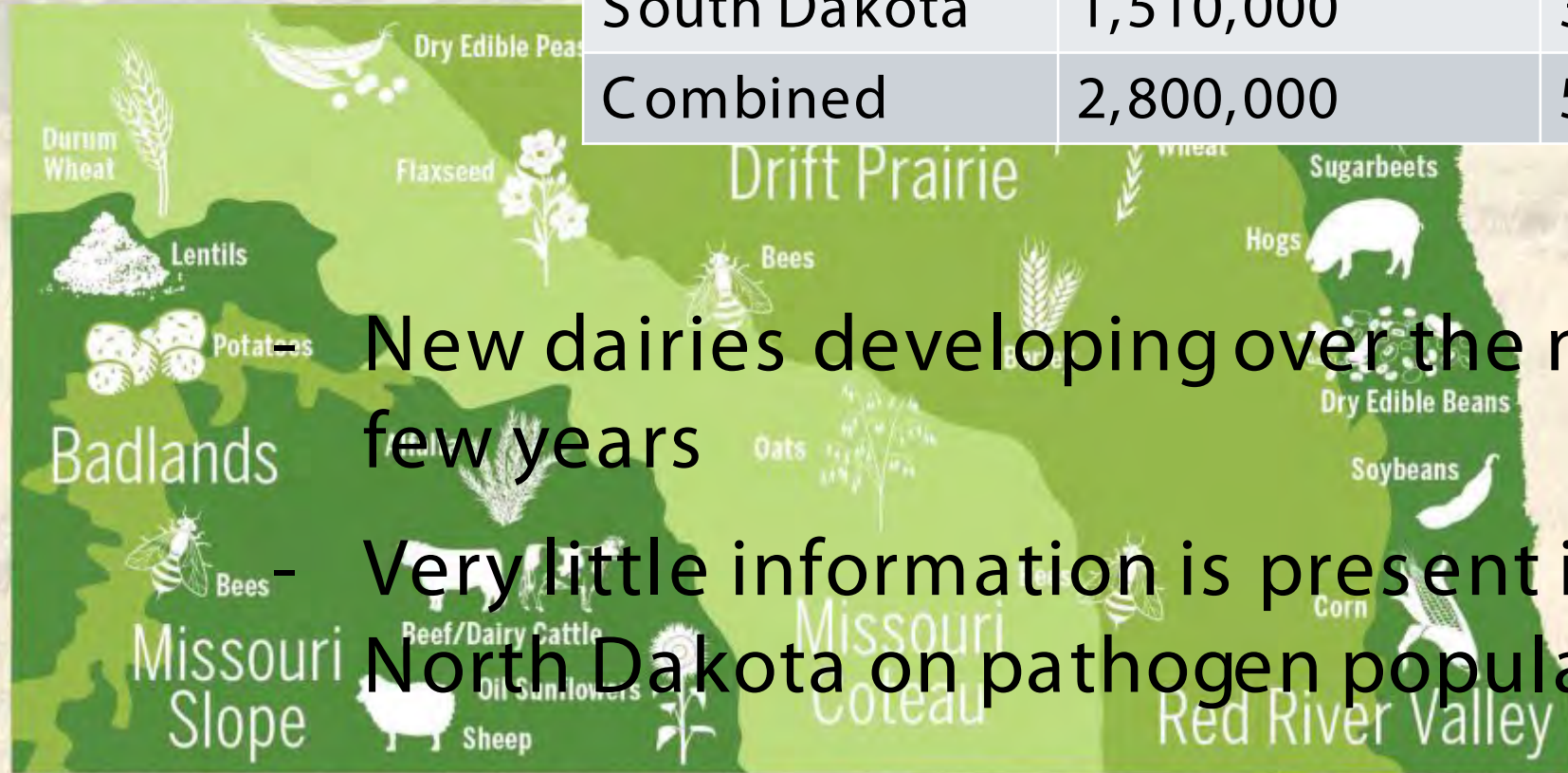
Objectives

1. Conduct a regional survey of alfalfa diseases present in North and South Dakota
2. Evaluate the efficacy of fungicide seed treatment programs



WHAT'S GROWING

Agricultural commodities span the state,



State	Alfalfa Production (ac)	Cattle Inventory
North Dakota	1,290,000	1,730,000
South Dakota	1,510,000	3,550,000
Combined	2,800,000	5,280,000

New dairies developing over the next few years

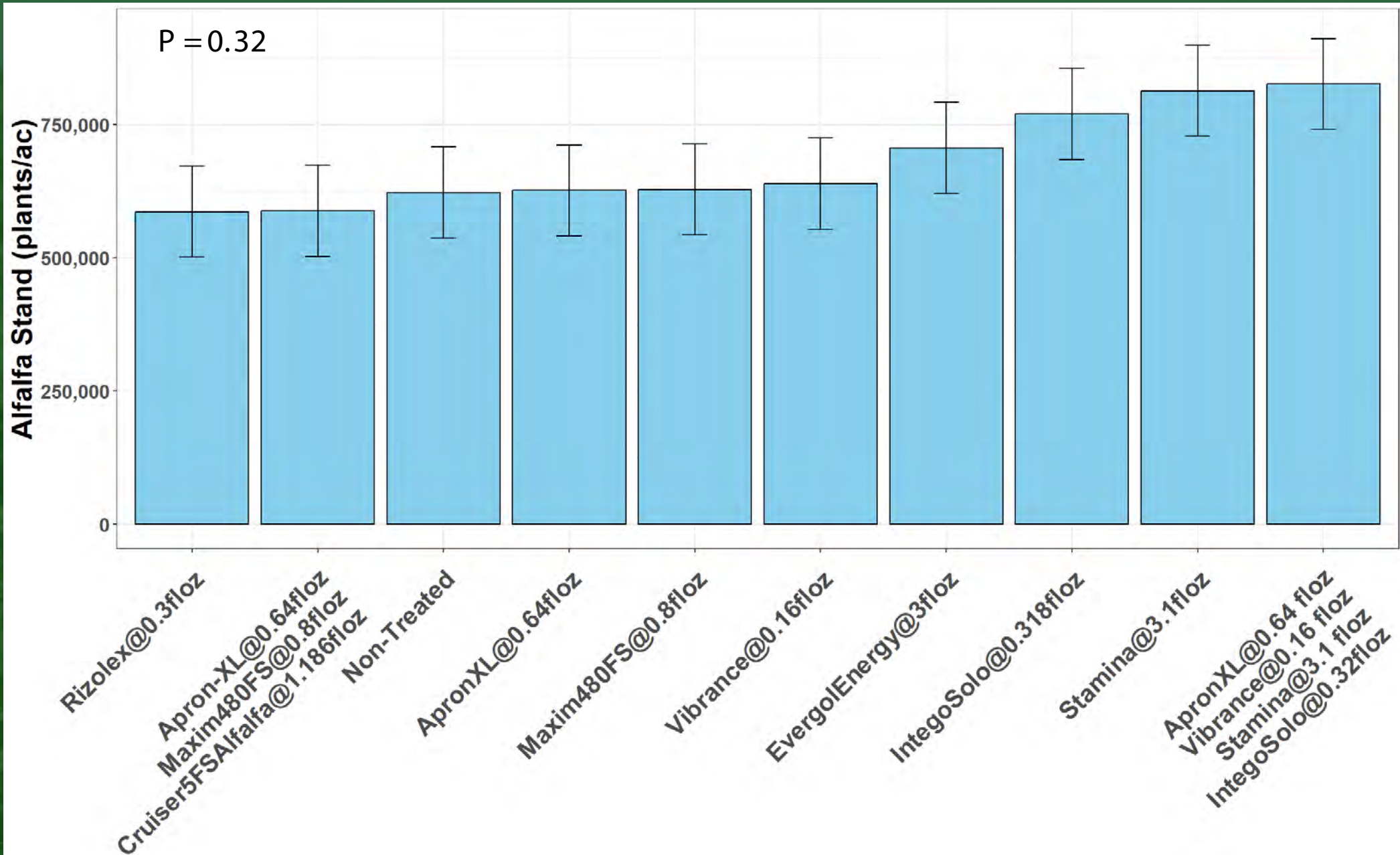
- Very little information is present in North Dakota on pathogen populations

1. Conduct a regional survey of alfalfa diseases present in North and South Dakota

- Scouting production fields during 2026 and 2027
- Isolation of pathogens from soil, alfalfa roots, crowns, stems, and leaves
- Molecular confirmation via ITS and TEF1 α
- Confirmation of pathogenicity via Koch's Postulates

2. Evaluate the efficacy of fungicide seed treatment programs

- Evaluation of nine commercial seed treatment programs for field performance
- Three sites planted in 2026
 - Stand Counts (plants/ac)
 - Harvest Biomass (g)
 - Winter Survival (%)



Thank you!

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**National
Sclerotinia
Initiative**

