Soybean Management

Part 1: On-Farm Strategies to Reduce Deer Damage

Part 2: Optimizing In-Season Potassium Applications

David Moseley
LSU AgCenter – Soybean Specialist

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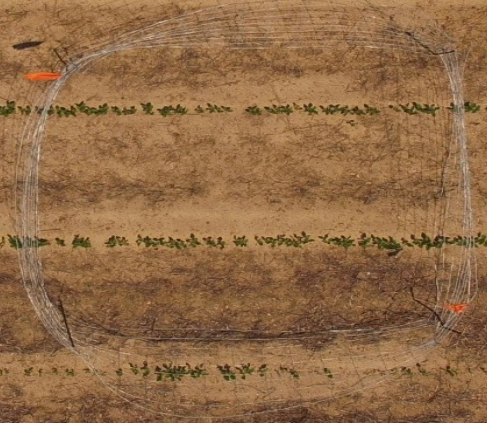
On-Farm Strategies to Reduce Deer Damage

2024 & 2025 LSU AgCenter Deer Repellent On-farm Trials

- **Collaboration**
  - Farmers
  - LSU AgCenter
  - Consultants
  - Companies
- **Treatments**
  - Products
  - Rates
  - Application timings
- **Funding**
  - LA Soybean & Grain Research & Promotion Board

2 WAP



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2024 Deer Repellent On-farm Trial (M-Pede vs Control)

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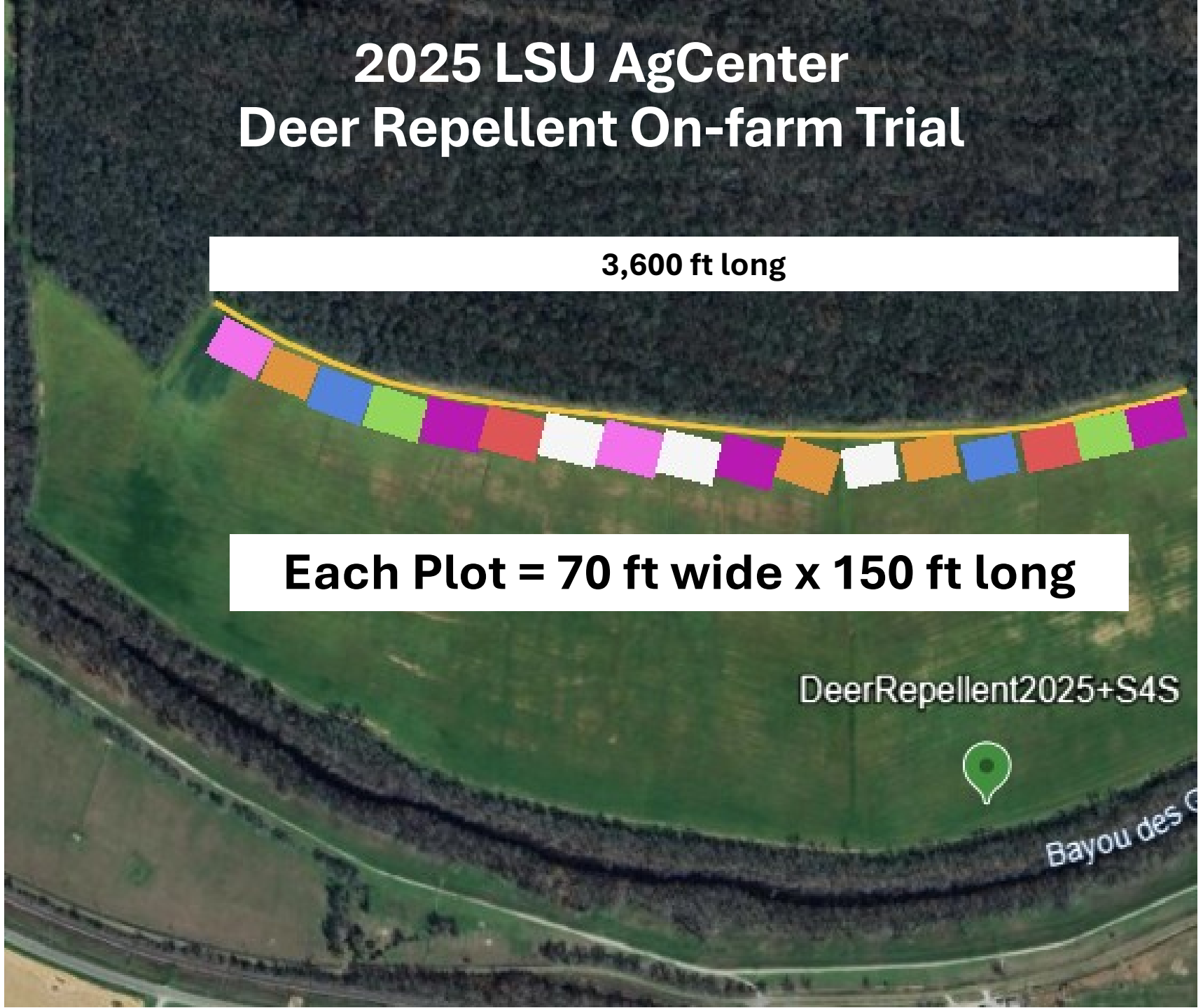
2025 LSU AgCenter Deer Repellent On-farm Trial

Product	Ingredients	Application Time	Rate	Gal/A Spray Mixture	Location (State Entering Product)
M-Pede	K salts of fatty acids	**Emergence**	2%	10 gal/A	**S4S (Louisiana)**
Milorganite	6-4-0	**Emergence**	1,000 lbs/A		**S4S (South Carolina)**
TriCo Pro	Sheep fat (up to 6 months control)	**Emergence**	1.65 gal/A	20 gal/A (80 – 120 gal/A)	**S4S (Virginia)**
Penergetic b WV	Zeolites and citric acid	**Emergence**	14 oz/A	10 gal/A	LA only
Hinder	Ammonium soaps of higher fatty acids	**Emergence**	1 qt/A	10 gal/A	LA only
Plantskydd	Blood based (rain fast in 24 hours – 4 – 6 weeks control)	**Emergence**	1 lb/A	10 gal/A	LA only
M-Pede	K salts of fatty acids	**Emergence + 2 weeks + 2 weeks**	2%	10 gal/A	LA only
Control					**S4S (Control)**


2025 LSU AgCenter
Deer Repellent On-farm Trial
3,600 ft long
Each Plot = 70 ft wide x 150 ft long
DeerRepellent2025+S4S
Bayou des

2025 LSU AgCenter Deer Repellent On-farm Trial

- **Planting date:** May 15
- **Emergence date:** May 20
- **Repellent application date:** May 22
- **Rain:**
  - May 25, 2025 = 0.25 inches
  - May 26, 2025 = 0.6 inches
  - May 27, 2025 = 1.4 inches

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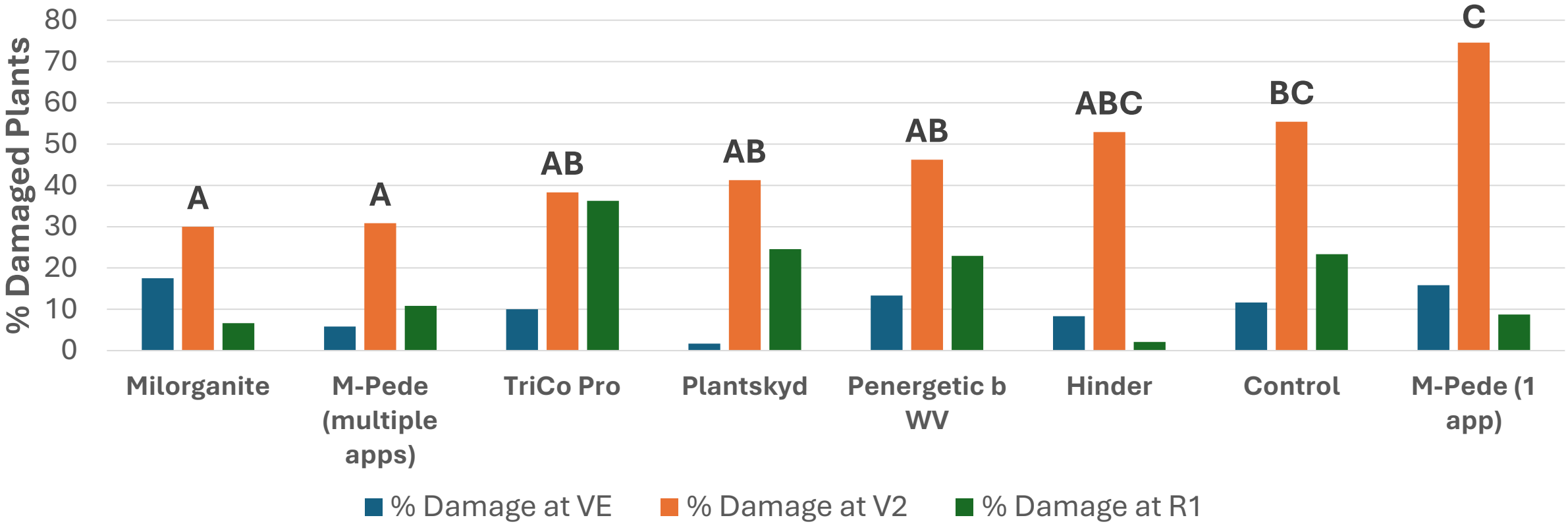
2025 LSU AgCenter Deer Repellent On-farm Trial

2025 LSU AgCenter Deer Repellent On-farm Trial

% Damage for Harvested Area (VE - R1)



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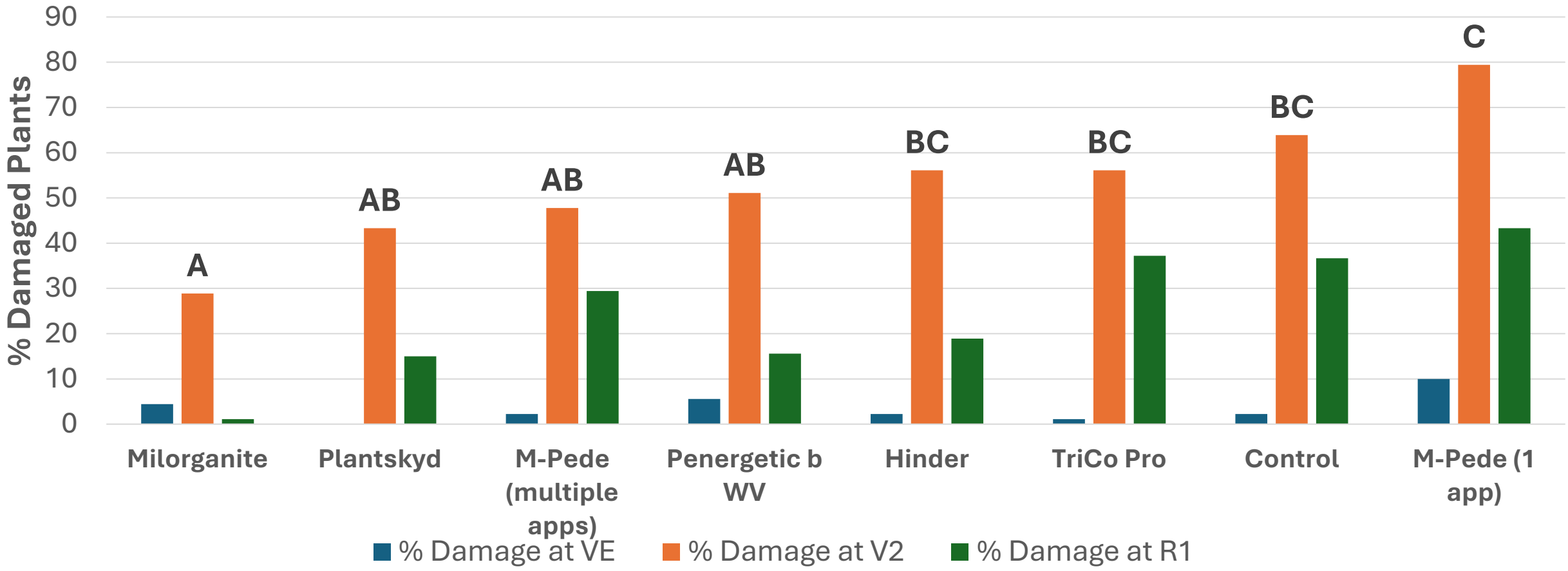
% Damage for Past the Treated Area (VE - R1)



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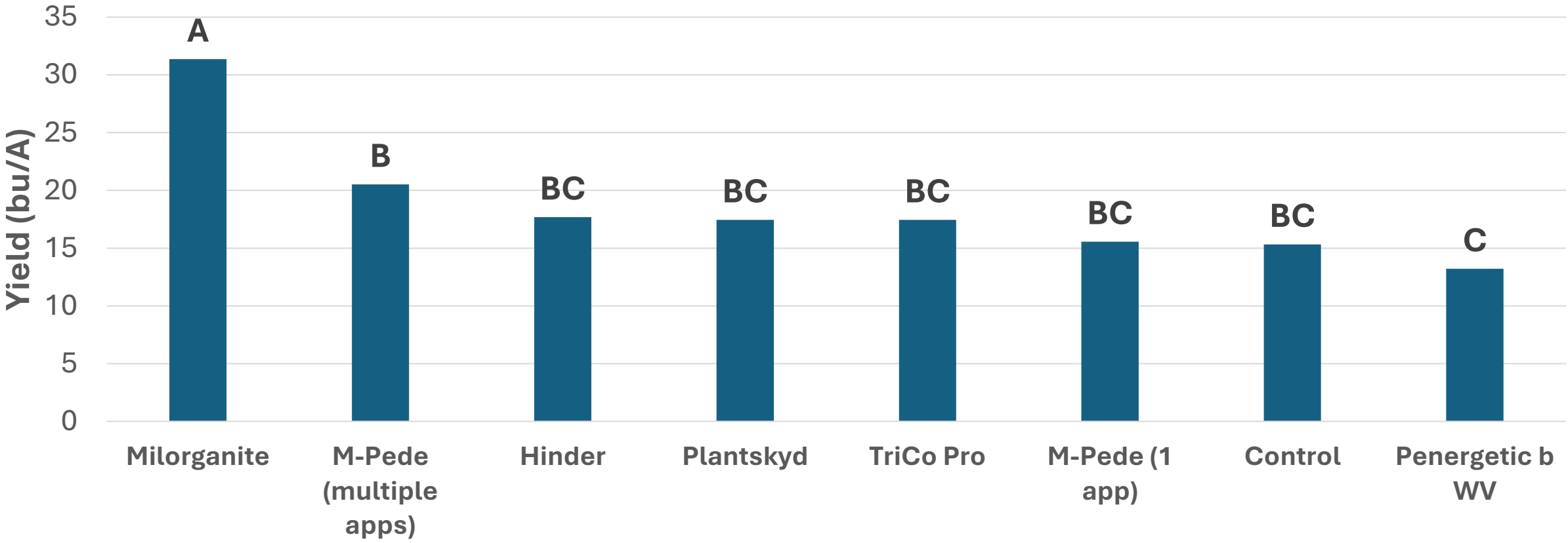
2025 Deer Repellent Yield for All Plots



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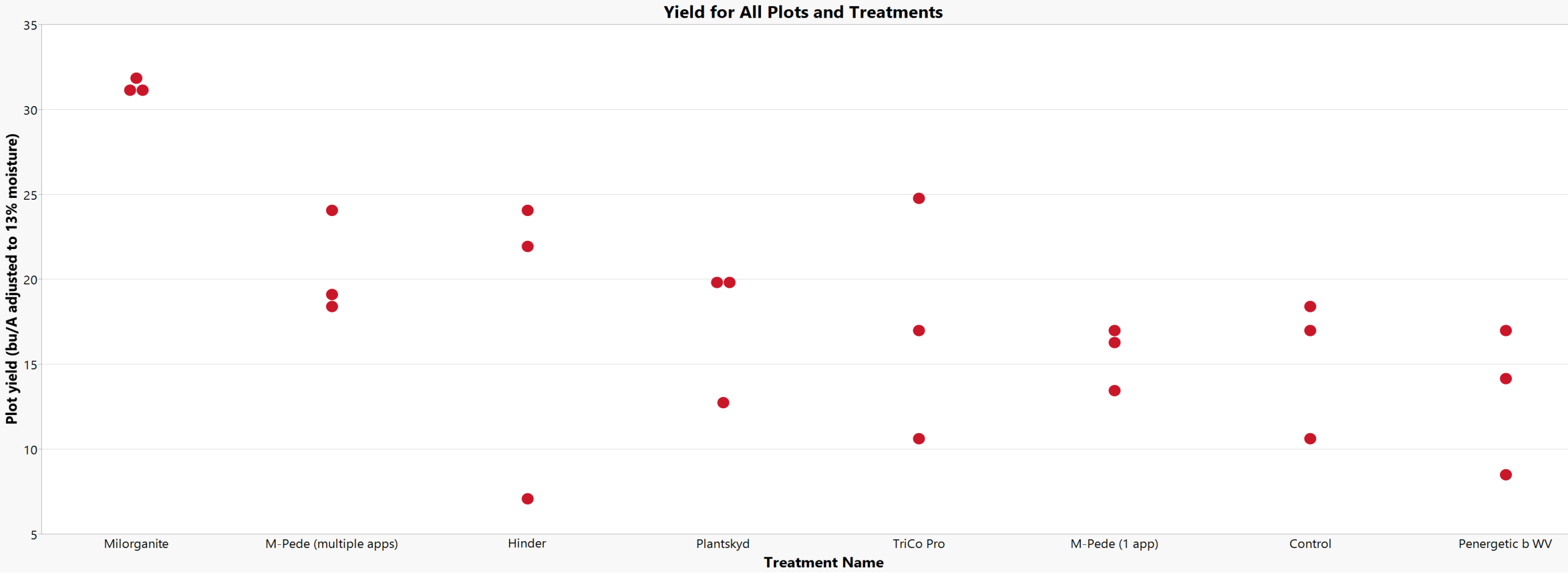
Yield Variation for All Plots



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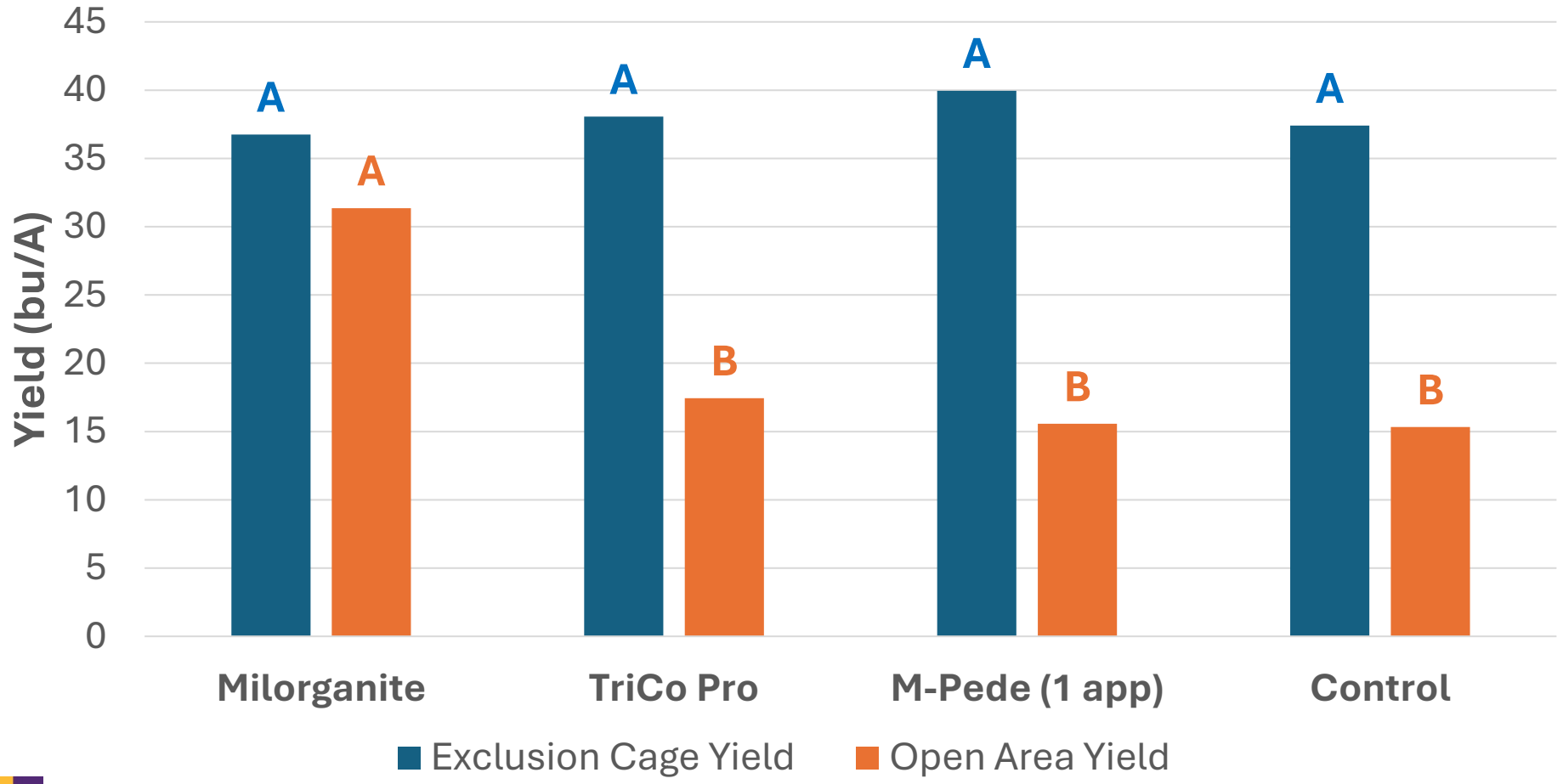
2025 Deer Repellent - Yield with Exclusion Cages



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2025 NCSU Deer Trial

(nothing working and Mpede app. on exclusion cage plants)

Managing Deer Damage in Agriculture

Integrated Pest Management is essential for successful damage reduction!

Manage deer densities

Fence high damage areas

Implement repellent “program” in low to moderate damage fields.

Deer Densities in Agriculture

Image credit: Bone Collector

100 deer per square mile
Assume 50% female = 50 does/mi2 or 7.8 does/100ac
Doe Harvest

20%	10 does/mi2 or 1.56 does/100ac
30%	15 does/mi2 or 2.34 does/100ac
40%	20 does/mi2 or 3.12 does/100ac
50%	25 does/mi2 or 3.9 does/100ac

- Harvesting **20-30%** of adult does will **stabilize** herd density (National Deer Association)
- Must harvest more than 30% of adult does to begin decreasing the population
- Deer densities greater than 20-30 deer per square mile may create significant crop loss.

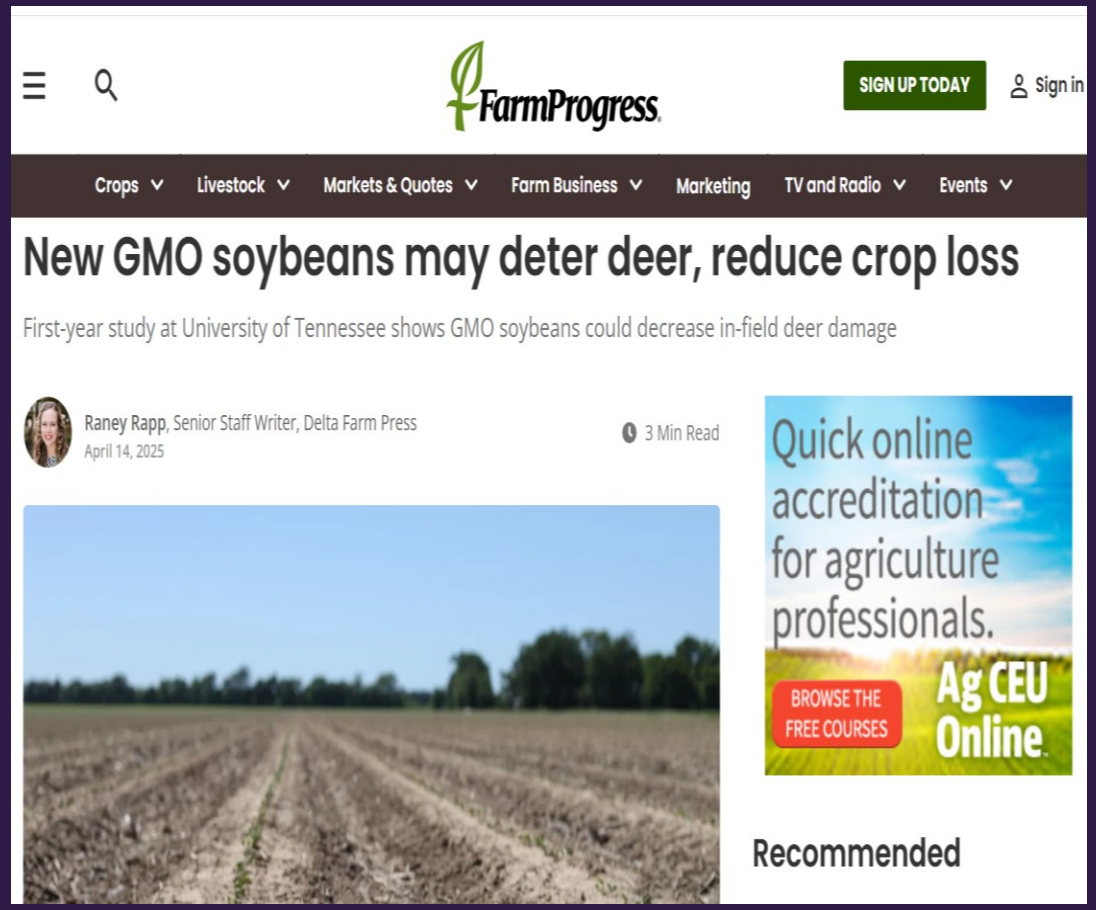
Return On Investment

- Repellent applications must make **Cents**
- If repellent is $20/acre/application, each application must make over 2 bushels
- In moderate damage, growers should plan on 3-5 applications to make it through the growing season. Thus, using a generic $20/acre/application a repellent program must make 6-10 bushels per acre to cover its costs.
- Only works if you stay with it!!!!!

7 wire Slanted Fence

- 7 strands alternating hot-ground
- Total height = 5’
- 10” above ground for 1st line
- 12” spacing between lines
- 90’ between post with 2x4 battens @ 30’

The Future



Dr. Lirong Xiang's robotic deer deterrent

Take Home

Reduce deer densities below 30 deer per square mile.

Utilize exclusion fencing in high damage areas

Apply repellents as needed throughout the season

There are a lot of great scientists working hard to address deer damage in agriculture!

Optimizing In-Season Potassium Applications

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K Recommendations for Soybean

Leandro Vieira et al.

Table 3. Interpretations of Mehlich-3 soil test for potassium (K).

Corn*, Cotton*, Soybean* - all soil types

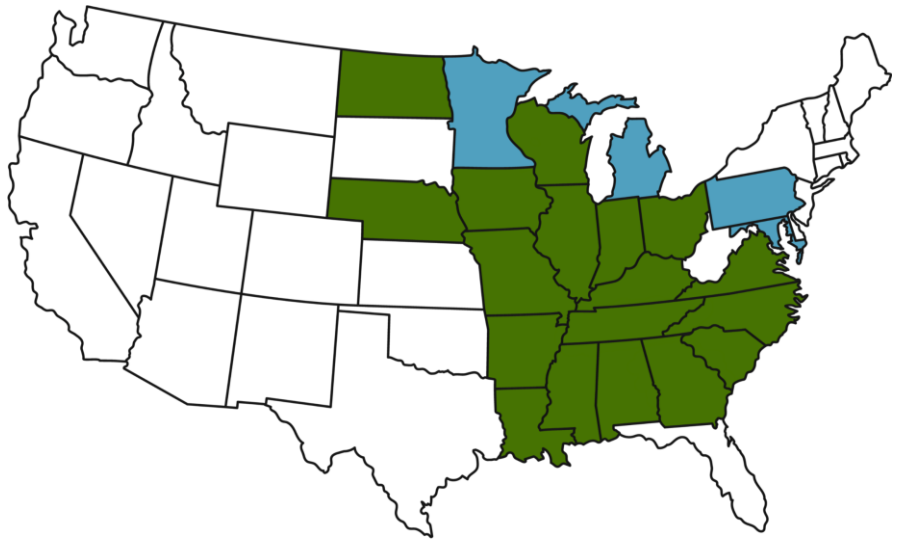
Soil Texture	Level	Concentration (ppm)	Recommendation (lbs K_2O/acre)
All	Very low	<50	120
All	Low	51-100	100
All	Medium	101-150	60
All	Optimum	151-250	0
All	Above optimum	>250	0

Soybean Nutrient Uptake and Removal

	Approximate		
Nutrient	Total Uptake	Removal in Grain	Removal in Stover
	lbs/bu	lbs/bu	lbs/ton DM
N	3.75	3.3	19.0
P_2O_5	0.90	0.74	5.2
K_2O	**2.3**	**1.17**	**39.0**
S	0.21	0.16	2.2
Mg	0.51	0.16	9.3
Ca	0.96	0.12	27.5
Zn	0.003	0.002	0.03
Mn	0.004	0.002	0.14
Cu	0.001	0.001	0.01
Fe	0.006	0.002	0.17
B	0.002	0.001	0.05

Adapted from data provided from Gaspar, Naeve, & Conley (2018); and Emma Grace (2024)

In-Season Potassium Response



Objectives:

1. Validate the **dynamic critical K concentration** curve for leaves and petioles beyond Arkansas in different environments
2. Determine the ability to **correct K deficiencies with in-season** corrective fertilizer applications across soils and irrigation capacities.

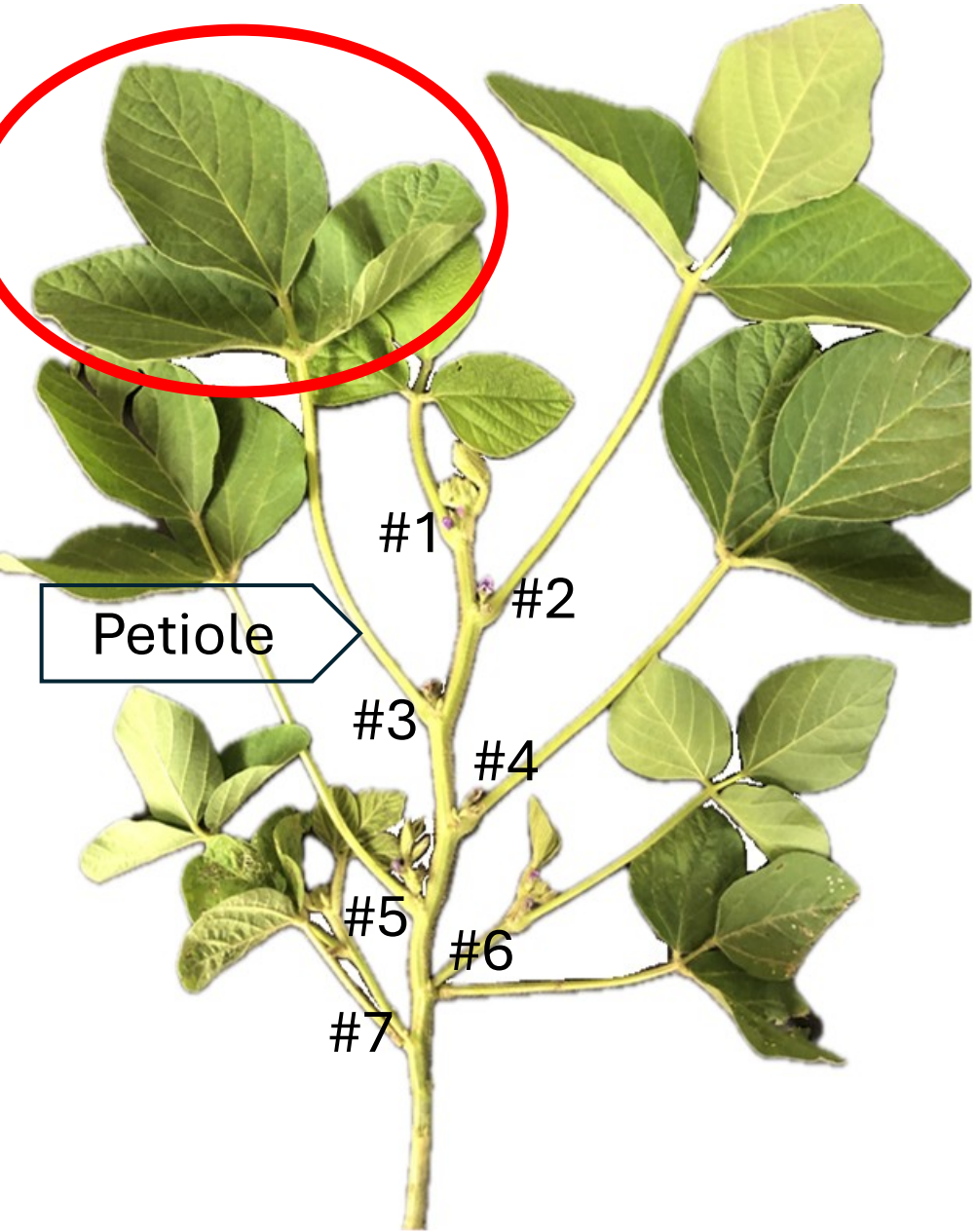
Timing	Source	Rate (lb K_2O/acre)
Preplant	Potash (0-0-60)	0, 30, 60, 90, 120, 150
5 days after R1	Potash (0-0-60)	0, 60, 120
	Foliar Feed (0-0-29)	4.15
20 days after R1	Potash (0-0-60)	0, 60, 120
	Foliar Feed (0-0-29)	4.15

Hidden Hunger

Expected K Symptoms

K Hidden Hunger

Proper Tissue Testing



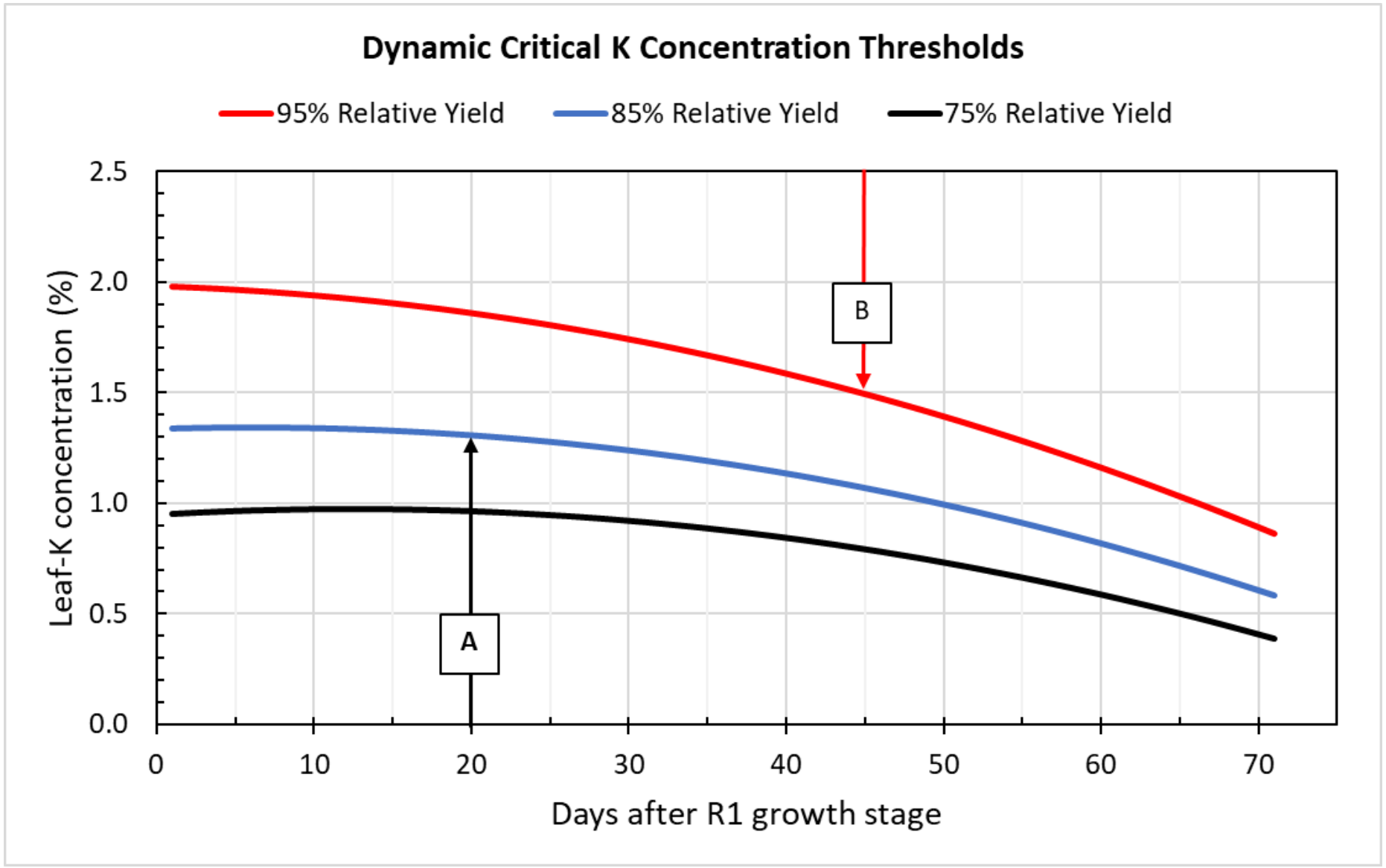
Uppermost Fully Expanded Trifoliate Leaf

Highest leaf with:

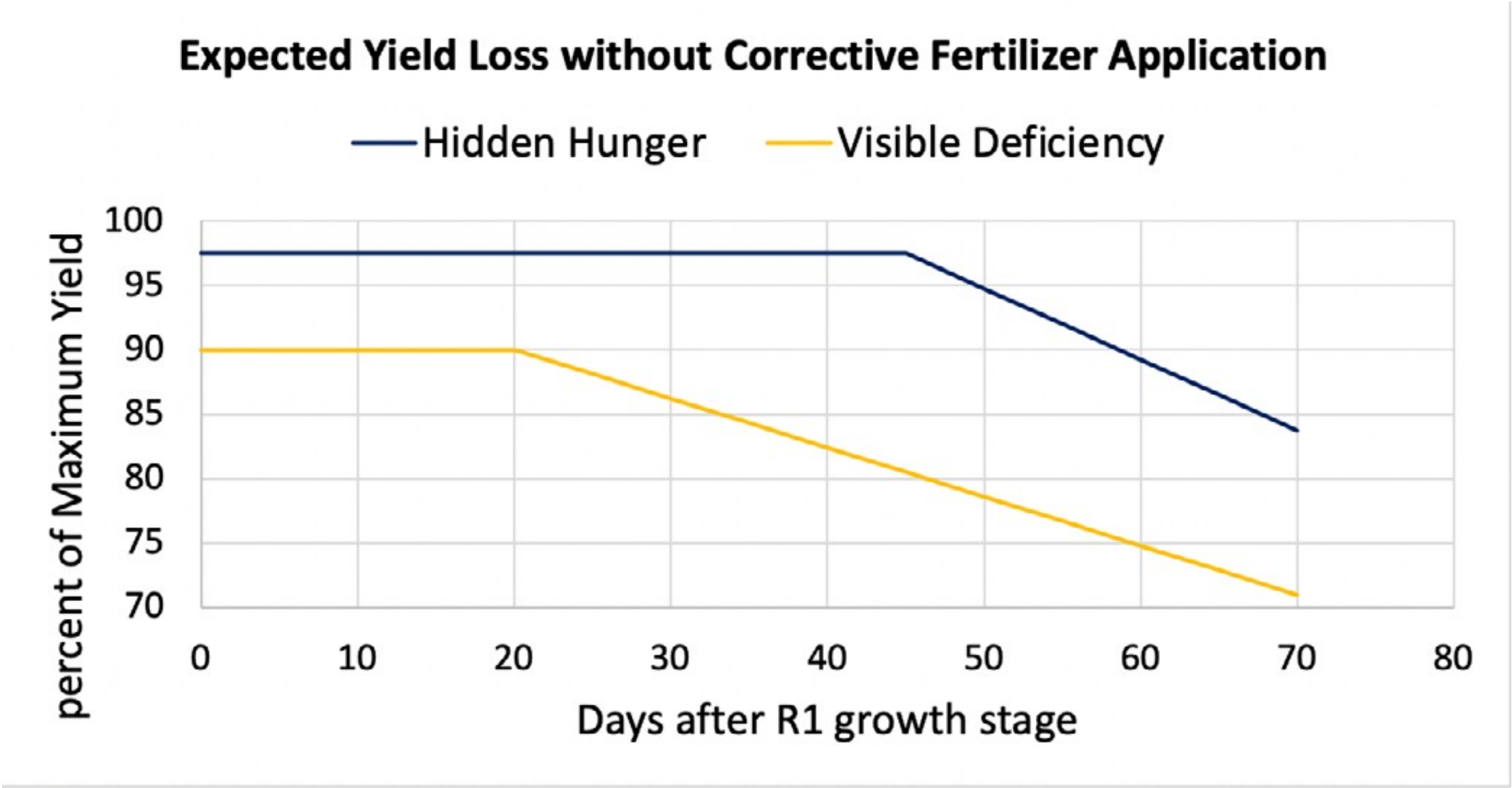
- Courser texture
- Darker color
- Does not include the petiole
- Includes all 3 attached leaflets
- 18 – 20 leaflets (randomly sampled)

Taken in good weather conditions!

Soybean Dynamic Critical K



Ortel et al. 2022. In-Season Potassium Management in Arkansas Soybean. University of Arkansas. FSA2200



Ortel et al. 2022. In-Season Potassium Management in Arkansas Soybean. University of Arkansas. FSA2200

Correcting K Deficiency In-Season

- K deficiency in soybean can be corrected in-season
- Apply 60 lbs K_2O per acre until the R5 growth stage
  - 100 pounds of Muriate of Potash (0-0-60)
- A higher % of yield potential can be recovered if the correction application is made close to R2

Rasel, P., Moseley, D., Copes, J., and Dodla, S. (2020). Soybean Potassium Deficiency and Management. LSU AgCenter.

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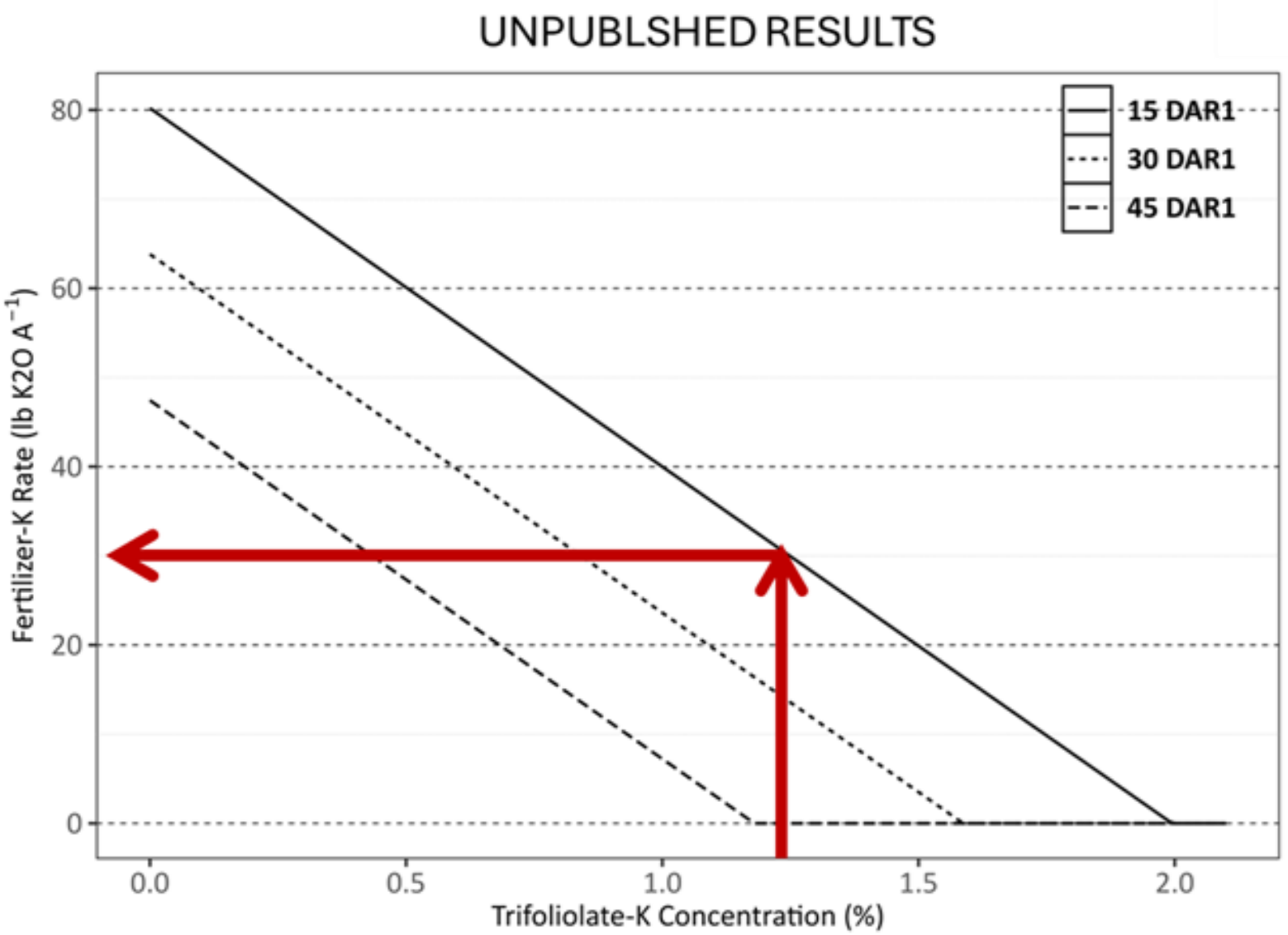
UNPUBLSHED RESULTS
15 DAR1
30 DAR1
45 DAR1
Fertilizer-K Rate (lb K2O A⁻¹)
80
60
40
20
0
0.0
0.5
1.0
1.5
2.0
Trifoliolate-K Concentration (%)

LSU AgCenter 2025 K Trial

- **Soil Type:** Coushatta silty clay loam

- **Soil-test K concentration:**
  - Early February: 147 lbs/A = **Low**
  - April: 224 lbs/A = **Medium**

- **Recommendation based on soil-test K concentration** (Drs. L. Vieira & R. Parvej)
  - **100 lbs K_2O** (with an estimated **8 – 31%** increase in yield and **100%** probability to see a yield increase)
  - **60 lbs K_2O** (with an estimated **1 – 24%** yield increase and **63%** probability to see a yield increase

LSU AgCenter 2025 K Trial

- **Planting date:** April 16, 2025
- **Maturity group:** 4.8
- **R1 date:** May 21, 2025

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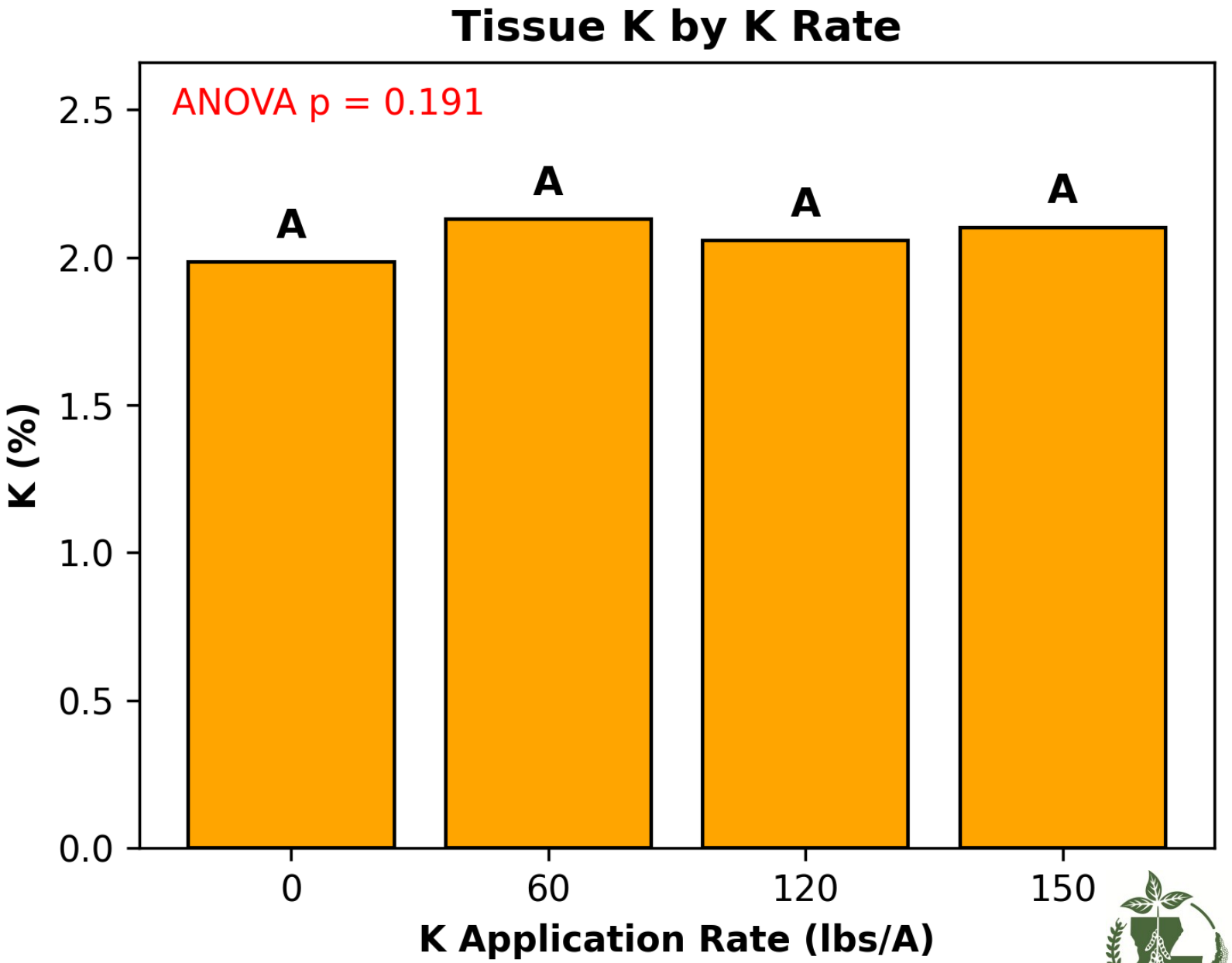

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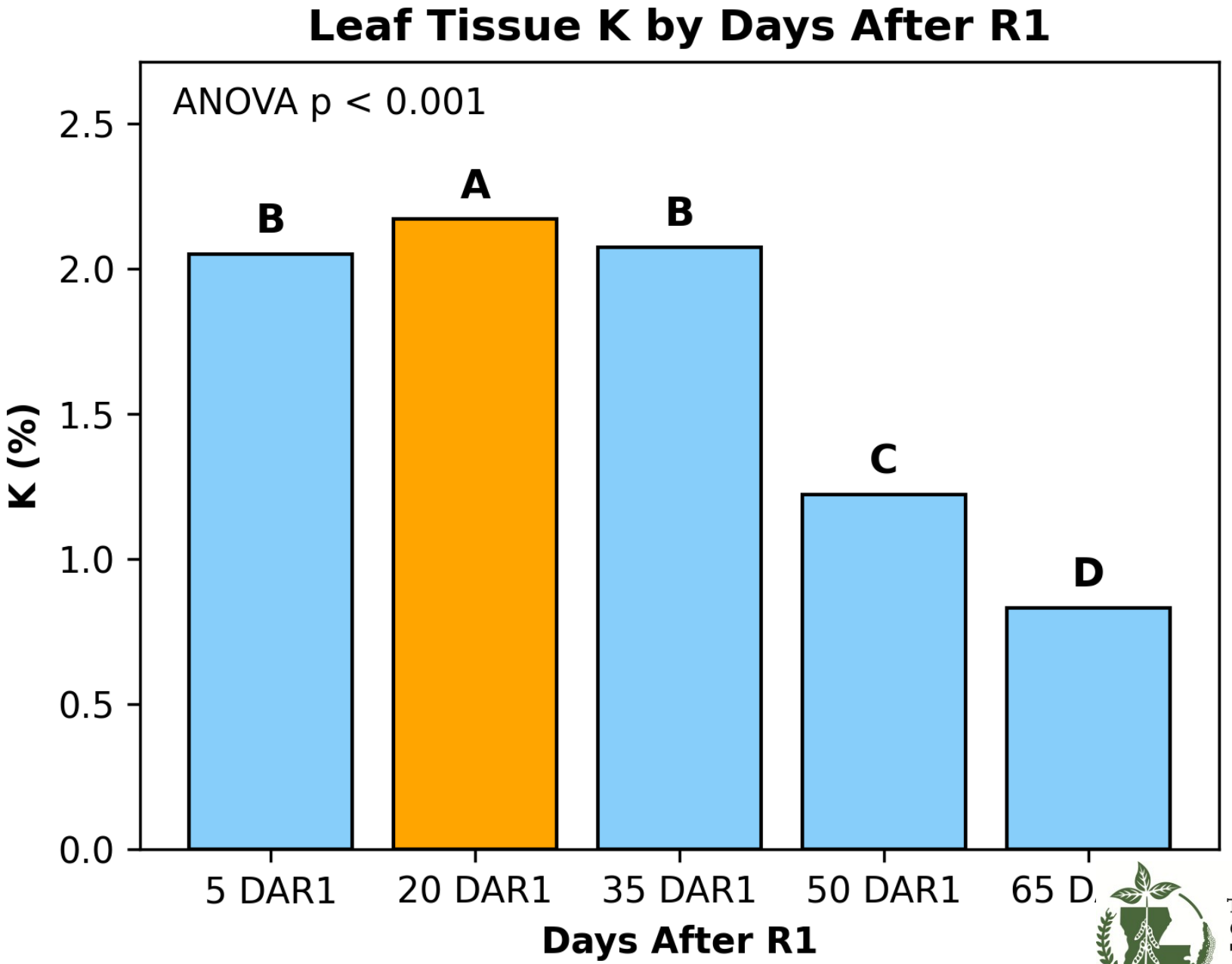

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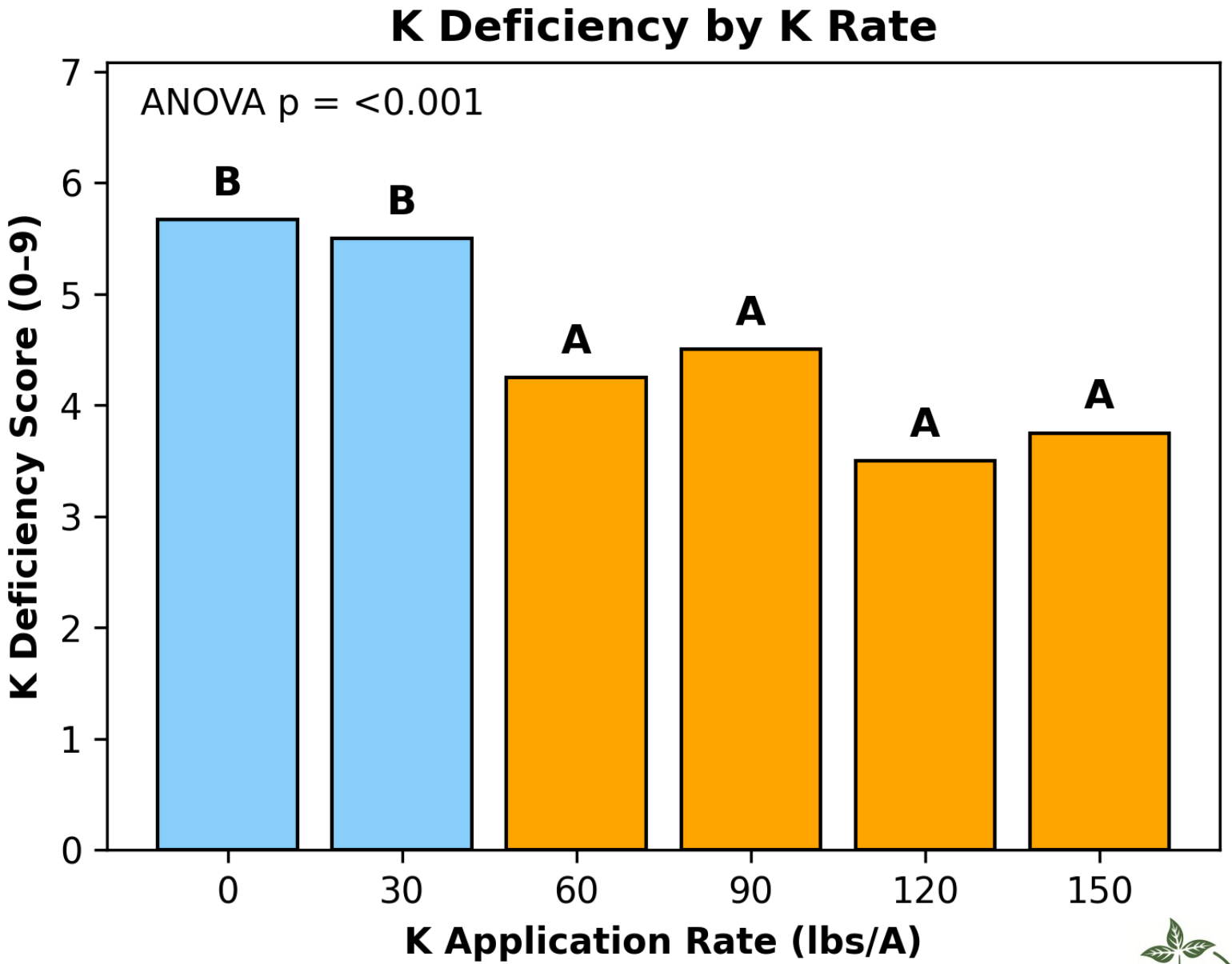
LSU AgCenter 2025 K Trial

Aug. 27, 2025 (R6.5 growth stage)



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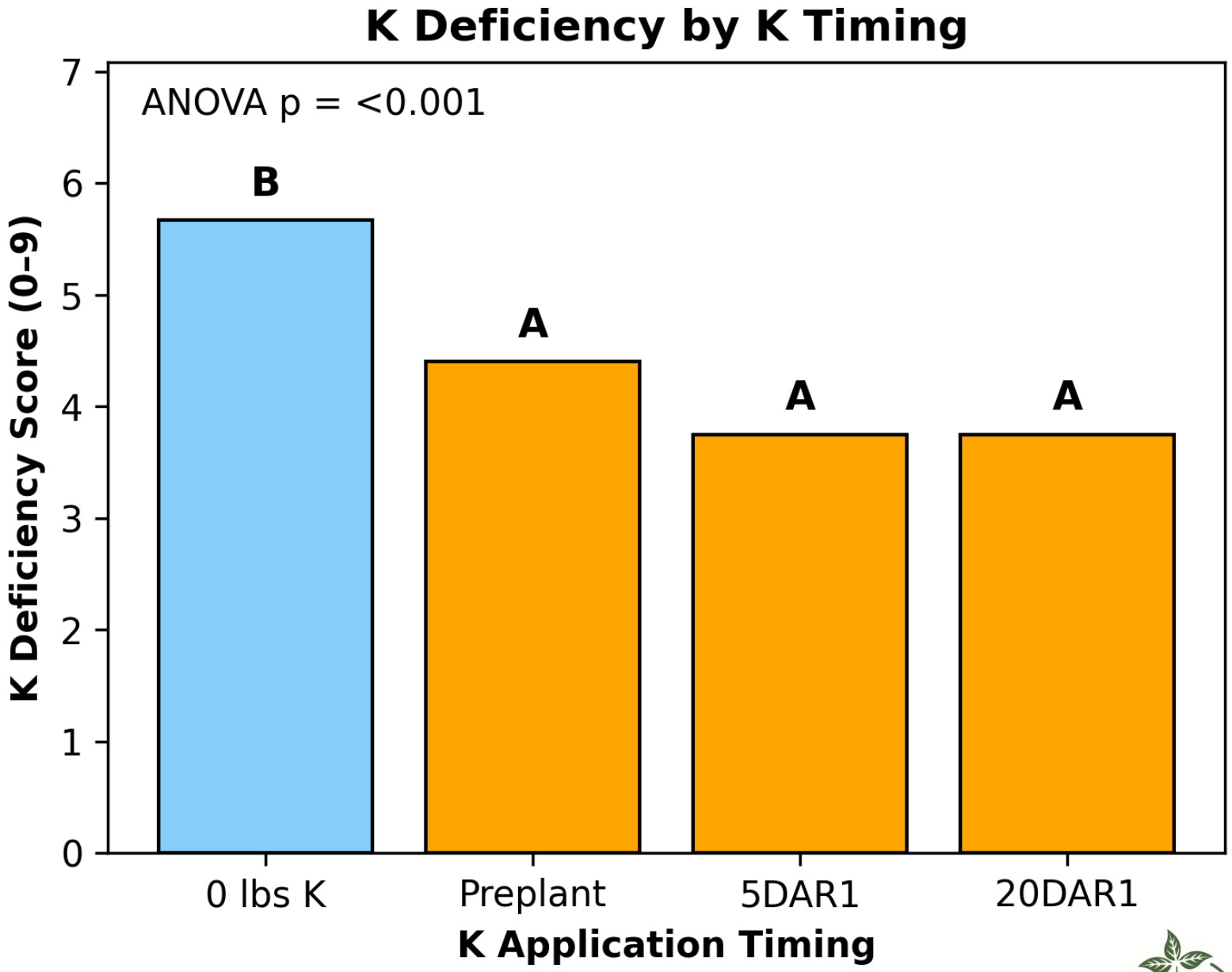

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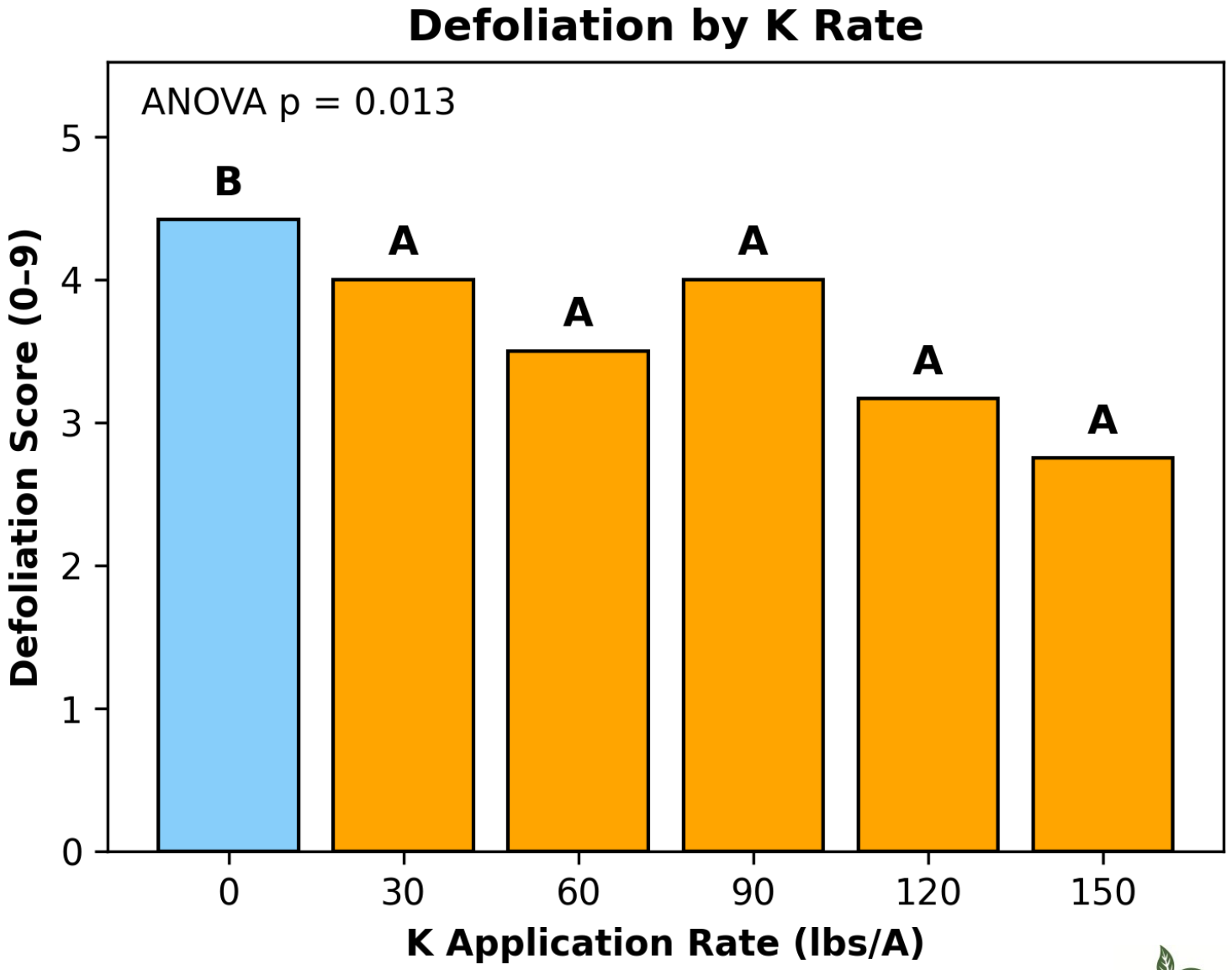

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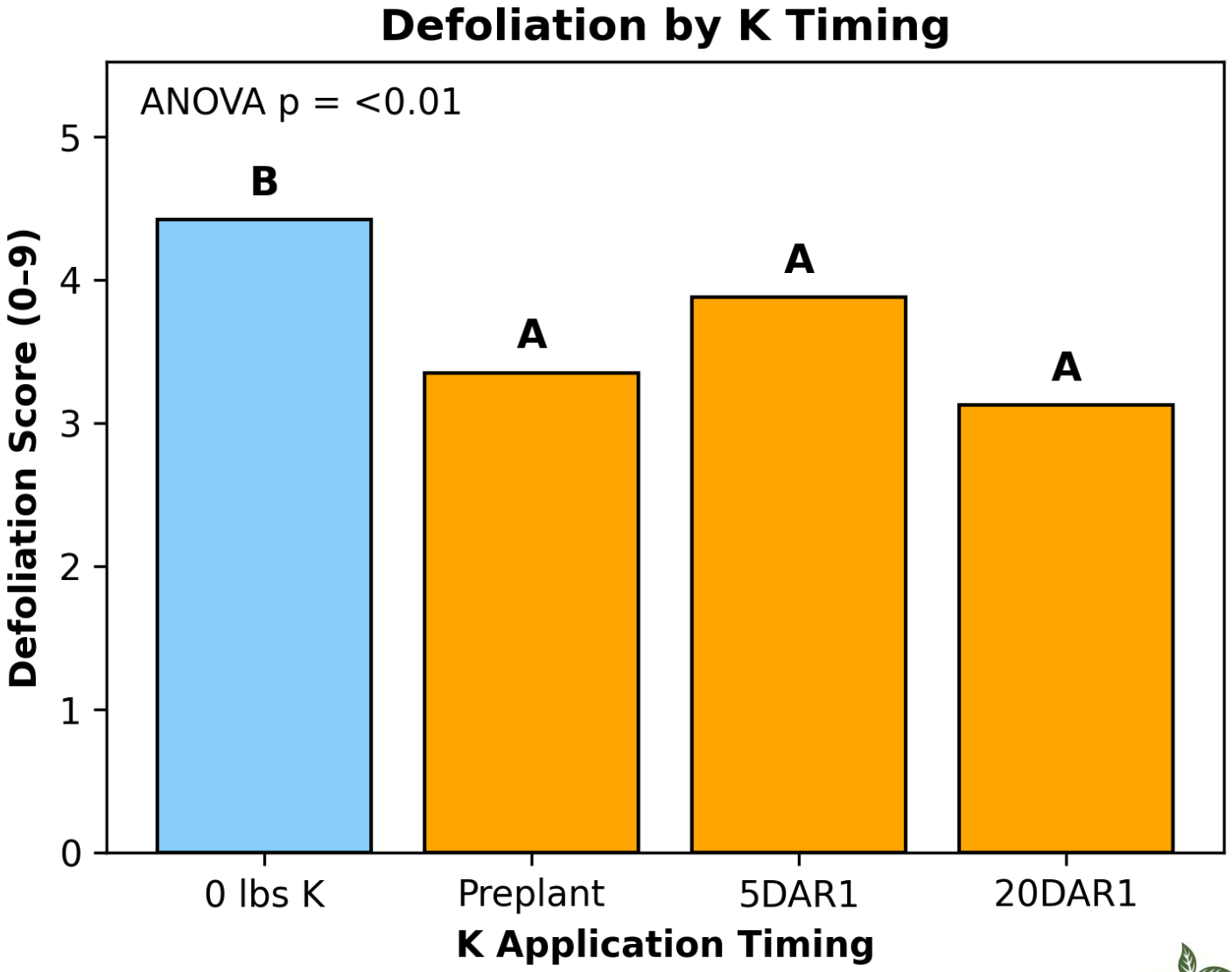

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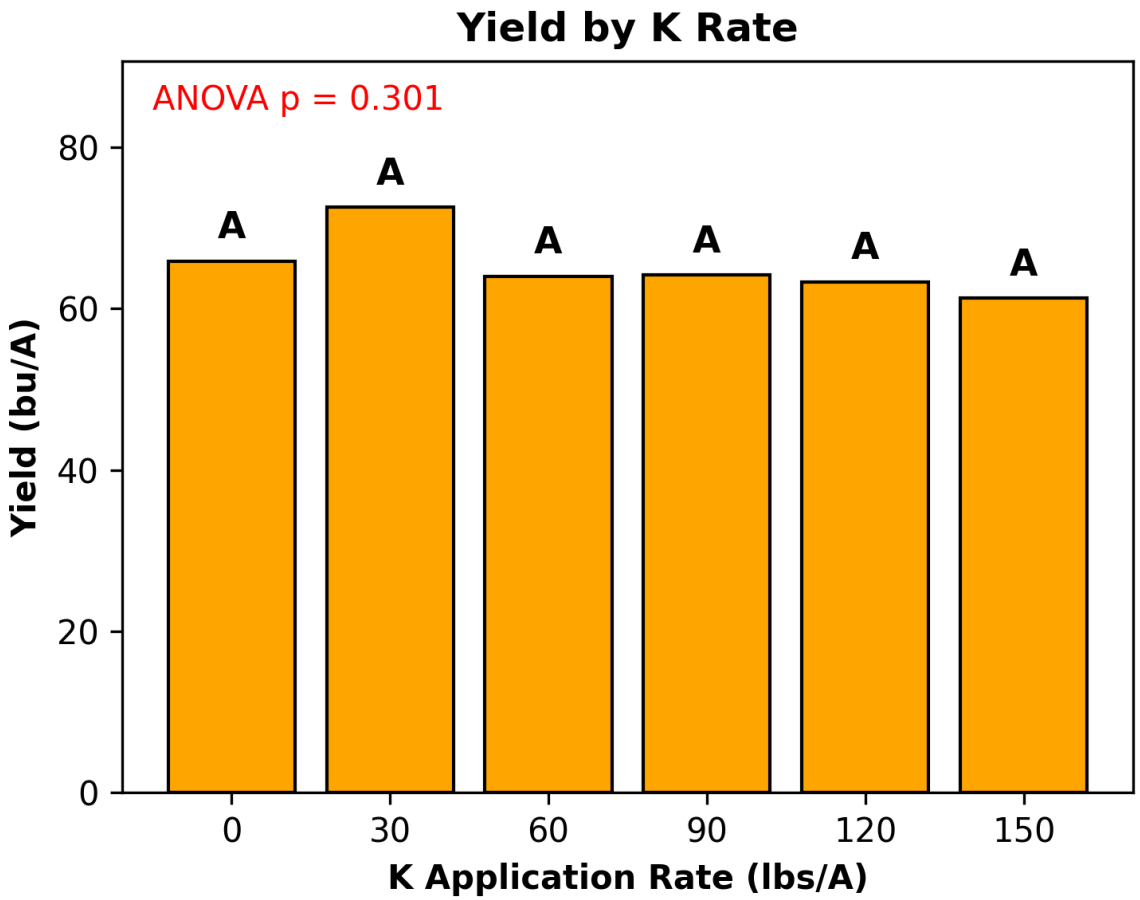

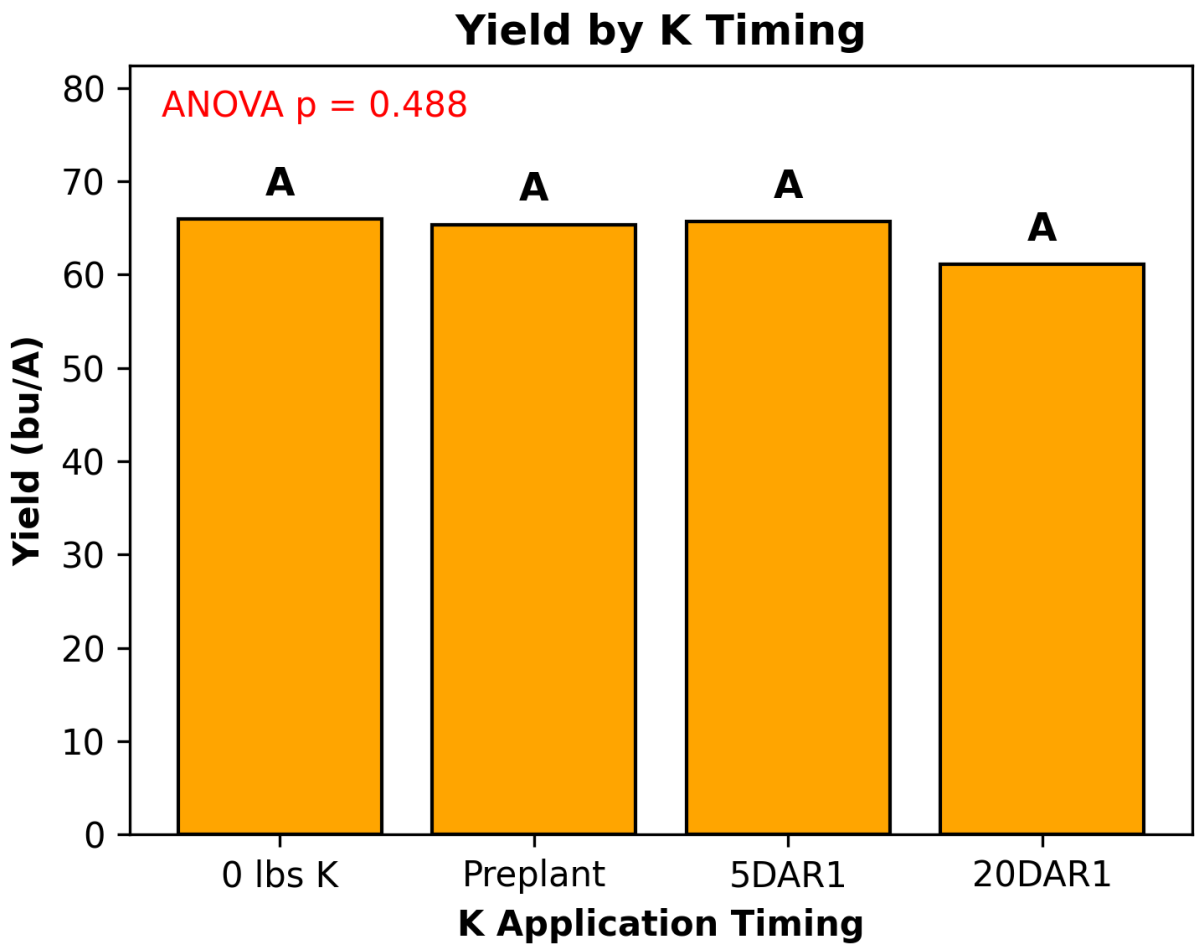

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Rain at the Dean Lee Research Station in 2025

Month	Total Rain Events	Total Rain (in)
Mar	12	4.2
Apr	7	4.1
May	13	9.0
Jun	11	6.2
Jul	12	5.5
Aug	9	6.1
Sep	5	3.7
Oct	8	3.6

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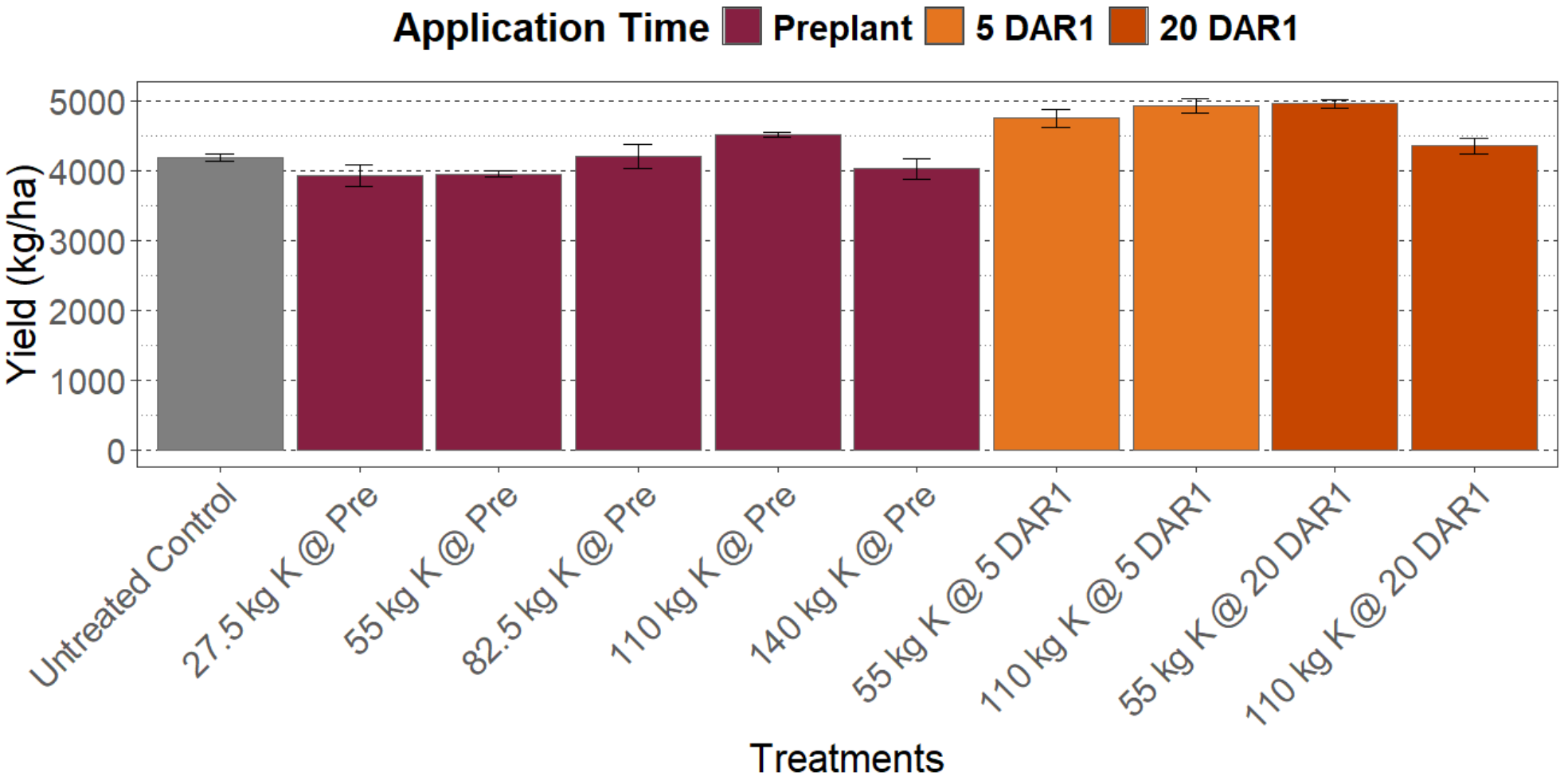
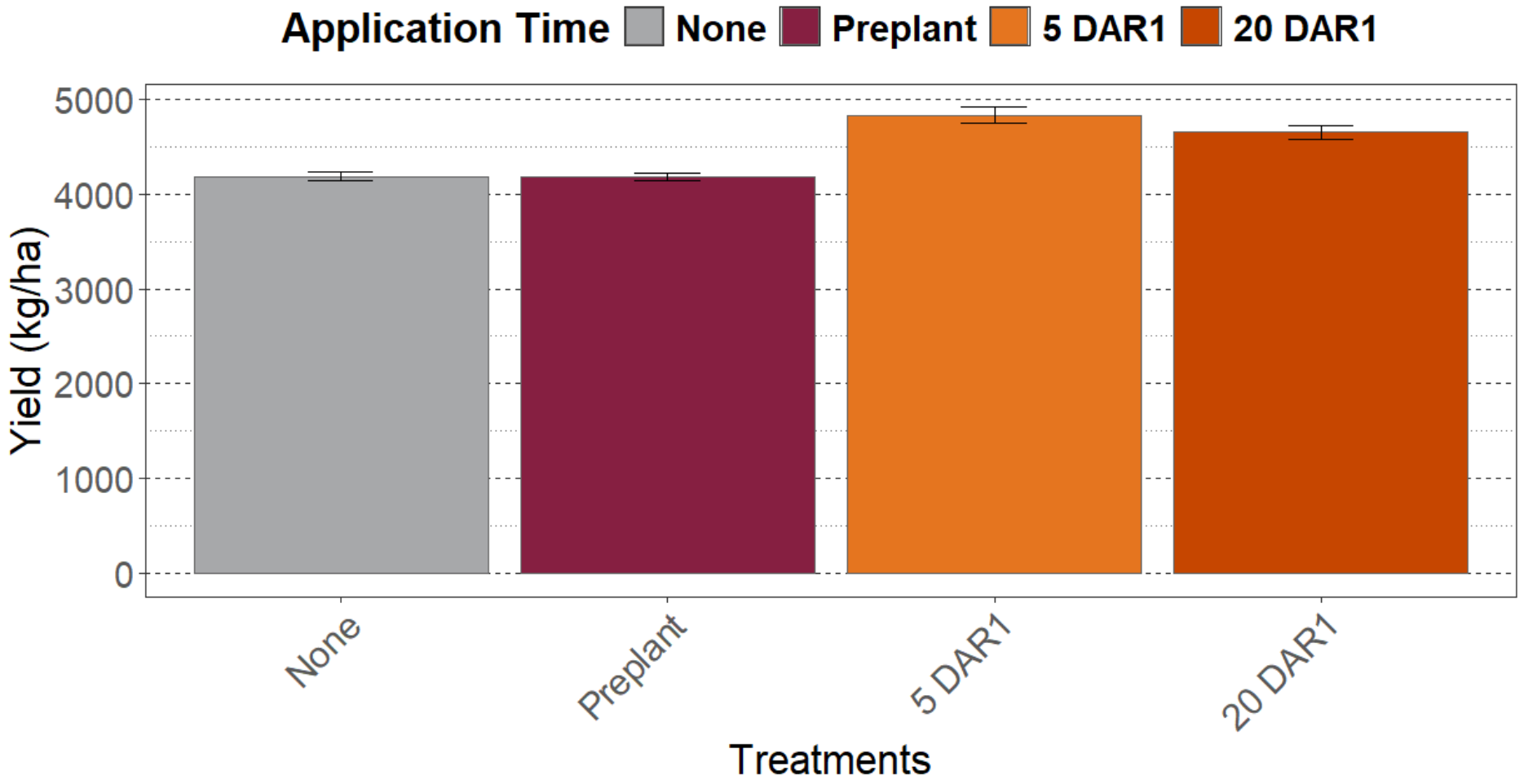
2025 Virginia Tech Preliminary Results (One field)

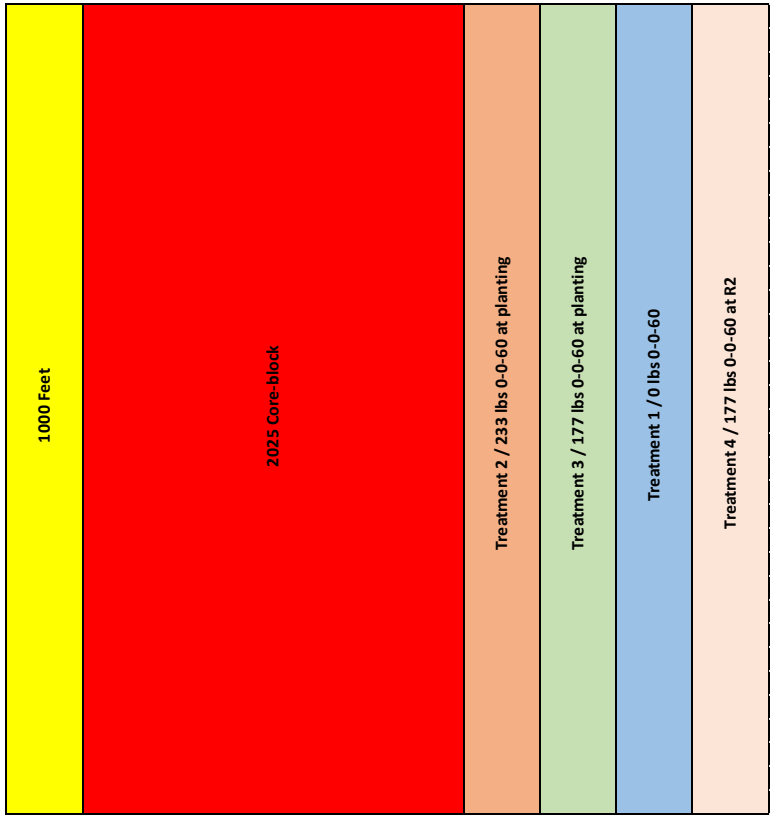


2025 Virginia Tech Preliminary Results (One field)



Beauregard Parish On-farm Potassium Trial

Description	Rate	Timing
Control	0 lbs 0-0-60	.
STK rate at planting	233 lbs 0-0-60	Planting
Profit Max at planting	177 lbs 0-0-60	Planting
Profit Max at R2	177 lbs 0-0-60	R2



At planting soil-test K concentration across the field

- 112 lbs /A (low = add 100 lbs K/A)

R6 – 6.5 Soil-test K concentration for the control

- back = 59 lbs K/A
- front of control, minumum symptoms = 75 lbs k/A

Beauregard Parish On-farm Potassium Trial at R6.5

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Beauregard Potassium Trial Results

Description	Rate	Timing	Yield (bu/A)
STK rate at planting	233 lbs 0-0-60	Planting	79
Profit Max at R2	177 lbs 0-0-60	R2	77
Profit Max at planting	177 lbs 0-0-60	Planting	76
Control (front)	0 lbs 0-0-60	.	71
Control (back)	0 lbs 0-0-60	.	67

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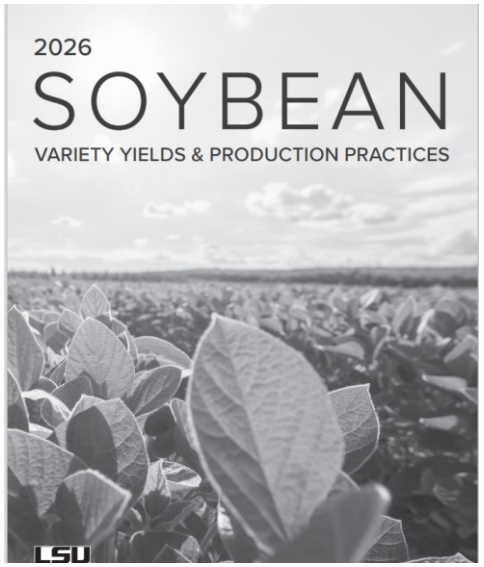

2026 Consultant and Farmer Survey

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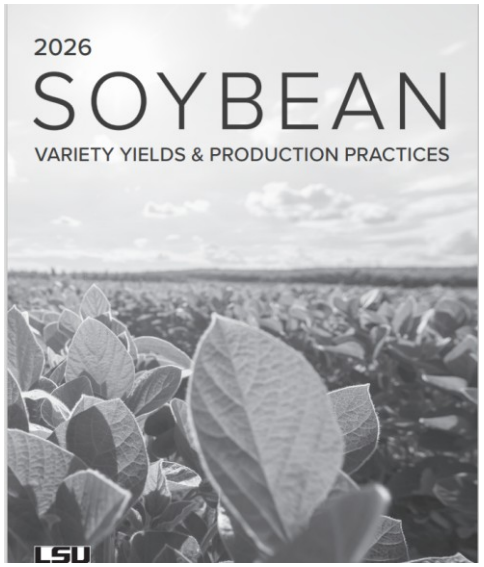

2026 Consultant and Farmer Survey

- **39 varieties** mentioned (*n* = 19)
  - **79%** of the mentioned varieties were tested by the LSU AgCenter in 2024 and/or 2025

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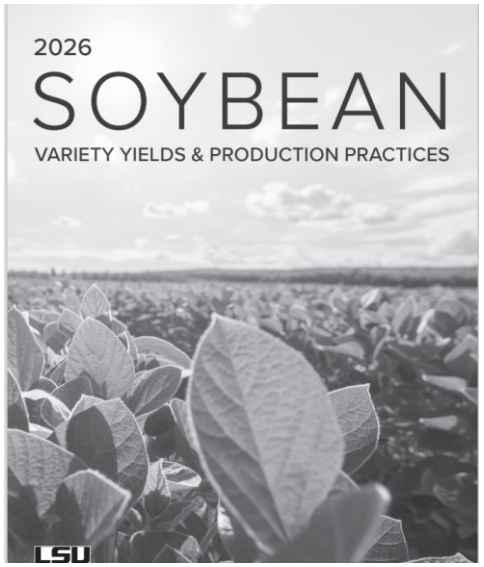

2026 Consultant and Farmer Survey

- **39 varieties** mentioned (*n* = 19)
  - **79%** of the mentioned varieties were tested by the LSU AgCenter in 2024 and/or 2025

- **Top 13 varieties** (≥2 mentions)
  - **92%** were tested by the AgCenter in 2024 and/or 2025

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