



DIVISION OF AGRICULTURE
RESEARCH & EXTENSION

University of Arkansas System

Assessment of Bahia grass Forage Yield and Nutrient Uptake Response to Phosphorus and Potassium Fertilization

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Extension Soil Fertility

Background

4.5 Million Acres of Forages (USDA-NASS 2017)

- Largely dominated by Bermudagrass, with Bahiagrass prevalence in the southern portion of the state.

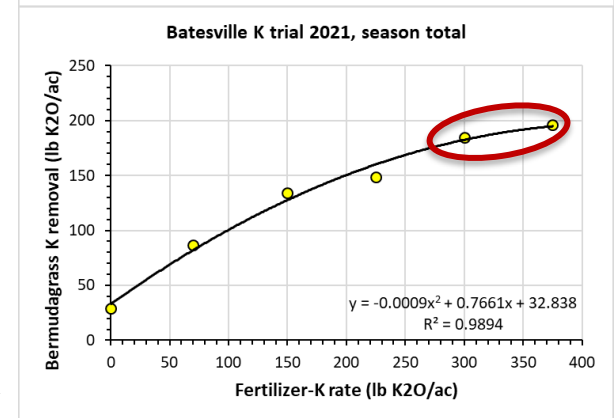
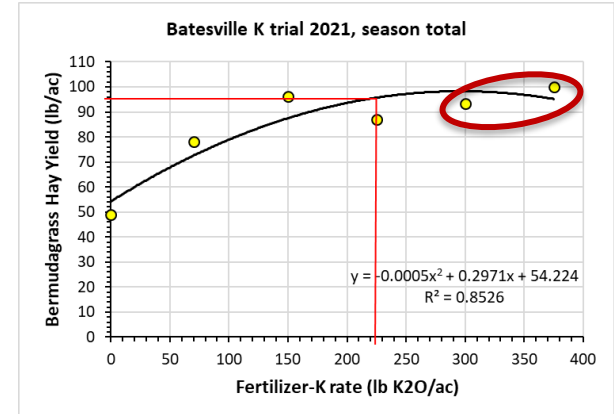
Estimates show lower K removal in Bahia (IPNI, 2014)

Different species – Same recommendations.

- Use of Bermudagrass recommendations on Bahia grass may be an inefficient use of fertilizers (Burton et al., 1997)

Recent research in Arkansas has identified concerns about potassium management in Forages

- Yield returns are greatest when $\geq 56 \text{ kg K}_2\text{O Ha}^{-1}$ application⁻¹ (Drescher et al., 2022)
- Up to 46% more uptake in High K₂O applications compared to the yield maximizing rate (Drescher et al., 2021)



Data Source: G. Drescher; University of Arkansas System Division of Agriculture

Methods

Objective

- Evaluate the influence of phosphorus and potassium applications on Bahia grass forage production and nutrient uptake.

Two trials were established in the spring of 2023

- UADA SWREC in Hope, AR
- Predominately Bahia grass
- Sawyer Loam
 - Mehlich-3 P – 16 ppm
 - Mehlich-3 K – 47 ppm
 - 1:2 pH – 5.5



Phosphorus Rate Trial

Methods

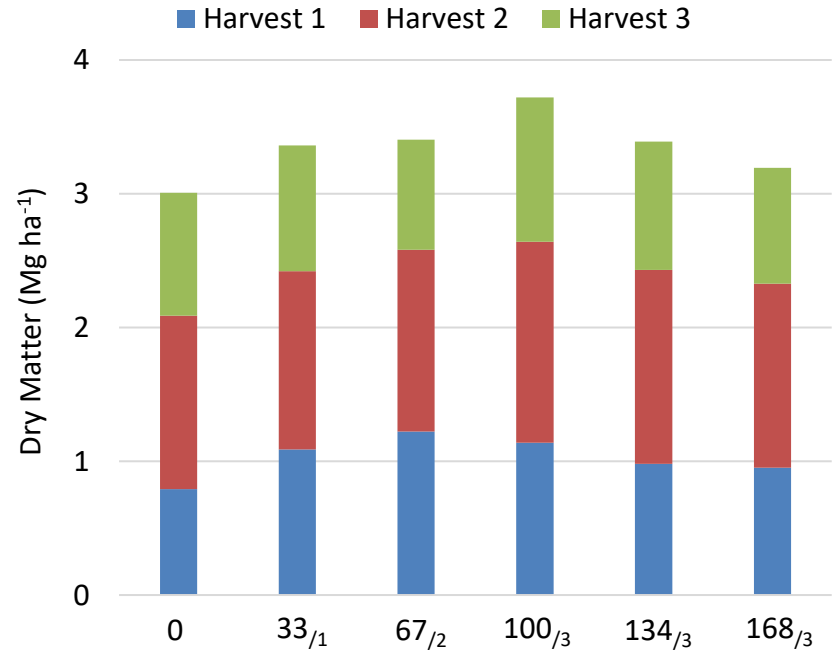
- Varied rates of P_2O_5
- Applied at:
 - Trial Establishment (Greenup)
 - After First Harvest
 - After Second Harvest
- All plots received
 - 67 kg N ha^{-1} application⁻¹
 - 84 kg K_2O ha^{-1} application⁻¹
- Harvested ~28 days following application

Treatment	Per Application (kg P_2O_5 ha^{-1})	Application Timing
0	0	N/A
33 _{/1}	33	Greenup
67 _{/2}	33	Greenup & 1 st Harvest
100 _{/3}	33	Greenup, 1 st & 2 nd Harvest
134 _{/3}	45	Greenup, 1 st & 2 nd Harvest
168 _{/3}	56	Greenup, 1 st & 2 nd Harvest

Phosphorus Rate Trial

Dry Matter Yield

- No response to P application
 - P Rate by Harvest ($p = 0.9900$)
 - Seasonal response to P ($p = 0.4983$)
- Average yield of 3.3 Mg DM ha⁻¹



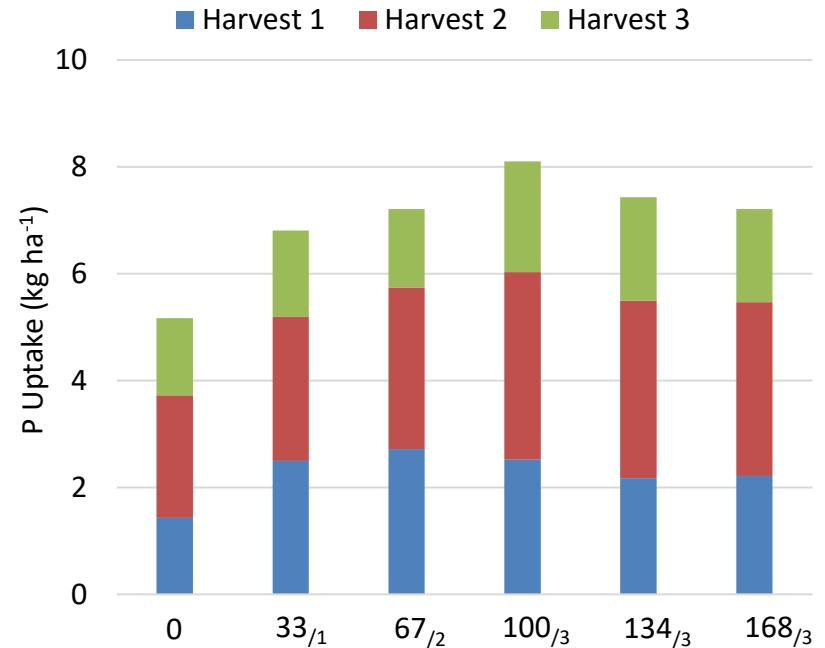
Phosphorus Rate Trial

Dry Matter Yield

- No response to P application
 - P Rate by Harvest ($p = 0.9900$)
 - Seasonal response to P ($p = 0.4983$)
- Average yield of 3.3 Mg DM ha⁻¹

P Uptake

- No response to P application
 - P Rate by Harvest ($p = 0.9518$)
 - Seasonal response to P ($p = 0.1083$)
- P uptake ranged 2.9 kg P ha⁻¹ for the season.



Potassium Rate Trial

Methods

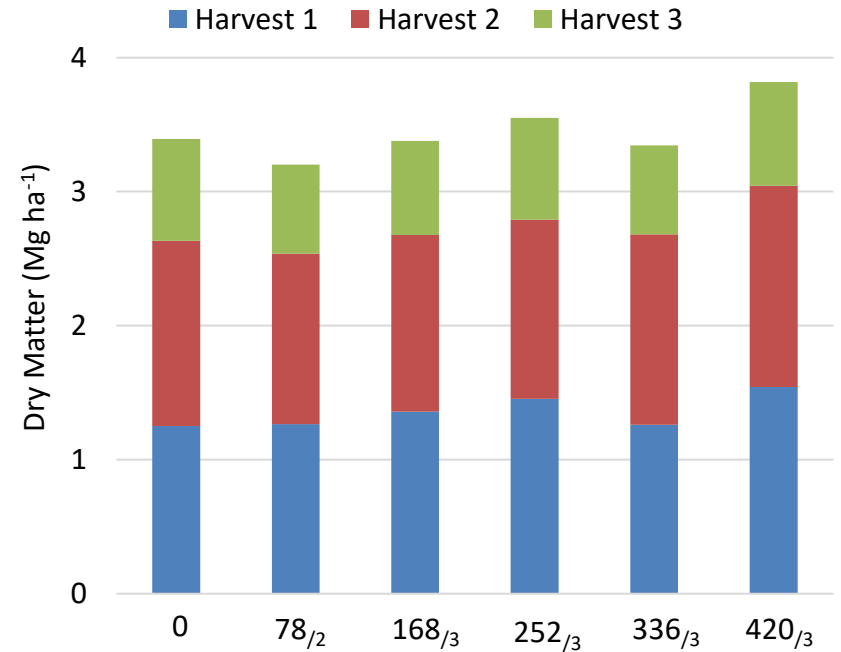
- Varied rates of K_2O
- Applied at:
 - Trial Establishment (Greenup)
 - After First Harvest
 - After Second Harvest
- All plots received
 - 67 kg N ha^{-1} application⁻¹
 - 77 kg P_2O_5 Ha^{-1} at Greenup
- Harvested ~28 days following application

Treatment	Per Application (kg K_2O ha^{-1})	Application Timing
0	0	N/A
78 _{/2}	39	Greenup & 1 st Harvest
168 _{/3}	56	Greenup, 1 st & 2 nd Harvest
252 _{/3}	84	Greenup, 1 st & 2 nd Harvest
336 _{/3}	112	Greenup, 1 st & 2 nd Harvest
420 _{/3}	140	Greenup, 1 st & 2 nd Harvest

Potassium Rate Trial

Dry Matter Yield

- No response to K application rate
 - K Rate by Harvest ($p = 0.9966$)
 - Seasonal response to K ($p = 0.8434$)
- Average yield of 3.4 Mg DM ha⁻¹



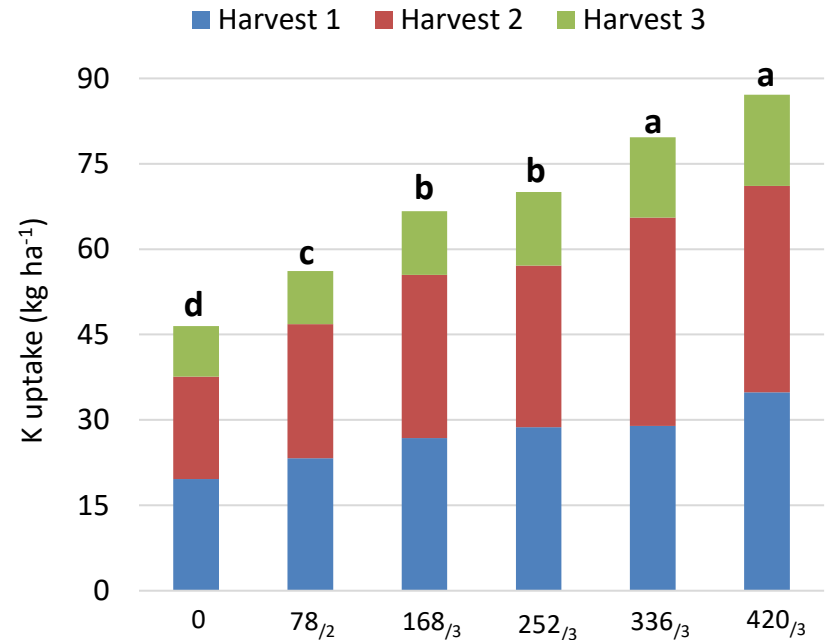
Potassium Rate Trial

Dry Matter Yield

- No response to K application rate
 - K Rate by Harvest ($p = 0.9966$)
 - Seasonal response to K ($p = 0.8434$)
- Average yield of 3.4 Mg DM ha⁻¹

K Uptake

- Total K uptake increased with Rate
 - K rate by Harvest ($p = 0.3845$)
 - Seasonal response to K ($p < 0.0001$)
- 41 kg K ha⁻¹ range in uptake, with a maximum of 87 kg K ha⁻¹



Take Homes

Forage Yield

- Yield responses are limited in this single-year study.
- Environmental conditions may have impacted yield responses (data not shown).

Nutrient Uptake

- Phosphorus uptake followed a similar pattern as yield.
- Potassium uptake increases with K application, regardless of yield response.

Future work

- Identify optimum application rate to maximize yield, reducing luxury uptake
- Identify potential differences in species management
- Identify the impact on forage quality



Thank You!

Questions?

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