Omission Fertilization of Bahiagrass Plots, a Multi-year Study

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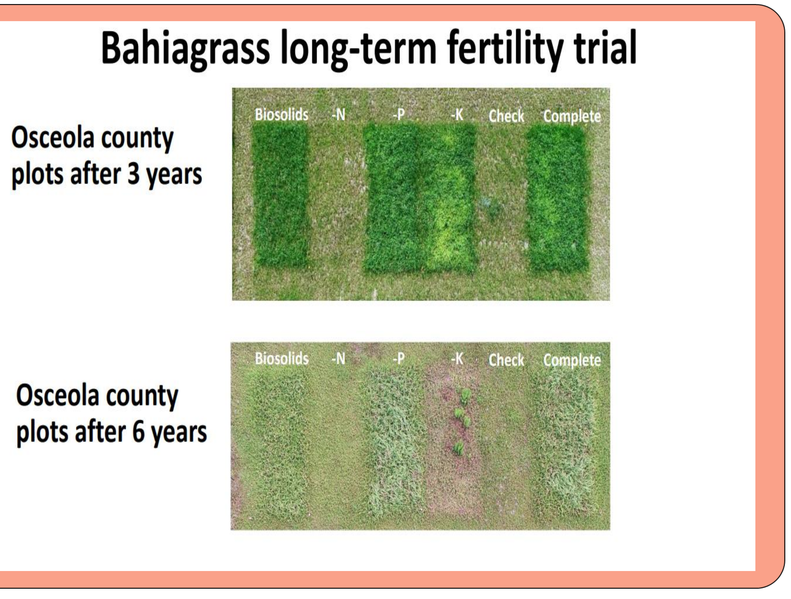
INTRODUCTION

With higher input costs, livestock and hay producers must be sure they are spending wisely. One area of input that has experienced dramatic price increases is fertilizer. Fertilizer plays a major role in how well a pasture grows, and in turn, how well grazing livestock will perform. Fertilizer is often an input that producers choose to skimp or omit. But what are the repercussions of reduced fertilizer inputs? Several county Extension Agents and a State Soils Specialist sought to address this question. Bahiagrass (*Paspalum notatum*) is the most grazed pasture grass in Florida. A study looking at omitting select macronutrients from a fertilization schedule for bahiagrass was conducted.

Objective: Determine long-term soil nitrogen (N) phosphorus (P) and potassium (K) depletion effects on bahiagrass forage health and production in Florida.

METHODS

- The research trial was completed on 10x20 ft treatment plots, using a randomized complete block design with three replications per location.
- Four Florida counties (Oseola, Orange, Columbia, and Gulf) were chosen for plots. The Osceola location was used for 6 consecutive years and the others for 3 consecutive years.
- Treatments were a full fertilization (N, P, K) supplied as minerals or biosolids (Class AA + KCl), respectively, versus a full treatment minus a single nutrient (minus N, minus P, or minus K), as well as a check which received no fertilization.
- Annual Application rates were normalized to 160-80-160 except when that macro was omitted.



Initial soil fertility at each location

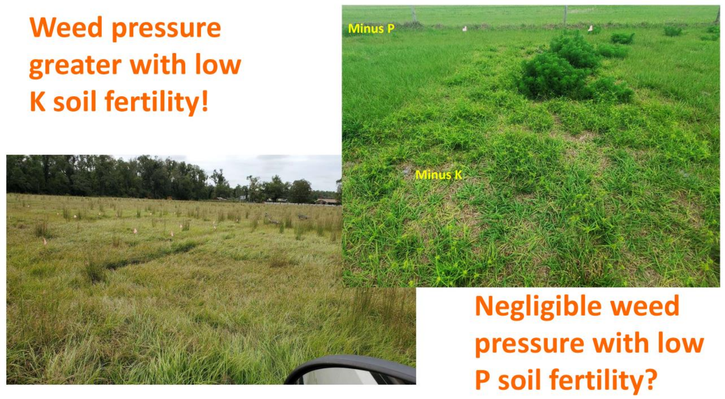


Table 1. Initial soil fertility at each location

County	pH	P[Z]	K	Ca	Mg	S	Zn	Cu
		---------- (mg kg^{-1})----------						
Osceola[Y]	4.9	19	22	790	49	8	0.3	0.4
Orange[X]	5.7	817	13	787	33	17	17.0	14.0
Columbia	6.4	63	14	602	43	7	1.7	0.4
Gulf	5.0	91	20	220	30	16	3.3	0.7

[Z]UF-IFAS soil test lab interpretation for Mehlich-3 extractable P: low ≤25, medium 26-45, and high>45; and for K: low≤35, medium 36-60, and high>60 (Mylavarapu et al., 2021).

[Y]Osceola site was initiated and sampled in 2016. Other sites were initiated in 2019.

[X]Orange county site had been impacted by several years of Class B biosolids applications, resulting in elevated P, Zn, and Cu.

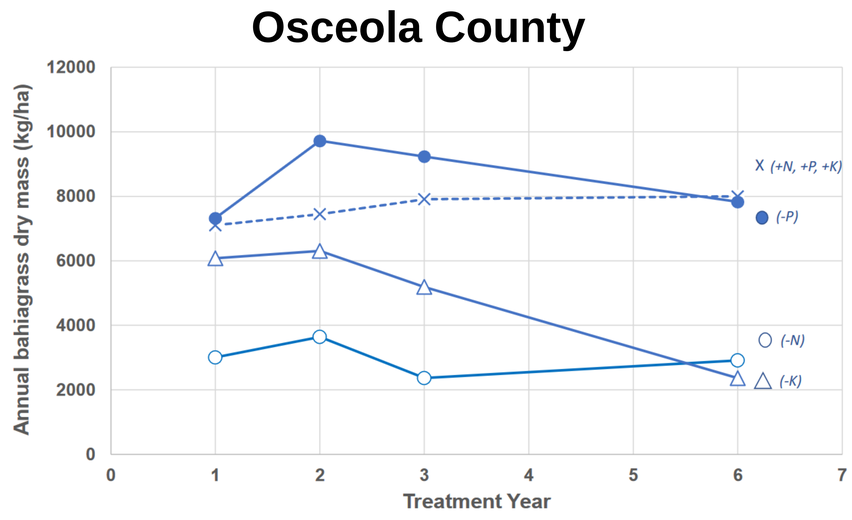


Figure 1. Yield at Osceola County as impacted by fertilizer management over 6 years. Symbols represent the means of three replicates.

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RESULTS

Table 2. Bahiagrass tissue K across four Florida locations after three years.

Fertilizer treatment	Tissue K[Z]
	(%)
Complete mineral	1.23 ab
Class AA biosolids + KCl	1.15 ab
Minus N	1.14 b
Minus P	1.26 a
Minus K	0.56 c
Low K sufficiency (suggested)	*1.20*

[Z]Data represent means ± standard error (n=24). Means sharing the same letter are not significantly different at alpha = 0.05.

Table 3. Annual bahiagrass potassium accumulation via aboveground biomass (forage) from multiple Florida locations under different fertility management treatments after three years.

Treatment		Osceola	Orange	Columbia	Gulf
		---- (kg ha^{-1})----			
Complete fertilizer	a[Z]	95	79	90	99
Class AA biosolids[Y]	a	96	72	67	85
Minus N fertilizer	b	35	45	38	54
Minus P fertilizer	a	125	79	88	81
Minus K fertilizer	c	36	36	23	21

[Z]Treatment main effects across four locations and three years (n=24). Means sharing the same letter are not significantly different at alpha = 0.05 [Y]Class AA biosolids + KCl (0-0-60)

CONCLUSIONS

- Forage production decreased over time unless N and K were added to the soil (Figure 1).
- Weed intrusion increased as K tissue concentration decreased (Table 2).
- Forage production did not increase by additional P when tissue P level was >0.15% (Figure 1).
- Fertilizer inputs should be guided by tissues samples to avoid excessive P applications and to avoid plant K deficiencies (Figure 1 and Table 3).

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