PUBLICATIONS

1984

FORAGE AND LIVESTOCK RESEARCH - 1984

Research Center Technical Report 84-1

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Overton, Texas

May 2, 1984

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RESPONSE OF COASTAL BERMUDAGRASS TO RATES
OF LIMESTONE AND PHOSPHORUS

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SUMMARY

Coastal bermudagrass response to limestone and phosphorus was evaluated on a strongly acid (pH 4.5) Lilbert loamy fine sand which tested low in phosphorus, calcium, and magnesium, and very low in potassium. Limestone and phosphorus treatments were applied in early July. Rates of limestone, containing magnesium were 0, 600, and 3400 lbs/A. Phosphorus rates were 0, 30, 61, 92, 123, 245, and 491 lbs of P_2O_5 per acre. Nitrogen, as urea, was applied overall at 150 lbs/A. Potassium at the rate of 260 lbs K_2O/A was also overall applied. The existing, six-inch tall stand of grass was mowed and immediately incorporated with a roto-tiller. The site received a two-inch rain that night.

The first harvest of 1983 was taken in mid-August and the second was made in October. Yield response of Coastal bermudagrass to limestone was not statistically significant at 384 lbs of dry matter per acre. Nearly all of this increase occurred in the first harvest. Coastal bermudagrass response to phosphorus was 2059 lbs of dry matter per acre.

OBJECTIVES

1. Determine the yield and quality of forage produced at varying levels of soil acidity (limestone rates).
2. Determine the effect of phosphorus rates on yield and quality of warm and cool season forages.
3. Determine the interactive effects of limestone and phosphorus on warm and cool season forage production.
4. Evaluate the effect of limed soil pH change on phosphorus availability to forage plants.

PROCEDURE

A Lilbert loamy fine sand was selected for this study. It is an East Texas benchmark soil which means it occupies a large number of acres. This soil was selected because it had a surface 6-inch depth pH of 4.5, phosphorus, calcium, and magnesium levels of 8, 200, and 30 ppm, respectively, and a very low 60 ppm potassium level. Three rates of limestone, 0, 0.3, and 1.7 tons/A were applied as major plots in a split-plot statistical design. Phosphorus rates of 0, 30, 61, 92, 123, 245, and 491 pounds of P_2O_5/A were applied as split plots over the limestone treatments. Eight replications of each treatment were applied. Nitrogen and potash were applied as urea and muriate of potash at rates of 150 and 260 lbs/A, respectively. The existing grass was mowed and all treatments were immediately roto-till incorporated. A two-inch rain soaked the experimental site the following night.

The first harvest was collected by harvesting a two square foot area in each plot on August 17 and 18. Additional nitrogen at the rate of 60 lbs/A was applied following this cutting. The second harvest was completed October 24 and 25. Yield data are presented in Table 1 for limestone rates and in Table 2 for phosphorus rates. Dry matter production increased 0.19 tons/A due to limestone treatment and this increase was not statistically different from the limestone check plot. Most of this yield increase occurred in the August harvest. Earlier growth may respond more to increased soil pH levels due to limestone treatment.

Increased yields of Coastal bermudagrass were produced by application of 92 or more lbs P_2O_5/A. The combined late summer and early fall harvest yielded more than one ton of oven-dry grass hay due to phosphorus fertilization.

In early November the experimental site was divided into two parts with four replications seeded to Marshall ryegrass and four seeded to Mt. Barker subterranean clover. The ryegrass is growing well but the sub clover stand was thinned by the late December freeze. These two forages will be reseeded again in the fall of 1984.

Further investigations in this study include soil pH and nutrient level changes due to limestone treatment and the effect of limestone and phosphorus on plant nutrient uptake and quality.

Table 1. Response of Coastal bermudagrass to limestone rates applied to a pH 4.5 Lilbert loamy fine sand.

Limestone rate	Yield, dry weight Harvest 1	Harvest 2	Total
Tons/A	Tons/A		
0	2.04	1.25	3.29
0.3	2.15	1.20	3.35
1.7	2.23	1.25	3.48

Table 2. Response of Coastal bermudagrass to phosphorus rates applied to an 8 ppm, low phosphorus, Lilbert loamy fine sand.

Phosphorus rate	Yield, dry weight Harvest 1	Harvest 2	Total[1]
lbs P_2O_5/A	Tons/A		
0	1.79 A	0.98 A	2.77 A
30	2.03 BC	1.01 AB	3.04 A
61	1.99 AB	1.14 AB	3.11 A
92	2.25 CD	1.28 BC	3.53 B
123	2.30 D	1.49 C	3.80 B
245	2.25 CD	1.28 BC	3.53 B
491	2.36 D	1.44 C	3.80 B

[1]Yields followed by the same letter within each harvest are not significantly different when tested by least significant difference at the 95% level of confidence.