PUBLICATIONS
1988

FORAGE AND LIVESTOCK RESEARCH - 1988

RESEARCH CENTER TECHNICAL REPORT 88-1

Texas A&M University Agricultural Research & Extension Center
at Overton

Texas Agricultural Experiment Station
Texas Agricultural Extension Service

Overton, Texas

April 21, 1988

COASTAL BERMUDAGRASS RESPONSE TO NITROGEN SOURCES

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SUMMARY

Nitrogen (N) source comparisons were conducted on Coastal bermudagrass growing on Lilbert and Gallime acid, sandy soils in 1984, 1985, and 1986. Nitrogen rates of 0, 40, 80, and 120 lb/ac were applied prior to each growth of grass. Treatments were applied and harvests were made three times in 1984, four times in 1985, and five times in 1986. Nitrogen sources were urea, ammonium nitrate, ammonium sulfate, urea with calcium added, and urea-ammonium nitrate with and without combinations with sulfur and boron at rates of 16 and 0.4 lbs/ac, respectively, each application. All nitrogen sources and combinations produced equal forage yields all years on the lower production Lilbert soil. On the Gallime soil in 1984, urea-ammonium nitrate with ammonium sulfate added compared favorably with ammonium nitrate and ammonium sulfate for forage production. Other N sources and nutrient combinations produced equivalent yields of grass. Urea and urea-ammonium nitrate produced similar yields, but ammonium nitrate produced significantly more grass than either of them, averaged over all N rates. A significant yield increase occurred between 80 and 120 lb N/ac at both sites in 1984 and 1985, but yields at both sites were equal at the 80 and 120 lb/ac N rates in 1986. No significant yield differences occurred among N sources on the Gallime soil in 1986.

INTRODUCTION

Market competitiveness has modified the views previously held by agricultural personnel concerning use of various N fertilizer sources. Research continues to seek answers to the questions relative to use of the various N fertilizer sources. This report contains results of comparisons of the more common N fertilizers, some applied with calcium (Ca), sulfur (S), or boron (B) to plots treated with phosphorus (P), potassium (K), zinc (Zn), and molybdenum (Mo). The main objective of this research was to evaluate the major single nutrient N fertilizers for Coastal bermudagrass hay production.

PROCEDURE

Two acid sandy soils, Gallime and Lilbert, were chosen for this study. Nitrogen source treatments included urea-ammonium nitrate (UAN), applied to plots treated with 4.5 lb of Zn and 46 grams of Mo/ac-equivalent compared to UAN without Zn and Mo. Urea-ammonium nitrate with 16 lb S/ac from ammonium thiosulfate was compared to UAN with 16 lb S/ac from ammonium sulfate. Additional treatments included UAN with 0.4 lb B/ac, urea with calcium chloride added at the ratio of 1:.34 urea:Ca, urea, ammonium nitrate, ammonium sulfate, and a zero N check. The 16 lb S and the 0.4 lb B/ac were applied with each rate of N prior to regrowth of each cutting of grass. These N sources were applied to 10 x 20 foot plots which were treated with 100 lb P_2O_5 and 160 lb K_2O/ac in spring 1984. An additional application of 200 lb K_2O/ac was made in October 1984. Overall treatments of 100 lb P_2O_5 and 200 lb K_2O/ac were made in April 1985. The 1986 uniform treatments included 200 lb K_2O/ac in January, and 200 lb K_2O and 100 lb P_2O_5/ac in April. Harvests were made after first trimming one foot off the end of each plot with a Hege 211B forage plot harvester. Approximately 85 ft^2 were harvested from each plot and weighed. A 200 to 400 gram sample was collected from each plot for moisture and chemical analysis. Analysis of variance and Newman-Keuls mean comparisons were run on these data using MSUSTAT.

RESULTS

The Lilbert soil was a lower production site than the Gallime. Nitrogen sources and combinations of UAN with S and B, and urea with Ca, averaged over all N rates, were equally effective for grass production on the Lilbert soil through three years of evaluations (Table 1).

Nitrogen source comparisons on the Gallime soil indicated that UAN plus ammonium thiosulfate, ammonium nitrate, and ammonium sulfate all produced similar dry matter yields in 1984. Ammonium nitrate produced equal yields compared to ammonium sulfate and both treatments were better than UAN. Sulfur and B mixed with UAN had no significant effect on yield. The 1985 total dry matter production indicates that UAN, UAN plus S from ammonium sulfate, urea, ammonium nitrate, and ammonium sulfate all produced similar dry matter yields. In 1986

TABLE 1. COASTAL BERMUDAGRASS RESPONSE TO NITROGEN SOURCES AND SOURCE COMBINATIONS WITH CALCIUM, SULFUR, AND BORON, AND TO NITROGEN RATES AVERAGED OVER ALL SOURCES

	Dry Matter Yield[1]					
	Lilbert Soil			Gallime Soil		
Nitrogen Sources	1984	1985	1986	1984	1985	1986
	Tons/ac					
UAN + Zn and Mo	3.6 a	5.2 a	6.1 a	5.2 ab	6.5 abc	6.2 a
UAN - Zn and Mo	3.8 a	5.1 a	6.4 a	5.2 ab	6.3 ab	6.4 a
UAN + 16 lb ATS-S	3.5 a	4.9 a	6.5 a	5.2 abc	6.2 a	6.4 a
UAN + 16 lb AMS-S	3.5 a	5.4 a	6.5 a	5.5 bcd	6.5 abc	6.6 a
Urea + Ca (1:.34)	3.6 a	4.9 a	6.0 a	5.3 abc	6.3 ab	6.8 a
UAN + 0.4 lb B/ac	4.0 a	4.8 a	6.3 a	5.1 a	6.2 a	6.4 a
Urea	3.6 a	4.7 a	5.9 a	5.3 abc	6.4 abc	6.3 a
Ammonium Nitrate	3.9 a	5.1 a	6.3 a	5.8 d	7.2 c	6.5 a
Ammonium Sulfate	3.8 a	5.7 a	6.5 a	5.5 cd	7.0 bc	6.3 a
Nitrogen Rate[2]						
lb/ac						
0	1.6 a	2.6 a	3.4 a	1.8 a	2.6 a	3.5 a
40	3.6 b	4.8 b	6.2 b	5.0 b	6.2 b	7.1 b
80	4.6 c	6.0 c	7.6 c	6.9 c	8.3 c	7.6 c
120	5.0 d	7.0 d	7.9 c	7.6 d	9.0 d	7.5 c

[1]Dry matter yields within an individual year and site, by nitrogen source or by nitrogen rate followed by a similar letter are not significantly different at $p<.05$ by Newman-Keuls mean comparisons.

[2]Individual nitrogen rates with added S, Ca, or B were applied prior to each flush of grass growth.

there were no significant yield responses due to N sources on the Gallime soil.

Forage production on the Lilbert soil nearly equalled that on the Gallime soil in 1986. The Gallime soil was unlimed for the study. Soil pH in the surface depth from selected plots indicated that increased soil acidity levels to below pH 4.8 probably caused yield reductions in this soil. Increased production on the Lilbert soil in 1986 may have been due to continued application of potash during the three years of the study.

Nitrogen rate increases up to 120 lb/ac continued to increase forage yield at both sites in 1984 and 1985. In 1986 the 80 lb/ac N rate produced dry matter yields equal to those at the 120 lb/ac rate. A buildup of residual N in the soil, or increasing soil acidity could have contributed to this. The 120 lb/ac N rate significantly decreased forage yield in the fifth cutting on the Gallime soil in 1986 (data not shown).

Interaction of N sources and rates on dry matter yields in 1985 indicated that at the 40 and 80 lb N/ac rates, ammonium nitrate and ammonium sulfate increased dry matter yields to a similar extent, and produced signficantly greater yields than other N sources (data not shown). When the N rate was increased to 120 lb/ac, all N sources increased yields to the same extent, indicating that the 120 lb/ac rate provided adequate N even with any losses which may have occurred.

Addition of S to UAN as ammonium thiosulfate or as ammonium sulfate, had no effect on forage yield. The Lilbert soil contained 43 lb S and the Gallime contained 49 lb of available S/ac in the top three feet in 1984. Both soils have about two feet of surface sand above a sandy clay. Three years of intensive production were not able to deplete S from these soils. Application of ammonium thiosulfate with UAN produced no yield advantage compared to UAN alone in this three-year field study.

Addition of Ca to urea at the ratio of 0.34 Ca:1.0 N had no effect on increasing grass yield compared to urea alone at rates of 40, 80, and 120 lbs N/ac, each application, on these acidic soils. Addition of Zn, Mo, and B to these soils failed to increase forage yields.