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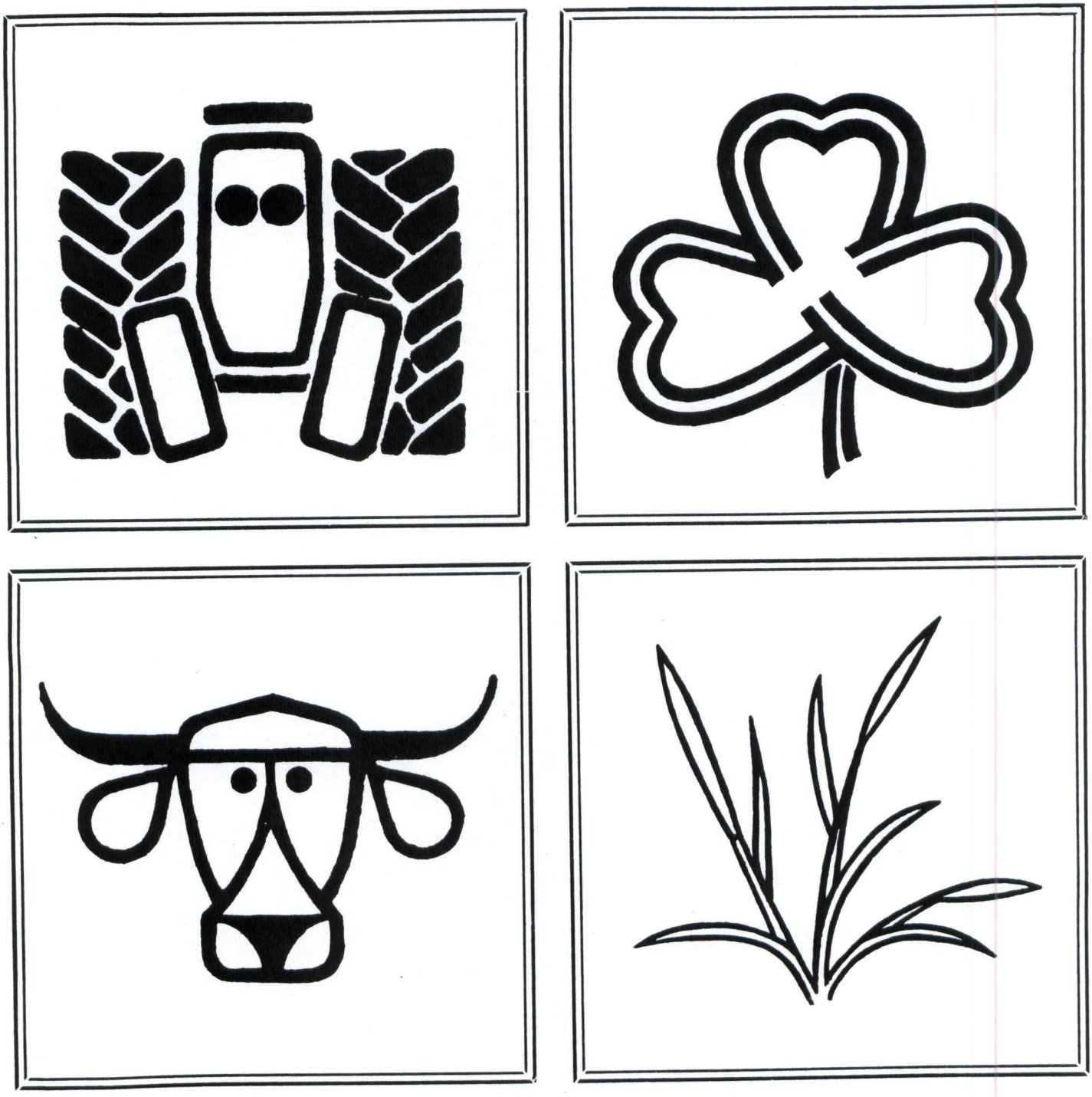

Forage Research in Texas

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Effect of Application Rate and Nitrogen Source on Dry Matter Production of Coastal Bermudagrass

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SUMMARY

Nitrogen was applied to Coastal bermudagrass at the rate of 400 lbs/acre as either ammonium nitrate, urea, Nitroform®, or percentage mixtures of ammonium nitrate:Nitroform®. The various sources were applied either in equally split applications throughout the season or in a single application at the initiation of the growing period. Nitroform® was also applied at 600 lbs N/acre in a single application. Nitrogen was applied for two years and dry matter yields were taken during both these years and also during the third year to estimate nitrogen source residual. The two-year average yields showed very small differences as bermudagrass yields ranged from approximately 12,500 lbs/ac from both the single and dual applications of Nitroform® rate to approximately 14,000 lbs/ac from six of the different treatments. Dry matter yields from bermudagrass plots following the second year of nitrogen applications were significantly higher from the single application of 600 lbs N/ac as Nitroform® (13,088 lbs/ac); whereas, the least amount of dry matter was produced from those plots which had previously received a single application of urea (7,595 lbs/ac).

Introduction

The method of application and the source of nitrogen fertilizers are important considerations for the predominant grass producers of the Southeastern U.S. The use of slow release nitrogen fertilizers may have a significant impact on fertilizer-grass management practices in an effort to reduce the custom application costs as well as the effective cost of forage dry matter per unit of nitrogen. The primary objective of this trial, therefore, was to determine the influence of application rate and source of nitrogen fertilizer on dry matter production of Coastal bermudagrass both during and following the year of application.

Procedure

Nitrogen (N) was applied to Coastal bermudagrass as ammonium nitrate (33.5-0-0), urea (46-0-0), Nitroform® (38-0-0), and various combinations of ammonium nitrate:Nitroform® at the rate of 400 lbs/ac on an upland, sandy soil (Darco) (Table 1). Phosphorus (0-46-0) and potassium (0-0-60) were applied at initiation of the growing season at the rate of 100 lbs/ac P_2O_5 and 200 lbs/ac K_2O, respectively. The 10 treatments were arranged in a randomized complete block design with four replications. Fertilizer treatments were applied for two years. Forage dry matter yields were taken during this two-year period and also during the year following N applications to monitor source differences in residual N.

Results and Discussion

Dry matter (DM) production of Coastal bermudagrass from various sources of nitrogen are shown in Tables 2 and 3. Although the annual rainfall that occurred during 1981 was only 3 inches more than that in 1980, there were 7 inches more rainfall during the growing season of 1981 as compared to 1980 (Table 4). Consequently DM from some of the Coastal plots during 1981 was nearly double that of 1980. During the relatively dry 1980 season, the most productive bermudagrass plots received split applications of 100 lbs N/ac at initiation of the growing season and 100 lbs N/ac following each harvest date. The least productive N source and rate was 400 lbs N/ac as Nitroform® applied at 200 lbs N/ac initially and 200 lbs N/ac at mid-season. In 1981, however, this dual application rate of Nitroform® was one of the treatments responsible for the higher DM production of Coastal.

During the 1982 growing season, residual N, as exhibited by DM yield, was greater from the previous year's treatment of 600 lbs N/ac as Nitroform® applied in a single application. In general, the highest yielding plots were treatments 4-8, or those plots which received all or more than half of their N as Nitroform® (Table 3). The N source which showed the least residual effectiveness was urea applied in a single application. Thus, from the data presented, it appears that slow-release nitrogen fertilizer such as Nitroform® may have a potential use as an alternate-year application under certain management conditions.

Table 1. Nitrogen rate and source treatments applied broadcast to Coastal bermudagrass.

Treatment	N rate (lbs/ac)	N source	Application
1	400	Ammonium nitrate	100 lbs initial 100 lbs after each cut
2	400	Ammonium nitrate	One application
3	400	Urea	One application
4	400	Nitroform®	One application
5	600	Nitroform	One application
6	400	Nitroform	200 lbs initial 200 lbs mid-season
7	400	20% $AmNO_3$: 80% Nitroform	100 lbs initial 100 lbs after each cut
8	400	40% $AmNO_3$: 60% Nitroform	100 lbs initial 100 lbs after each cut
9	400	60% $AmNO_3$: 40% Nitroform	100 lbs initial 100 lbs after each cut
10	400	80% $AmNO_3$: 20% Nitroform	100 lbs initial 100 lbs after each cut

Table 2. Forage dry matter production from active and residual rate and sources of nitrogen.

Treatment	1980	1981	2 Yr-Avg	1982[1]
	lbs/ac			
1	11,097 ab	16,887 cd	13,992	9,835 d[2]
2	9,154 e	17,450 a	13,302	8,949 e
3	10,711 c	15,795 e	13,253	7,595 f
4	9,100 e	15,806 e	12,453	10,997 b
5	10,931 bc	16,731 d	13,831	13,088 a
6	8,121 f	17,007 bcd	12,564	10,697 bc
7	8,571 e	16,899 cd	12,735	10,465 c
8	11,203 ab	17,342 ab	14,273	11,137 b
9	10,345 d	17,234 abc	13,790	9,810 d
10	11,435 a	17,390 ab	14,413	9,251 e

[1]Yields reflect residual nitrogen.

[2]Numbers within a column and followed by the same letter are not significantly different at the 0.05 level using Duncan's Multiple Range Test.

Table 3. Forage dry matter production from residual nitrogen fertilizer treatments.

Treatment	4-8[1]	6-3[2]	7-13[2]	10-28[2]	1982 TOTAL
	lbs/acre				
1	2401	3087	2211	2136	9,835 d[3]
2	1745	2762	2462	1980	8,949 e
3	1709	1084	1879	1923	7,595 f
4	2051	3027	3432	2487	10,997 b
5	3274	3450	3038	3281	13,088 a
6	1823	3130	3200	2544	10,697 bc
7	1889	3293	2619	2664	10,465 c
8	2069	3358	3017	2693	11,137 b
9	2249	2953	2213	2395	9,810 d
10	2429	2713	2206	1903	9,251 e

[1]Forage yield reported is Elbon rye.

[2]Forage yield reported is Coastal bermudagrass.

[3]Numbers within a column and followed by the same letter are not significantly different at the 0.05 level using Duncan's Multiple Range Test.

Table 4. Monthly and total rainfall during 3-year clipping period.

Month	1980	1981	1982
	inches		
January	3.62	1.05	3.35
February	2.69	2.81	3.18
March	2.67	2.81	2.74
April	4.35	2.01	3.87
May	6.15	7.89	5.48
June	2.11	4.71	4.89
July	1.38	5.49	1.40
August	0.95	0.79	0.43
September	3.26	3.69	0.74
October	1.96	2.76	6.58
November	3.58	2.82	6.18
December	1.53	0.67	6.26
TOTALS			
April-October	20.16	27.34	23.39
Year	34.25	37.50	45.10