Forage Research in Texas

1982

Rate of Application and Source of Nitrogen on Yield 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 a percentage mixture of ammonium nitrate:Nitroform. The various sources were applied either as a single application at the beginning of the growing season, or as equally split applications throughout the season. Nitroform was also applied at the single application rate of 600 lbs/acre nitrogen. The 2-year average yields ranged from 12,453 lbs/acre dry matter for Nitroform in a single application to 14,413 lbs/acre dry matter for the 80:20 mixture of ammonium nitrate:Nitroform. In general, nitrogen supplied in a single application as any source and the high percentage mixture of Nitroform (20 $AmNO_3$:80 Nitroform) had the lowest average yield of the ten treatments.

Introduction

The need for nitrogen in the production scheme of Coastal bermudagrass has been well established. With the ever-increasing demand for fossil fuel products and by-products, the method of application and the source of nitrogen fertilizers are critical to the economic stability of forage-livestock operations in the Southeastern U. S. Current bulk fertilizer application costs are $15.00 to $20.00 per ton. Therefore, if less applications can be made through the use of heavier rates of nitrogen and/or slow release nitrogen fertilizers, the economic impact for the producer may be significant. The primary objective of this trial was to determine the influence of application rate and source of nitrogen on Coastal bermudagrass using conventional and slow-release sources of nitrogen.

Procedure

Nitrogen was applied to Coastal bermudagrass as ammonium nitrate (33.5-0-0), urea (45-0-0), and Nitroform® (38-0-0) at the rate of 400 lbs/acre in single and split applications. Nitroform was also supplied in a single application at the rate of 600 lbs/acre nitrogen (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/acre P_2O_5 and 200 lbs/acre K_2O, respectively. Treatments were replicated four times in a randomized complete block design, and the bermudagrass was harvested at the hay stage of growth.

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Results

During 1980, dry matter production of Coastal bermudagrass ranged from 8,121 lbs/acre from Nitroform supplied in two applications of 200 lbs/acre each to 11,435 from the 80:20 mixture of ammonium nitrate:Nitroform (Table 2). However, the reverse combination of ammonium nitrate:Nitroform (20:80) produced one of the lowest yields. Dry matter production was also apparently suppressed by the single applications of both ammonium nitrate and Nitroform at 400 lbs/acre nitrogen. In general, yields were relatively low on all treatments.

Dry matter yields during 1981 were nearly double those of the preceding year on some treatments (Table 3). Both the urea and Nitroform sources, when supplied in a single application, produced the least amount of forage. The other 8 treatments were surprisingly similar in production. The 2-year average yields are shown in Table 4. The lowest dry matter production occurred on the 400 lb/acre nitrogen rate of Nitroform supplied in a single application; whereas, the highest yield occurred with the 80:20 mixture of ammonium nitrate:Nitroform.

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. Initial dry matter production of Coastal bermudagrass as influenced by rate and source of nitrogen.

Treatment	6-11-80	7-12-80	8-20-80	10-30-80	TOTAL
	lbs/acre				
1	5,857	1,173	883	3,184	11,097
2	4,406	1,823	672	2,253	9,154
3	6,006	1,894	615	2,196	10,711
4	5,165	1,250	764	1,921	9,100
5	6,186	1,492	936	2,317	10,931
6	3,786	947	1,125	2,263	8,121
7	3,764	903	999	2,905	8,571
8	5,265	1,519	1,088	3,331	11,203
9	4,831	1,118	1,060	3,336	10,345
10	5,877	1,159	1,038	3,361	11,435

Table 3. Second-year dry matter production of Coastal bermudagrass as influenced by rate and source of nitrogen.

Treatment	6-1-81	6-30-81	7-28-81	11-5-81	TOTAL
	lbs/acre				
1	5,385	4,198	3,622	3,682	16,887
2	6,236	3,766	3,430	4,018	17,450
3	5,841	3,934	2,746	3,274	15,795
4	4,869	3,694	3,118	4,125	15,806
5	5,877	3,850	3,334	3,670	16,731
6	5,673	4,066	3,466	3,802	17,007
7	5,553	4,054	3,574	3,718	16,899
8	5,526	4,030	3,778	4,006	17,342
9	5,217	3,982	3,886	4,149	17,234
10	5,337	4,341	3,850	3,862	17,390

Table 4. Two-year average production of Coastal bermudagrass as influenced by rate and source of nitrogen.

Treatment	1980	1981	2-yr Avg.
	lbs/acre		
1	11,097	16,887	13,992
2	9,154	17,450	13,302
3	10,711	15,795	13,253
4	9,100	15,806	12,453
5	10,931	16,731	13,831
6	8,121	17,007	12,564
7	8,571	16,899	12,735
8	11,203	17,342	14,273
9	10,345	17,234	13,790
10	11,435	17,390	14,413