

Forage Research in Texas

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SOURCE AND RATE OF NITROGEN ON COASTAL BERMUDAGRASS FORAGE PRODUCTION

OBJECTIVE:

Compare various sources and rates of nitrogen on forage dry matter production, forage nitrogen content and nitrogen recovery in Coastal bermudagrass.

PROCEDURE:

Ten treatments of various sources and rates of nitrogen were applied each to a Darco (deep sand) and a Cuthbert (sandy clay with gravel) soil (Table 1). Sulfur (gypsum), phosphorus (0-46-0), and potassium (0-0-60) were applied prior to initiation of spring growth at the rates of 45, 224, and 269 kg/ha of S, P_2O_5 , and K_2O , respectively. Split applications of nitrogen were made 4 to 6 weeks before each harvest. Plots were 1.8 x 3.6 m and were harvested with a sickle mower. Nitrogen was analyzed via micro-Kjeldahl procedures.

RESULTS AND DISCUSSION:

Seasonal dry matter forage production of Coastal bermudagrass grown on a Darco soil is shown in Table 2. The unusually dry season caused depressed yields and probably diluted the treatment differences. Significant yield differences due to rates and sources of nitrogen were slight and overlapping. The most clearly delineated differences occurred at each harvest date. Table 3 shows the percent nitrogen of bermudagrass forage grown on the Darco soil. Again, only slight statistical differences were evident. Nitrogen recovery, which combines dry matter production and percent nitrogen is shown in Table 4. In general, the 336 kg/ha rate had the highest N recovery.

Period and total forage dry matter of Coastal bermudagrass grown on a Cuthbert soil is shown in Table 5. The low rate of urea tended to produce less forage than some of the other treatments. Percent nitrogen at each of the three harvest dates is presented in Table 6. Nitrogen recovery is shown in Table 7. With the exception of the ammonium nitrate sulfate source, the low rates of nitrogen had the lowest recovery rates. Because

of the lack of sufficient moisture for bermudagrass growth, this nitrogen source and rate trial did not have well defined treatment differences.

Table 1. N-source treatments

Treatment No.	Description
1	Check
2	168 kg N/ha - Ammonium nitrate
3	336 kg N/ha - Ammonium nitrate
4	168 kg N/ha - Urea
5	336 kg N/ha - Urea
6	168 kg N/ha - Ortho ammonium nitrate sulfate (30-1-0)
7	336 kg N/ha - Ortho ammonium nitrate sulfate (30-1-0)
8	168 kg N/ha - Nipak urea ammonium phosphate
9	336 kg N/ha - Nipak urea ammonium phosphate
10	168 kg N/ha - Ca-protected urea (band)
11	336 kg N/ha - Ca-protected urea (broadcast)

Table 2. Total dry matter production (kg/ha) of Coastal bermudagrass on a Darco soil.

Treatment	Dry Matter (kg/ha)			
	5-25	7-26	10-12	Total
1	623 g	1069 c	1359 c	3051 d ^{1/}
2	2530 e	2312 b	2550 ab	7392 abc
3	3677 b	2606 ab	2529 ab	8812 abc
4	1940 f	2244 b	2450 b	6634 c
5	3164 c	2490 ab	2568 ab	8222 abc
6	2718 de	2143 b	2702 ab	7563 abc
7	4044 a	2804 a	2566 ab	9414 a
8	1970 f	2283 b	2456 b	6709 bc
9	3047 cd	2397 ab	2750 ab	8194 abc
10	3836 ab	2445 ab	2713 ab	8994 ab
11	3640 b	2502 ab	2977 a	9119 a
Avg	2835 a	2300 a	2511 a	

Table 3. Percent nitrogen of Coastal bermudagrass forage grown on a Darco soil.

Treatment	% Nitrogen		
	5-25	7-26	10-12
1	1.57 bc	1.09 c	1.76 b ^{1/}
2	1.48 c	1.32 bc	1.52 b
3	2.09 a	1.74 a	1.41 b
4	1.59 bc	1.33 bc	1.52 b
5	1.91 abc	1.57 ab	1.70 b
6	2.05 a	1.30 bc	1.55 b
7	1.77 abc	1.71 a	1.70 b
8	1.92 abc	1.37 bc	1.71 b
9	1.91 abc	1.73 a	1.81 b
10	1.99 ab	1.57 ab	2.23 a
11	1.97 ab	1.51 ab	1.47 b

^{1/}Yields 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. Nitrogen recovery (kg/ha) from Coastal bermudagrass grown on a Darco soil.

Treatment	Nitrogen (kg/ha)			Total
	5-25	7-26	10-12	
1	9.8	11.7	24.1	45.6 e ^{1/}
2	37.6	30.5	39.1	107.2 cd
3	77.2	45.5	35.6	158.3 abc
4	31.1	29.7	36.8	97.6 de
5	60.5	39.2	43.9	143.6 abcd
6	55.5	28.4	40.4	124.3 abcd
7	70.9	48.1	43.1	162.1 ab
8	37.9	31.4	42.4	111.7 bcd
9	58.6	41.7	50.2	150.5 abcd
10	76.4	38.2	58.9	173.5 a
11	71.7	35.9	42.6	150.2 abcd
Avg	53.4 a	34.6 b	41.6 ab	

Table 5. Total dry matter production (kg/ha) of Coastal bermudagrass on a Cuthbert soil.

Treatment	Dry matter (kg/ha)			Total
	5-24	7-25	10-16	
1	1172 d	1213 d	1707 ^{2/}	4092 d ^{1/}
2	2532 bc	3332 bc	1902	7766 abc
3	3820 a	4031 a	2140	9973 a
4	1960 d	2997 c	1998	6955 c
5	2891 b	3968 a	2103	8962 abc
6	2591 bc	3295 bc	1984	7870 abc
7	3560 a	4038 a	2103	9701 ab
8	2151 cd	2866 c	2437	7454 bc
9	2990 b	4065 a	2218	9273 abc
10	3541 a	3741 ab	2357	9639 ab
11	3584 a	3592 ab	2172	9349 abc
Avg	2798 b	3379 a	2102 b	

^{1/} Yields within a column and followed by the same letter are not significantly different at the 0.05 level using Duncan's Multiple Range Test.

^{2/} Means were not significantly different at the 0.05 level of probability.

Table 6. Percent nitrogen of Coastal bermudagrass forage grown on a Cuthbert soil.

Treatment	5-24	7-25	10-16
1	1.90 e	1.34 cde	1.29 cd ^{1/}
2	2.22 bcde	1.18 e	1.25 cd
3	2.56 a	1.73 ab	1.83 ab
4	2.29 abcd	1.55 bcd	1.35 cd
5	2.19 cde	1.62 b	1.91 a
6	2.40 abc	1.27 de	1.47 bcd
7	2.55 ab	1.74 ab	1.63 abc
8	1.95 de	1.57 bc	1.31 cd
9	2.26 abcde	1.63 ab	1.50 bcd
10	2.32 abc	1.76 ab	1.62 abc
11	2.51 abc	1.87 a	1.18 d

Table 7. Nitrogen recovery (kg/ha) from Coastal bermudagrass grown on a Cuthbert soil.

Treatment	5-24	7-25	10-16	Total
1	22.5	16.3	22.0	60.8 d ^{1/}
2	56.3	38.7	24.5	119.5 cd
3	98.0	71.3	39.2	208.5 a
4	44.5	45.4	27.1	117.0 cd
5	62.9	66.9	40.1	169.9 abc
6	61.8	41.9	29.6	133.3 bc
7	90.2	71.4	33.3	194.9 a
8	41.9	42.8	31.8	116.5 cd
9	67.2	66.0	33.1	166.3 abc
10	82.2	65.7	38.2	186.1 ab
11	89.8	67.7	25.8	183.3 ab
Avg.	65.2 a	54.0 a	31.3 b	

^{1/} Yields with a column and followed by same letter are not significantly different at the 0.05 level using Duncan's Multiple Range Test.