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SUMMARY. Nitrogen fertilization significantly increased the yield of Coastal bermudagrass in a 12-year period (1955-66) on nonirrigated Houston Black clay at Temple, Texas. There was a small response to phosphorus and potassium on this soil that is low in phosphorus and high in potassium. There was an economic response to nitrogen fertilizer up to 90 pounds per acre. The response to phosphorus at 45 pounds per acre was as high as at 90 pounds per acre, and the response to both rates was greater with the higher rates of nitrogen. Rainfall was below average 7 of the 12 years.

COASTAL BERMUDAGRASS FERTILIZATION

Blackland Experiment Station, 1955-66

*E. D. Cook and R. W. Baird**

MORE FORAGE IS NEEDED to support the increasing livestock population in the Blacklands. Coastal bermudagrass appears to have a potential for high yields of good quality forage. It can be grazed intensively without apparent damage. This grass also appears to be adapted to most soil types ranging from sands to clays, but it is limited by cold weather.

Since Coastal bermudagrass was a new grass to the Blackland area, a factorial fertilizer experiment was started in the spring of 1954 (driest year on record) at the Blackland Experiment Station. The test was on Houston Black clay which has a pH of 7.5-8, an organic matter content of 2.5-3.5 percent and a low, readily soluble phosphorus level. Livestock production is an important enterprise in this area, and forage is an integral part of a livestock production system. It is hoped that this data from 1955-66 can be used as a guide to fertilizing nonirrigated Coastal bermudagrass pastures for economic production.

Materials and Methods

The forage plots were 12 feet x 12 feet. Forage yields were harvested from an area 30 inches wide and 10 feet long, and the forage yields are reported on air-dry basis. Fertilizer treatments consisted of all combinations of four rates of nitrogen (N) (0, 45, 90 and 135 pounds per acre), three rates of phosphoric acid (P_2O_5) (0, 45 and 90 pounds per acre) and two potash treatments (90-90-60 and 135-90-60) replicated

*Respectively, agronomist, Texas Agricultural Experiment Station, Blackland Experiment Station, Temple, Texas, and superintendent, Blackland Experiment Station, a joint employee Soil and Water Conservation Research Division, Agricultural Research Service, U. S. Department of Agriculture and Texas Agricultural Experiment Station.

TEXAS A&M UNIVERSITY
Texas Agricultural Experiment Station
H. O. Kunkel, Acting Director, College Station, Texas

TABLE 1. COASTAL BERMUDAGRASS FERTILIZER TEST, TEMPLE TEXAS, 1955-66

Treatment[1]	Pounds per acre air-dry forage												
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	12-year average
0-0-0	6,280	1,400	3,810	4,415	2,715	2,205	2,360	2,165	1,405	2,135	2,230	1,935	2,755
0-45-0	7,365	1,470	3,940	5,045	2,735	3,085	2,410	2,105	1,610	2,100	2,660	2,050	3,045
0-90-0	5,665	1,370	4,025	4,830	3,580	2,530	2,430	1,970	1,520	2,090	2,855	2,050	2,910
45-0-0	9,625	2,055	4,820	5,610	4,220	3,975	4,090	3,800	2,205	3,670	4,450	3,985	4,375
45-45-0	7,365	2,015	4,885	6,750	4,405	4,090	4,060	3,460	2,685	4,150	5,370	4,320	4,460
45-90-0	7,210	1,950	4,950	5,495	4,550	3,710	3,845	3,285	2,560	3,810	4,555	3,805	4,140
90-0-0	9,860	3,525	6,550	7,065	6,310	4,670	5,050	5,965	2,625	3,790	5,245	5,210	5,485
90-45-0	10,925	3,930	6,505	7,810	6,575	6,180	5,960	6,100	3,500	4,650	5,800	4,790	6,060
90-90-0	11,125	3,595	6,710	6,745	5,935	5,790	5,410	6,860	3,555	4,000	5,755	5,215	5,890
90-90-60	10,340	3,655	7,025	7,515	6,060	6,605	6,425	7,270	4,110	4,260	6,325	4,920	6,205
135-0-0	10,525	3,405	6,530	7,465	5,405	5,125	5,335	6,050	2,800	4,505	5,335	5,955	5,720
135-45-0	10,220	3,405	7,470	8,095	7,165	5,990	6,030	7,960	3,460	4,995	5,755	5,785	6,360
135-90-0	10,665	3,020	6,975	8,300	7,445	6,915	6,315	8,300	3,560	4,535	5,580	5,430	6,420
135-90-60	10,170	3,845	8,890	8,985	7,705	5,900	6,245	8,835	4,145	4,795	5,605	6,355	6,785
Average	9,095	2,760	5,935	6,725	5,345	4,770	4,725	7,415	2,840	3,820	4,822	4,415	
Annual rainfall, inches	37.13	16.40	47.35	33.75	46.87	42.48	28.62	29.59	19.09	30.91	39.66	31.48	
Rainfall, Mar.-Sept., inches	30.03	5.53	28.03	22.42	24.37	19.11	16.05	15.51	12.78	19.68	19.80	24.48	
Month of high rainfall, inches	Aug. 13.6		Apr. 9.0								May 8.58	Apr.-May 11.0	

[1]Fertilizer applied in split application, all P_2O_5, K_2O and up to 90 pounds of N applied in February. Houston Black clay soil.

four times. The nitrogen was supplied by ammonium nitrate (33.5 percent N), phosphoric acid by 46 percent superphosphate, and the potassium was from 60 percent muriate of potash. The plots were clipped two to four times each year depending on the growth and rainfall. All the phosphorus, potash and 90 pounds of N were applied in February; the rest of the N was applied after the first clipping.

Results and Discussion

The forage yields were increased by each 45-pound increment of nitrogen with or without phosphorus, but the increase was small between 90 and 135 pounds per acre. Phosphoric acid or potash increased yields only slightly. Results of this forage test are shown in Table 1.

An application of 45 pounds of N per acre produced 1,570 pounds more air-dry forage per acre than the check plot. Ninety pounds of N per acre produced an additional 1,500 pounds per acre, but 135 pounds of N produced only 360 pounds per acre more than the 90 pounds of N per acre. The 360-pounds-per-acre increase in forage production from the third increment of 45 pounds of N per acre was not enough to pay for the extra nitrogen.

Phosphoric acid at 45 pounds per acre increased forage yields about 300 pounds per acre, but the 90-pound rate did not further increase forage yields. However, at the two higher nitrogen levels, phosphoric acid at 45 pounds per acre increased forage yields approximately 700 pounds per acre. Sixty pounds of potash per acre added to 90-90-0 produced 315 additional pounds of forage. When 60 pounds of K_2O was added to 135-90-0, the forage increase was 365 pounds of forage per acre.

Rainfall during the 12-year period was erratic, ranging from 47.35 inches in 1957 to 16.40 inches in 1956. Rainfall was below the 53-year average 7 of the 12 years. The rainfall in 1954, the driest year on the 53-year record, was 13.78 inches. The rainfall in August 1955 was 13.46 inches; April 1957, 9.0 inches; May 1965, 8.58 inches; and April and May 1966, 11.0 inches. The low rainfall probably accounts for the rather low yields.

These results indicate that a combination of nitrogen, phosphorus and potassium are required for maximum forage production. As nitrogen is increased, the response to phosphorus and potassium appears to increase.

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