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# Forage Research in Texas

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Department of Soil and Crop Sciences

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Location: Stephenville

FORAGE YIELDS OF SIX WARM-SEASON GRASSES GROWN AT  
FOUR NITROGEN RATES ON WINDTHORST FINE SANDY LOAM SOIL

OBJECTIVE:

To compare forage yields of different grass types under similar conditions and nitrogen levels.

PROCEDURE:

Six forage grasses were established on Windthorst fine sandy loam in March 1972. Morpa lovegrass, Klein 75, and buffel hybrid 18-35 were seeded in rows spaced three feet apart. The buffel hybrid winterkilled in the winter of 1974-75. Renner lovegrasses were seeded in rows two feet apart in the early spring of 1973. Bermudagrasses were established from plant material placed in rows three feet apart. Variety plots were 17 x 40 ft. in a randomized complete-block design with nitrogen rate subplots measuring 10 x 17 feet. Four replications were used.

Ammonium nitrate was applied in split applications at four nitrogen levels (Table 1). However, the amount for each application and for the season was different in 1972 and 1974 as compared with that applied in 1975-1977. Applications of 50, 60 and 100 lb. N/acre at N levels 2, 3, and 4, respectively, were made in March and after the second harvest in 1972. Applications at level 3 were made at 60 lbs. N/acre except that 70 lb. N/acre was applied after the third harvest. In 1974 nitrogen was applied on March 22 and after each of the four harvests; level 2 was split into 50 lbs. N/acre March 22, and 25 lbs. N/acre was applied after cuttings two and three. Nitrogen levels 3 and 4 received 62.5 and 100 lbs. N/acre, respectively, at each of the five applications. In each of the years 1975, 1976, and 1977 one-third of the total nitrogen was applied in mid-April and after the first and second cuttings. Phosphorus and potassium fertilizer were applied April 26, 1976. All fertilizer was applied on the soil surface.

Forage dry matter yields were determined by collecting and weighing the forage from the 3 x 17 feet center section of each subplot, drying a sample at 70°C, and converting to oven-dry yield per acre. Bermudagrasses and bunchgrasses were cut to a height of two-three, and four inches, respectively. Grasses were normally cut shortly before formation of seed heads on the subplot with high nitrogen levels. Morpa and Renner lovegrass were usually harvested about two weeks earlier in the spring than the bermudagrasses. Spring growth of Kleingrass 75 was about one week earlier than the bermudagrasses, but was harvested at the same time.

RESULTS AND DISCUSSION

Mean annual yields of all grasses increased as nitrogen rate increased (Table 2). The bunchgrasses produced about twice the dry matter of the bermudagrasses when no nitrogen was applied. Yields at the first level (no nitrogen) were grouped near an average of 1.75 tons/acre except for Renner lovegrass which produced 2.5 tons/acre. Coastal yields began to segregate upward from the group at the second level of applied nitrogen while Morpa lovegrass segregated downward. This segregation was still evident at the highest nitrogen level.

The bermudagrasses produced higher yields than the bunchgrasses at the highest nitrogen rate, while the bunchgrasses produced higher yields where either no nitrogen or the lowest level of nitrogen was applied (Table 2). However, Renner lovegrass yields were higher than Coastcross-1 even at the highest nitrogen level. The bermudagrasses were more responsive than the bunchgrasses as nitrogen increased from level three to level four. Renner lovegrass produced greater yields than all other grasses where either no nitrogen or the lowest rate of nitrogen was applied. Coastal bermuda produced greater yields than all other grasses at the two higher nitrogen levels. Kleingrass 75 responded well to nitrogen up to the third level with little additional yield at the highest nitrogen level.

Table 1. Fertilizer application, harvest dates, and rainfall record for nitrogen rate test on six forage grasses grown on Windthorst fine sandy loam at Stephenville, 1972, 1974-1977.

| <u>Year</u> | <u>N Level</u> | <u>Lbs.N/acre*</u> | <u>No. of Harvests</u> | <u>Rainfall**</u> |
|-------------|----------------|--------------------|------------------------|-------------------|
| 1972        |                |                    | 4                      | 15.25             |
|             | 1              | 0                  |                        |                   |
|             | 2              | 100                |                        |                   |
|             | 3              | 250                |                        |                   |
| 1974        | 4              | 400                |                        |                   |
|             |                |                    | 4                      | 15.97             |
|             | 1              | 0                  |                        |                   |
|             | 2              | 100                |                        |                   |
| 1975        | 3              | 313                |                        |                   |
|             | 4              | 500                |                        |                   |
|             |                |                    | 3                      | 11.91             |
|             | 1              | 0                  |                        |                   |
| 1976***     | 2              | 75                 |                        |                   |
|             | 3              | 188                |                        |                   |
|             | 4              | 300                |                        |                   |
|             |                |                    | 3                      | 24.54             |
| 1977        | 1              | 0                  |                        |                   |
|             | 2              | 75                 |                        |                   |
|             | 3              | 188                |                        |                   |
|             | 4              | 300                |                        |                   |
|             |                |                    | 3                      | 18.44             |

\*Nitrogen fertilizer was applied in split applications. See text for details.

\*\*Acre-inches received April-September.

\*\*\*Eighty pounds  $P_2O_5$  and 160 pounds  $K_2O$  per acre were applied April 26.

Table 2. Dry matter yields of bermudagrasses, kleingrass, and lovegrasses grown on Windthorst fine sandy loam at Stephenville, 1972-1977<sup>1/</sup>

| N Level**                    | Mean Annual Yield* |          |          |          | Total Yield<br>as % of Coastal |          |          |          |
|------------------------------|--------------------|----------|----------|----------|--------------------------------|----------|----------|----------|
|                              | <u>1</u>           | <u>2</u> | <u>3</u> | <u>4</u> | <u>1</u>                       | <u>2</u> | <u>3</u> | <u>4</u> |
| <u>Grass</u>                 |                    |          |          |          |                                |          |          |          |
| Coastal bermudagrass         | 0.8                | 1.6      | 3.7      | 4.6      | 100                            | 100      | 100      | 100      |
| Coastcross-1<br>bermudagrass | 0.6                | 1.8      | 3.0      | 3.5      | 76                             | 106      | 81       | 76       |
| Alecia bermudagrass          | 0.6                | 1.4      | 3.2      | 4.1      | 74                             | 82       | 87       | 90       |
| Kleingrass 75                | 1.2                | 2.0      | 3.1      | 3.2      | 158                            | 120      | 84       | 70       |
| Morpa lovegrass              | 1.2                | 1.8      | 2.3      | 2.7      | 154                            | 109      | 63       | 58       |
| Renner lovegrass             | 1.4                | 2.5      | 3.4      | 3.7      | 177                            | 149      | 90       | 81       |

<sup>1/</sup>Data was not taken in 1973; Renner lovegrass was first harvested in 1974.

\*Mean computed on five years' data except for Renner lovegrass.

\*\*Nitrogen was applied in split applications of 0, 25, 62.5, and 100 lbs. N/acre/cutting for N levels 1, 2, 3, and 4, respectively. See text and Table 1 for details.