PERFORMANCE OF BERMUDAGRASS VARIETIES IN NORTHEAST TEXAS

Gerald W. Evers, J. L. Gabrysch, and J. M. Moran

Summary

Nine varieties and three experimental selections of bermudagrass (*Cynodon dactylon* (L.) Pers.) were compared for rate of establishment and forage production at the Texas A&M University Agricultural Research and Extension Center at Overton from 1991 to 1993. 'Jiggs', 'Brazos', 'Grazer', and 'NK 37' bermudagrass had a faster rate of establishment than the other entries. The year after establishment, forage yields ranged from 13,800 to 5,700 lb dry matter (DM)/acre and were related to rate of establishment. In 1993 when all entries began the growing season with a solid stand, 'Tifton 85', Jiggs, and 'Coastal' were the most productive. Grazer and 'World Feeder' appeared to have less drought tolerance when grown on a deep, sandy soil. Below normal winter temperatures did not occur during the study so differences in cold tolerance have not been observed. Tifton 85 is reported to be less cold hardy than 'Tifton 78' and Coastal. Cold tolerance of Jiggs bermudagrass is not known. There were no consistent varietal differences in crude protein percentage during the growing season.

Introduction

Bermudagrass is one of the most widespread and valuable forage species grown in the southeastern U.S. Its area of adaptation is south of a line from Virginia to southern Kansas (Burton and Hanna 1985) and it can be grown in the southwest under irrigation. 'Coastal', the first hybrid bermudagrass was released in 1943 and is grown on more acres than any other variety. Adaptability to sandy, low pH soils, good drought tolerance because of a deep root system, and tolerance to close, frequent grazing are several of the reasons for its widespread use. During recent years, new hybrids and ecotypes have become available with more cold tolerance, improved digestibility, faster establishment, or better adaptability to loam and clay soils (Eichhorn 1984, Holt et al., 1978). Eight commercially available varieties and three experimental selections were compared to Coastal bermudagrass on a deep, sandy soil at the Texas A&M University Agricultural Research and Extension Center at Overton during 1991, 1992, and 1993.

Keywords: bermudagrass / *Cynondon dactylon* (L.) Pers. / adaptability.

Procedures

Six plants were transplanted in a single row, 2.5 ft apart down the middle of a 6 x 15 ft plot except for 'NK 37' bermudagrass which was seeded at 8 lb/acre on 7 May 1991. Soil type was a Darco fine sandy loam with a topsoil depth of greater than 48 in. The low planting density was necessary because of the small amount of planting material available of some of the entries. Aatrex (atrazine) was applied at 1 lb/acre after transplanting for weed control. Plots were mowed several times to control summer weeds and fertilized during 1991 for a total of 160-60-100 lb/acre of nitrogen (N), phosphorus (P), and potassium (K), respectively. All plots were visually rated for spread and coverage at the end of the first growing season in October.

In 1992, Aatrex was applied at 1 lb/acre on 2 March and Grazon P+D (picloram + 2,4-D) at 1 qt/acre on 9 April for weed control. Initial fertilization was 80 lb/acre of N, P, and K on 17 April. Fifty lb of N per acre were applied after each harvest and an additional 160 lb K/acre during the 1992 growing season for a total of 330 lb N, 80 lb P, and 240 lb K per acre. A 5-ft wide swath was harvested from the center of each plot with a sickle bar harvester at monthly intervals from May through September. A subsample of the harvested forage from each plot was collected to determine dry matter percentage and analyzed for crude protein.

Soil analysis taken in March 1993 indicated a moderate P level but very low N and K levels. Initial fertilizer rate was 100 lb/acre of N, P, and K on 16 April. Seventy-five lb/acre of N and K were applied after each harvest to overcome the low N and K soil levels. Total fertilization for 1993 was 400-100-400 of N, P, and K. Weeds were controlled with Grazon P+D at 1 qt/acre on 16 April. This was the first year all entries had a solid stand at the beginning of the growing season. The study was harvested seven times from early May through October.

Crude protein was determined by near infrared reflectance spectrospcopy (NIRS) (Marten et al., 1989). Predictions were made from a bermudagrass equation developed from samples collected at the Overton Research and Extension Center. The calibration equation was developed from 154 subsamples and validated with 20 subsamples. The R^2 of calibration (correlation of known values on NIRS values) for crude protein was 0.97 and the standard error of calibration (SEC) was 0.75. The R^2 of validation (correlation of known values on NIRS-predicted values) was 0.99 and the standard error of performance (SEP) was 0.66. Subsamples were assayed for crude protein by macro-Kjeldahl procedure. Statistical analysis was performed on the data and significant difference between entries determined by Waller-Duncan Multiple Range Test at the 0.05 level.

Results and Discussion

All entries except World Feeder spread faster than Coastal in the establishment year (Table 1). Jiggs bermudagrass exhibited the most rapid growth and had substantially better coverage than the other entries. Brazos, Grazer, and NK37 all reached better than 50% coverage at the end of the establishment year.

In 1992, early forage production was related to rate of establishment. Jiggs, Brazos, Tifton 85, and Grazer produced the most forage at the first harvest (Table 2). Coastal and World Feeder were the least productive. Yields at the first three harvests were low because of poor moisture conditions and incomplete stands. Jiggs was the most productive variety in 1992 because of a rapid establishment rate and vigorous growth. Brazos and Tifton 85 were next with almost 6 tons and then 'Overton' with 5 tons/acre. World Feeder, Coastal and line 74x12-7 were the least productive at about 3 tons/acre. The stand of NK 37 was lost for unknown reasons.

Crude protein percentages were high in 1992 with a range of 12 to 21% because of the good fertilization program and 4-5 week cutting interval (data not reported). Crude protein values are higher than what would be expected under hay harvesting conditions where mowed grass is dried for several days in the field. Forage samples were collected at harvest and placed in a drying oven within 3 hr of harvest in this study. Quick drying limited protein degradation that can occur with field drying. Crude protein percentage followed the typical bermudagrass trend by being highest at the first harvest, declining during the growing season with a slight increase in fall due to cooler temperatures and shorter daylengths which slow maturity. No variety consistently had a low or high protein percentage across all harvest dates.

All entries had solid stands at the beginning of the 1993 growing season which resulted in a more accurate comparison. Brazos, Jiggs, World Feeder, 'Tifton 44', and Tifton 85 had the best early production at the first harvest on 4 May (Table 3). Forage production was good the first half of the growing season but no significant rainfall from late July through October reduced yields substantially. Grazer and World Feeder are short, thick types that were more stressed under the poor moisture conditions. The range in total yields in 1993 was similar to 1992 but two additional harvests were taken in 1993. Tifton 85, Jiggs, and Coastal were the most productive followed by Brazos, Tifton 44, Tifton 78, and Overton with similar yields of about 5 tons/acre. Grazer was the least productive.

Crude protein percentage in 1993 ranged from 10 to 24% and was influenced by a combination of growing season and soil moisture (data not reported). As in 1992, there were no consistent differences between entries during the growing season. Grazer and World Feeder had

high protein values at most harvest dates because they are short with a higher leaf percentage than other varieties. Protein level in most warm-season perennial grasses is influenced mainly by nitrogen fertilizer rate and stage of maturity at harvest.

The more rapid establishment rate of Jiggs, Tifton 85, and Brazos bermudagrass resulted in the highest forage production the year after planting. After solid stands developed, Coastal was as productive as these varieties. Tifton 85 has been reported to be more digestible than Coastal which would result in higher animal performance under grazing. However, Tifton 85 is not as cold tolerant as Coastal. After 3 years Tifton 85 has suffered no stand loss at Overton. It is recommended that Tifton 85 grown in northeast Texas go into the winter with 4 to 6 in. of growth to help prevent stand loss from low temperatures. Jiggs establishes rapidly and has been very productive. The absence of below normal winter temperatures during this study has prevented a comparison of cold tolerance. The high K fertilization program used in this study may also have prevented stand loss due to low temperatures.

Literature Cited

Burton, G. W., and W. W. Hanna. 1985. Bermudagrass. p. 247-254. In M. E. Heath, R. F. Banres, and D. S. Metcalfe (ed.). Forages - The Science of Grassland Agriculture. Fourth Edition, Iowa State University Press, Ames, IA.

Eichhorn, M. M., Jr. 1984. Summary of varietal trials with warm-season perennial grasses in Louisiana, 1970-82. Louisiana Agric. Exp. Stn. Bull. 763.

Holt, E. C., B. E. Conrad, W. C. Ellis, R. M. Jones, D. A. Lovelace, and M. J. Norris. 1978. Bermudagrass research in central and north Texas. Texas Agric. Exp. Stn. PR-3482.

Martin, G. C., J. S. Shank, and F. E. Barton. 1989. Near infrared reflectance spectoscopy (NIRS): Analysis of forage quality. Agric. Handbook no. 643. USDA-ARS, U.S. Print Office, Washington, DC.

Shenk, J. S., S. L. Fales, and M. O. Westerhaus. 1993. Using near infrared reflectance product library files to improve prediction accuracy and reduce calibration costs. Crop Sci. 33:578-581.

Table 1. Coverage of bermudagrass varieties at the end of the establishment year October, 1991 (0=no cover, 5=100% cover).

Variety	Rating	Variety	Rating
Jiggs	4.5	Tifton 44	2.0
Brazos	3.25	Tifton 78	2.0
Grazer	3.0	Overton bermuda	2.0
NK-37	2.75	Line 74x12-6	1.75
Tifton 85	2.25	Coastal	1.5
Line 16-12	2.25	World Feeder	1.0

Table 2. Forage production of bermudagrass varieties at Overton 1992.

Variety	Harvest Dates					
	May 21	June 17	July 17	Aug 17	Sept 18	Total
	Dry matter yield (lb/acre)					
Jiggs	2118 a†	2875 a	1993 a	4497 a	2356 a-c	13,839 a
Tifton 85	941 bc	2251 b	1591 bc	4178 ab	2641 a	11,602 b
Brazos	1220 b	2068 bc	1893 ab	3628 bc	2660 a	11,469 b
Overton	366 ef	1821 cd	1327 c	4616 a	1883 c-e	10,013 c
Grazor	670 cd	2212 b	876 de	3452 b-d	1356 e	8,566 d
Tifton 44	585 d	1626 d	1374 c	3359 c-e	1588 de	8,532 d
Tifton 78	552 d	1290 e	780 d-f	2861 de	2038 de	7,521 d
16-12	537 d	1035 ef	778 d-f	2639 ef	2458 ab	7,447 d
World Feeder	119 f	265 g	506 f	2807 d-f	2306 a-c	6,003 e
Coastal	199 ef	973 f	963 d	2097 f	1593 de	5,825 e
74x12-6	460 de	1051 ef	567 ef	2073 f	1537 de	5,688 e
CV %	35.6	14.4	23.2	16.8	18.8	11.1

†Values in a column followed by the same letter are not significantly different at the 0.05 level of Waller-Duncan Multiple Range Test.

Table 3. Forage production of bermudagrass varieties at Overton in 1993.

Variety	4 May	4 June	23 June	19 July	23 Aug	22 Sept	22 Oct	Total
	Dry matter (lb/acre)							
Tifton 85	1774 abc*	1442 cde	2363 ab	3495 a	1381 a	949 a	1216 b	12,620 a
Jiggs	2096 ab	1798 a	2171 abc	2928 b	1066 bc	744 bc	1381 a	12,184 ab
Coastal	1708 bc	1701 ab	1990 bc	3009 b	1318 a	892 ab	797 cd	11,415 bc
Brazos	2156 a	1482 cde	2160 abc	2447 c	992 c	809 abc	781 d	10,827 cd
Tifton 44	1815 abc	1592 bc	2426 a	2548 c	794 d	774 bc	547 f	10,496 d
Tifton 78	1598 cd	1461 cde	1938 c	2301 c	1167 b	748 bc	950 c	10,163 d
Overton	1241 d	1533 bcd	2061 abc	2491 c	1089 bc	859 abc	745 de	10,019 de
74 x 12-6	1628 cd	1305 e	1962 c	1855 d	1035 bc	717 c	812 cd	9,314 e
World Feeder	1888 abc	1353 de	1854 c	1907 d	549 e	368 d	502 f	8,421 f
16-12	1613 cd	1408 cde	1886 c	1534 e	771 d	525 d	608 ef	8,345 f
Grazer	1564 cd	739 f	2112 abc	1033 f	321 f	404 d	516 f	6,689 g
CV %	14.9	9.8	10.8	8.4	12.1	17.4	14.8	6.4

*Waller-Duncan Multiple Range Test, 0.05 level.