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Production Potential of Texas Bluegrass (*Poa arachnifera* Torr.)

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Summary

Texas bluegrass (*Poa arachnifera* Torr.) is a tufted dioecious perennial cool-season grass with long, slender rhizomes. This study was conducted to determine the forage potential of Texas bluegrass. Replicated plots using transplants of 13 different accessions were established in the fall of 1988 at the Texas A&M University Research and Extension Centers at Dallas and Stephenville. Dry matter production for the 1989-90 production year averaged 6,926 lb/A at Dallas and 2,280 lb/A at

Stephenville. Dry matter production for the 1990-91 production year averaged 3,829 lb/A at Dallas and 4,167 lb/A at Stephenville. In a separate study, the variation in in vitro true digestibility was investigated for one population (entry 1-86). Differences were not significant among plants with mean values of 87.9% for vegetative stage of growth and 78.3% at anthesis.

Introduction

Many livestock producers desire a cool-season perennial grass to cut the annual cost of seeding winter annuals for their animals. Any decrease in winter pasture cost would greatly enhance the

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economic position of livestock production. A reliable cool-season perennial forage grass would allow substantial savings from the yearly cost of land preparation and seed purchases to establish annual grasses.

Texas bluegrass is a tufted dioecious perennial cool-season grass with long, slender rhizomes. It occurs in all the vegetational areas of Texas except the South Texas Plains, the High Plains, and the Trans-Pecos, Mountains, and Basins. It also occurs in Oklahoma, southern Kansas, and western Arkansas. In Texas, it occurs most frequently in the following vegetational areas: (1) Blackland Prairies, (2) Cross Timbers and Prairies, (3) Edwards Plateau, and (4) Rolling Plains. This study was conducted to determine the forage potential of Texas bluegrass.

Procedure

Thirteen ecotypes of Texas bluegrass, each from a different Texas county, were selected to determine dry matter production potential. Because of the limited seed quantity, direct seeding in the field was not done. Seeds were germinated in flats using a commercial media and then transplanted to growing trays with cell sizes of 1.9 x 2.1 in. Twelve plants were used to establish each plot at Texas A&M University Research and Extension Centers at Dallas and Stephenville during the fall of 1988. There were three replications, and plot size was 4 x 6 ft. At Dallas the soil was Houston black clay (fine, montmorillonitic, thermic Udic Pellusterts), a very deep, fertile soil. At Stephenville, the soil type was a Windthorst fine sandy loam

(fine, mixed, thermic Udic Paleustaff), a shallow-type soil underlain by a clay hardpan.

Each year, fertilizer was applied at rates of 64 lb nitrogen (N)/A in fall and spring at Dallas and 60 lb N/A in fall and 60 lb N/A and 26 lb phosphorus (P)/A in spring at Stephenville. During the 1989-90 and 1990-91 growing season, respectively, Dallas had four harvests and three harvests, and Stephenville had two and four harvests.

Subsamples were collected at harvest for N determination at the Dallas location. Samples for *in vitro* true digestibility (IVTD) were hand-harvested from plants growing at Dallas in a space plant nursery. All samples were oven-dried at 60 °C. Total N was determined by micro-Kjeldahl, and IVTD was determined using the method of Goering and Van Soest.

Results and Discussion

Dry matter production averaged 6,926 lb/A in the 1989 season (Table 1) and 3,829 lb/A in the 1990-91 season (Table 2) at Dallas. As expected with a non-selected, highly heterozygous population, the variation within ecotypes was very high, as shown by the high CV values. No particular ecotype was outstanding in this test, but entry 35-88 was significantly worse than the top entries in 1989-90. No differences were observed, however, in the 1990-91 season. The yield of Texas bluegrass compares favorably with yields obtained from an adjacent tall fescue test at Dallas that was treated with the same fertility and harvested at the same time. The mean dry matter production of tall fescue cultivars was 3,858 lb/A in the 1989-90

Table 1. Dry matter production of Texas bluegrass at Dallas, Texas, 1989-90.

Entry	Date (mo.-day-year)				Total
	11-14-89	3-23-90	5-7-90	6-19-90	
lb/A				
23-88	1603 abc	3487 ab	3629 a	582 b	9301 a
2-88	2617 a	3254 ab	3611 bc	728 ab	9211 a
15-88	1397 abc	4400 a	2400 bcd	573 b	8768 a
20-88	1800 ab	3605 ab	2568 bcd	578 b	8551 a
39-88	1712 abc	3477 ab	2499 bcd	841 a	8530 a
21-88	1463 abc	2834 b	2782 b	817 a	7896 ab
32-88	1892 ab	3050 ab	1949 cd	582 cd	7473 ab
19-88	1855 ab	2518 ab	2399 bcd	686 ab	7458 ab
1-86	1960 ab	2779 ab	2061 bcd	657 ab	7457 ab
4-88	1435 abc	3194 ab	2051 bcd	653 ab	7332 ab
18-88	1572 abc	2615 ab	1956 cd	636 ab	6779 ab
40-88	497 bc	1967 b	3514 a	650 ab	6628 ab
35-88	999 bc	2204 b	1771 d	543 b	5519 b
Mean	1600	3030	2475	656	6926
C.V. (%)	41	33	17	16	19

season and 6,541 lb/A in the 1990-91 season. The tall fescue test during the summer of 1991 showed a substantial loss of stand; the Texas bluegrass test showed no loss.

Dry matter production of Texas bluegrass was much lower at Stephenville during the 1989-90 season and yielded a mean of 2,280 lb/A (Table 3) but was higher than the Dallas location yield during the 1990-91 season, which had a mean of 4,167 lb/A (Table 4). Yields at Stephenville did not differ significantly.

Protein content differed among the different entries, but the greatest differences were due to

plant maturity. Mean protein content varied from a high of 22% to a low of 13% with an average of 16%. In a separate study, the variation in IVTD was investigated for one population (entry 1-86). No significant differences occurred among plants having mean protein values of 87.9% at vegetative stages of growth and values of 78.3% at anthesis.

The yield of Texas bluegrass at both locations and its quality at Dallas indicate that this grass has a good potential as an improved cool-season pasture grass. Future studies are being conducted to determine the production potential in other regions of Texas and Oklahoma.

Table 2. Dry matter yield of Texas bluegrass at Dallas, Texas, 1990-91.

Entry	Date (mo.-day-year)			Total
	12-11-90	4-5-91	5-1-91	
 lb/A			
23-88	975 ab	1743 NS	1320 bc	4038 NS
2-88	1108 ab	1356	1083 bcd	3547
15-88	1070 ab	1239	1144 bcd	3453
20-88	750 b	1196	1144 bcd	3090
39-88	1413 a	2061	1059 bcd	4533
21-88	1405 a	1695	1451 b	4551
32-88	867 ab	1885	1078 bcd	3830
19-88	1163 ab	1980	1453 b	4596
1-86	971 ab	1951	1452 b	4374
4-88	945 ab	1554	780 d	3279
18-88	947 ab	1131	918 cd	2996
40-88	591 b	1101	2005 a	3697
35-88	1067 ab	1761	933 cd	3761
Mean	1021	1588	1220	3829
C.V. (%)	30	34	20	21

Table 3. Dry matter production of Texas bluegrass at Stephenville, Texas, 1989-90.

Entry	Date (mo.-day-year)		Total
	3-21-90	4-23-90	
 lb/A		
32-88	959 NS	1879 NS	2838 NS
1-86	1016	1578	2594
20-88	902	1619	2521
2-88	909	1503	2412
39-88	896	1510	2406
40-88	736	1635	2371
21-88	786	1542	2328
4-88	786	1398	2184
18-88	839	1332	2171
23-88	783	1306	2089
19-88	769	1246	2015
35-88	748	1175	1923
15-88	723	1065	1788
Mean	859	1446	2280
C.V. (%)	32	20	19

Table 4. Dry matter yield of Texas bluegrass at Stephenville, Texas, 1990-91.

Entry	Date (mo.-day-year)				Total
	10-31-90	3-4-91	4-4-91	5-22-91	
 lb/A				
23-88	866 NS	1227 ab	781 NS	1150 NS	4024 NS
2-88	1100	1313 ab	1017	1155	4585
15-88	1055	1693 a	910	1113	4771
20-88	763	1176 ab	1074	1117	4130
39-88	948	1387 ab	1074	1214	4623
21-88	820	682 b	715	970	3187
32-88	1174	1156 ab	898	1122	4350
19-88	1162	1493 ab	900	1100	4665
1-88	988	1444 ab	960	1041	4433
4-88	974	1040 ab	938	989	3941
18-88	1050	1140 ab	842	1022	4054
40-88	745	879 ab	805	1086	3515
35-88	817	1048 ab	924	1124	3913
Mean	958	1206	910	1093	4167
C.V. (%)	27	36	27	14	20