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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.

Keywords: dry matter / cool-season grass.

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

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 Paleustalf), a shallow-type soil underlaid 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) 11-14-89	3-23-90	5-7-90	6-19-90	Total
	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) 12-11-90		4-5-91		5-1-91		Total	
	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) 3-21-90		4-23-90		Total	
	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) 10-31-90		3-4-91		4-4-91		5-22-91		Total	
	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	