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PERFORMANCE OF COOL-SEASON PERENNIAL GRASSES AT DALLAS, TEXAS

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Summary

This study was undertaken to determine the persistence and yield of 'Matura' bromegrass (Bromus willdenowii), AU 'Triumph' tall fescue (Festuca arundinaceae), 'Kentucky' 31 tall fescue with and without the endophyte, and 7 tall fescue experimental lines developed at Dallas, TX. Matura bromegrass produced highest yield the first year with 8005 lb/ac. dry matter but had the lowest production the second year. There were no differences in the tall fescue lines the second year indicating a lack of environmental stress. There were differences in protein content for each harvest date the first year with Matura bromegrass, AU Triumph tall fescue and PI 100-3 tall fescue being in the lowest group each harvest date.

Introduction

Livestock producers in Texas have expressed an interest in a cool-season perennial forage grass to reduce the cost of over-wintering their herds. This decrease in cost would be due to the elimination of annual soil preparation, seed and planting cost. One grass, 'TAM Wintergreen' Hardinggrass (Phalaris tuberosa) was released as an adapted cool-season perennial for Texas but most stands were lost due to disease, overgrazing during the summer months, or plowed up due to low fall forage production. Early research with cool-season perennial grasses demonstrated that tall fescue was the most drought tolerant of the cool-season grasses but later research found that this advantage was in most cases due to the presence of the endophyte Acremonium coenophialum (Read and Camp 1986). In the southeastern US the breeders now develop tall fescue cultivars with a percent of the plants being infected with the endophyte to insure stand survival. At Dallas, selection has been for summer survival within endophyte free tall fescue populations. Annual yields

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of tall fescue plots at Dallas from 1980 to 1983 varied from 8930 to 6402 lb/ac. In that test the cultivars of Ky-31 and Kenhy along with the experimental Temple-1 had the highest 3 year average yield (Read 1984). The data were encouraging with some of the experimental lines such as PI-26, S-Sel, and PI-144 producing higher yields by the third year than available varieties indicating tolerance to the environment in the north central Texas (Read 1984). Similar observations were made in tests at College Station, TX for Temple 3 and PI-26 (Hussey and Read 1993).

The objective of this study was to compare dry matter production and persistence of seven tall fescue experimental lines, Kentucky 31 tall fescue with (E+) and without (E-) endophyte, AU Triumph tall fescue and Matura rescuegrass. The Kentucky 31 E+ is genetically identical to the Kentucky 31 E- and was produced by International Seed Co. for research on the influence of the endophyte in tall fescue.

Procedure

This study was conducted at the Texas A&M University Research and Extension Center at Dallas, TX on Houston Black clay soil. Plots were planted on 26 Oct. 1992 using a 7 row plot planter. Plot size was 5 by 20 ft. with 4 replications in a randomized complete block design. Plots were harvested 3 times in 1992-93 and 4 times in 1993-94. The tall fescue plots were screened cytologically for the presence of the endophyte by examining 10 randomly collected culms from each plot.

Results and Discussion

The only tall fescue lines infected with the endophyte were Kentucky 31 E+ with 95% of the culms infected and Syn 6 with 42.5 % of culms infected. The 42.5 % infection of Syn 6 was due to one infected entry of a 5 plant synthetic line. If all plants in the synthetic line contributed equally the percent infection would have been 20%. The higher percent is probably due to the competitive advantage of infected plants over noninfected plants.

Matura rescuegrass produced the highest yield the year of establishment (Table1) but produced the lowest yield the second year (Table 2). This was due to thinning of the stand during the summer months. Successful use of Matura in north central Texas will

require that it be handled as an annual. There were differences in dry matter production of the tall fescue lines the first year but there were no significant differences in total yield the second year. Normally there are significant differences between tall fescue lines with and without the endophyte. But in this test no differences in yield due to the presence of the endophyte were observed. Lack of differences in the presence of the endophyte has been observed in Kentucky where environmental stresses are less than experienced in Texas (Dr. R. Buckner, Univ. of KY. personal communication). The experimental lines used in this study were developed with emphasis on persistence and not production. Additional testing under environmental stress will need to be undertaken to determine if progress in persistence has been made.

Protein content was determined only for the 1992-93 growing season. There were differences in protein content for each harvest date (Table 3). Matura rescuegrass and AU Triumph tall fescue and PI 100-3 tall fescue were all in the lowest grouping for all dates. This data indicates that protein content should be monitored to insure that it is not reduced by the breeding program.

Literature Cited

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Table 1. Dry matter yield of cool-season perennial grasses at Dallas, 1992-93.

Entry	2 Apr	26 Apr	26 May	Total
	----------lb/A----------			
Syn 6 TF	1264 cd[-1]	1755 bc	1794 cde	4813bc
BLK 1,2,3, Sel TF	1686 bcd	1464 d	1576 e	4726bc
Ky31 E+ TF	975 d	1588 bcd	2008 bc	4571 c
KY 31E- TF	1329 bcd	1706 bcd	2332 b	5367 c
Syn 4 TF	1508 bcd	1604 bcd	1752 cde	4864bc
PI 100-3 TF	1428 bcd	1490 cd	1608 de	4526 c
AU Triumph TF	1820 bc	1633 bcd	2029 bc	5482bc
PI 100-2 TF	1987 b	1791 b	1953 cd	5731 b
Temple 3 TF	1435 bcd	1702 bcd	1974 c	5111bc
Syn 5 TF	1301 bcd	1451 d	1617 de	4369 c
Matura Rescuegrass	2780 a	2380 a	2845 a	8005 a
C.V. (%)	27	9	11	13

[-1] Values within a column followed by the same letter are not significantly different at 0.05 level, Duncan's multiple range test.

Table 2. Dry matter yields of cool-season perennial grasses at Dallas, 1993-94.

Entry	17 Feb	22 Mar	20 Apr	6 Jun	Total
	----------lb/A----------				
Syn 6 TF	2890 a[-1]	1518 a	1182 a	1483 a	7073 a
BLK 1,2,3, Sel TF	2672 a	1361 ab	1127 ab	1251 ab	6411 a
KY 31 E+ TF	2957 a	1235 ab	858 bcd	1301 ab	6350 a
KY 31 E- TF	2667 a	1380 ab	886 bcd	1407 a	6339 a
Syn 4 TF	2502 a	1510 a	1063 abc	1262 ab	6337 a
PI 100-3 TF	2847 a	1444 a	897 abcd	1121 ab	6308 a
AU Triumph TF	2720 a	1381 ab	921 abcd	1208 ab	6230 a
PI 100-2 TF	2568 a	1395 ab	1030 abc	1196 ab	6189 a
Temple 3 TF	2981 a	1010 b	811 cd	1122 ab	5924ab
Syn 5 TF	2894 a	1153 ab	716 d	870 b	5633ab
Matura Rescuegrass	950 b	978 b	1137 ab	1472 a	4538 b
C.V. (%)	16	20	18	25	15

[-1] Values within a column followed by the same letter are not significantly different at 0.05 level, Duncan's multiple range test.

Table 3. Crude protein of cool-season grasses at Dallas, 1992-93

Entry	2 Apr	16 Apr	26 May
	----------%----------		
Syn 6 TF	26.2 a[-1]	19.4 ab	17.8 a
BLK 1,2,3, Sel TF	24.2 abcd	21.1 a	18.0 a
KY 31 E+ TF	25.9 ab	20.8 a	15.6 ab
KY 31 E- TF	25.8 abc	20.4 a	17.1 a
Syn 4 TF	23.8 cde	19.5 ab	17.1 a
PI 100-3 TF	23.9 bcde	20.0 ab	15.6 ab
AU Triumph TF	21.9 e	18.0 b	15.4 ab
PI 100-2 TF	23.1 de	19.4 ab	17.1 a
Temple 3 TF	24.0 bcd	19.1 ab	16.9 a
Syn 5 TF	24.7 abcd	20.4 a	16.3 a
Matura Rescuegrass	22.0 e	19.9 ab	12.5 b
C.V. (%)	5	7	14

[-1] Values within a column followed by the same letter are not significantly different at 0.05 level, Duncan's multiple range test.