1989 Tall Fescue Variety Trial

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ABSTRACT

Tall fescue is a very heat and drought tolerant, cool season turf, which can remain green throughout the year in the arid Southwest. Data are lacking on the performance of tall fescue varieties in this location. Sixty-five tall fescue entries were established in November 1987 and their performance as a home-lawn turf rated for quality, color, density, percent ground cover, pest incidence and water use. All varieties performed very well during the first seven months of 1989, but a decline in August quality was observed during summer monsoons mainly due to the incidence of large brown patch (Rhizoctonia solani L.) and record-setting high temperatures. Turf still showed signs of stress by mid-September. Turfgrass irrigation water use from 1 January to 23 September totalled 43.3 inches (1100.5 mm) and averaged 63 % of predicted evapotranspiration.

INTRODUCTION

Tall fescue (Festuca arundinaceae) is the most heat and drought tolerant, cool season turfgrass available. It has a deep root system. Because of these characteristics it may be possible to use this grass in the arid Southwest providing that it is maintained at higher heights of cut, moderate fertility regimes and medium to low traffic conditions. These minimize environmental stress and would tend to be found in home-lawn situations.

The ability of tall fescue to survive summer heat and remain green during the winter months may make it possible to have a green lawn throughout the year without overseeding. In addition, reduced irrigation water use might be realized 1) by eliminating the need for additional water during overseeding; 2) because winter water use of tall fescue would be lower than that of ryegrass; and 3) by eliminating the need to overirrigate in late spring/ early summer to prevent sudden cool-season grass death due to high temperatures and dry weather conditions.

MATERIALS AND METHODS

A tall fescue variety trial was established on 28 October 1987 at the University of Arizona Campus Agricultural Center. This study is part of a 5-year National Tall Fescue Evaluation Program (NTEP) coordinated by the USDA, Beltsville, MD. The soil is a sandy loam (typic torrifluvent) with a pH of 8.0. Sixty-five entries (varieties and experimental plant materials) were planted with three replications per variety in a completely randomized block design. Individual plot size is 25 ft^2 and they are in full sunlight. Full details of the 1987 planting procedures, 1988 maintenance practices and performance ratings are described by Mancino, et al.(2) and the United States Department of Agriculture (4). Both 1988 and 1989 were record-setting years in Southern Arizona for hot weather with over 85 days at or exceeding 100 degrees by mid-September.

Cultural practices in 1989 were similar to those in 1988 except that there was no need for weed control in the winter of 1988/89. Insect pests also posed no problem during 1989. As in 1988, two applications of the fungicide Fore (mancozeb) were made during summer monsoons to control large brown patch (Rhizoctonia solani) and gray leaf spot (Curvularia sp.). Mowing height was maintained at 2 inches and a 3-1-2 fertilizer was used to apply 0.5 lbs N/1000 ft^2 in October 1988, and February and August 1989. Iron was applied in March and September 1989 at a rate of 2 oz/1000 ft^2.

Irrigation during 1989 was controlled by a soil moisture sensor placed at a depth of 6 inches. This sensor prevented irrigation from occurring if the soil was at or above field capacity. In essence irrigations were made to prevent drought stress without excessive water use and irrigations would not occur following significant rainfall events. In May of 1989 the arrangement of sprinkler heads was changed from square to triangular spacing to improve irrigation efficiency. Irrigation water is a secondarily treated wastewater (EC = 1).

Tall fescue plots were evaluated in 1989 for 1) overall quality of appearance in January, March, June, August and September; 2) color in January, March and September; 3) density and percent ground cover in March and September; and 4) number of winter weeds/plot in January. Density indicates the number of leaves/unit area while percent ground cover indicates soil exposure.

An analysis of variance was used to test for significant differences between entries and to calculate Least Significant Difference (LSD) values. To determine statistical differences among entries, subtract one entry's mean from another entry's mean. Statistical differences occur when this value is larger than the corresponding LSD value at the bottom of a column.

RESULTS AND DISCUSSION

Tall fescue irrigation water use was not as high as expected for a cool-season grass in this region by averaging 63 % of what was predicted by AZMET (Table 1). Surprisingly, water use was highest in January in relation to ET_o but actual water use was low compared to most other months. This was up from the 1988 November and December water use values (data not shown). Percent ET_o was again highest in September, possibly due to the influence of disease stress on the turf. Nus and Hodges (3) reported that disease increased water use in Kentucky bluegrass (Poa pratensis L.) turf.

Varietal data are presented in Tables 2 to 5. Turfgrass quality for a majority of the entries was less than acceptable in January (Table 2). This was due to a lack of greenness (Table 3) during midwinter. Although tall fescue is a cool-season grass, as is perennial ryegrass, many of the entries went into partial dormancy due to cold weather. Some entries (10 out of 65) however, remained acceptably green. Although aesthetically pleasing, these entries might be more susceptible to winter kill during extremely cold winters by failure to protect themselves by going into dormancy. All entries had good or very good color by the March rating showing a quick and early green-up in response to warmer weather.

Overall, turfgrass quality (Table 2) was good to very good at the March and June ratings. It was observed that quality was also good in July although formal ratings were not taken. A decrease in quality occurred during August as a result of large brown patch and gray leaf spot and a further decline occurred in September. High temperatures and humidities stressed the turf during summer monsoons and made it more susceptible to fungal attack. These stressful conditions were in addition to the abnormally hot weather, which began as early as March. A more rapid recovery occurred in 1988 following fungicide treatment (2,4).

Turf color (Table 3) probably had the greatest impact on September quality. Color was greatly reduced due to disease, with the turf appearing chlorotic. Some plots showed signs of "melting out" and this is reflected in the density data (Table 4). Percent ground cover (Table 4) was decreased for some entries but to a much lesser extent than color and density.

Significant differences existed between entries for winter weed infestation (Table 5). However, practically speaking, the weed problem was kept to a minimum due to the high density and percent ground cover provided by the tall fescue during the winter season. Summer weeds were not a problem due to a good turf cover in late winter/early spring.

CONCLUSION

The tall fescue entries being evaluated in this trial appear to be doing well under Southern Arizona conditions with good quality in fall (data not shown), winter, spring and early summer. More obvious varietal differences

may occur as this stand matures, accumulates thatch, and becomes injured due to traffic and disease.

At this time it appears that the summer monsoons are the most critical management period for tall fescue in this region with disease (large brown patch and gray leaf spot) reducing turf quality and density. The use of higher mowing heights and moderate levels of soil fertility might reduce the incidence of these diseases by decreasing environmental stress (1). This will be tested in 1990.

REFERENCES

1. Beard, J.B. 1973. Turfgrass Science and Culture. Prentice-Hall, Inc. Englewood Cliffs, NJ. 658 pp.

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3. Nus, J.L. and C.F. Hodges. 1986. Comparative water use rates and efficiencies, leaf diffusive resistances and stomatal action of healthy and stripe-smutted Kentucky bluegrass. Crop Sci. 26:321-324.

4. United States Department of Agriculture. NTEP Tall Fescue Test - 1987, Progress Report 1988. Publ. no. PSI 10. 37 pp.

Table 1. Tall fescue water use by month of 65 entries grown in full sunlight in Tucson, AZ.

Month	Water Use (mm)	Rain-fall (mm)	ETo(mm)[1]	%ETo(mm)[2]
Jan	72.6	22.1	78.7	92.3
Feb	57.8	1.0	106.7	54.0
Mar	70.2	24.9	182.1	38.6
Apr	138.4	0.0	228.8	60.5
May	151.1	0.0	266.3	55.5
Jun	194.1	2.0	285.1	68.1
Jul	159.8	45.0	271.1	58.9
Aug	125.4	18.3	223.8	56.0
Sept[3]	131.1	7.9	157.2	83.4
Total	1100.5	121.2	1799.8	63.0[4]

1 = Calculated by local AZMET Weather Station.

2 = Irrigation water only.

3 = September 1 to September 23, 1989.

4 = Mean %ET.

Table 2. Mean 1989 Quality Ratings For 65 Tall Fescue Varieties Grown in Tucson, AZ. 1 = poor, 6 = acceptable, and 9 = excellent.

Name	Jan	Mar	Jun	August	Sept
Adventure	5.0	7.0	7.3	5.0	4.3
Apache	5.3	7.0	6.7	5.7	5.0
Arid	5.3	6.7	6.0	5.7	5.7
Aztec	5.0	7.0	6.3	5.3	5.2
Barnone	5.3	7.0	7.0	5.7	5.2
Bel-86-1	4.5	7.0	7.0	4.5	4.5
Bel-86-2	5.0	7.0	6.0	5.0	6.0
Bonanza	5.3	7.0	6.3	5.3	5.2
Carefree	5.0	7.0	6.3	5.7	5.2
Chieftan	5.3	7.0	6.3	5.3	5.2
Cimmaron	5.0	7.0	6.7	5.7	5.5
Emperor	6.0	7.0	7.0	5.3	4.3
Falcon	6.5	6.0	6.0	5.5	5.3
Fatima	5.0	7.0	6.7	6.0	5.0
Finclawn 5GL	4.7	6.5	6.3	5.0	5.3
Finelawn I	6.0	7.0	6.5	5.0	5.8
Hub 887	5.0	7.0	7.0	5.3	5.2
JB-2	5.0	7.0	5.7	5.5	5.7
Jaguar	6.0	7.0	6.5	5.5	5.3
Jaguar II	5.3	7.0	6.0	5.3	4.7
KWS-BG-6	5.0	8.0	6.7	6.0	5.5
KWS-DUR	4.7	7.0	6.3	5.7	5.8
Ky-31	4.3	6.3	6.7	6.0	5.0
Legend	5.0	7.0	7.0	6.0	4.5
Mesa	4.7	7.0	6.7	5.0	5.0
Monarch	4.3	7.0	6.3	5.7	5.0
Normarc 25	5.0	7.0	6.3	5.3	5.5
Normarc 77	6.0	7.0	6.3	5.3	5.3
Normarc 99	4.5	8.0	6.5	6.0	5.0
Olympic	5.3	7.0	7.0	5.3	5.5
PE-7	5.7	7.0	7.3	5.3	5.2
PE-7E	5.0	7.0	6.7	5.7	5.3
PST-5AG	5.0	6.7	6.7	5.3	5.0
PST-5AP	5.0	6.5	6.7	5.7	5.2
PST-5BL	5.0	7.5	6.7	5.0	5.0
PST-5D1	4.7	7.5	6.0	5.7	5.3
PST-5D7	4.3	6.7	6.3	4.7	5.7
PST-5DM	4.5	6.5	6.0	5.5	5.8
PST-5EN	6.0	7.0	6.3	5.7	5.7
PST-5F2	5.7	7.0	7.0	6.0	5.3
PST-5HF	4.7	7.0	6.7	5.3	5.3
PSTG-5MW	5.3	7.3	6.7	5.7	5.3

PST-50L	5.3	7.0	7.0	5.7	5.2
PST-DBC	5.3	7.0	7.0	5.0	5.2

Table 2.--(continued)

Name	Jan	Mar	Jun	August	Sept
Pacer	5.3	6.3	6.0	5.0	4.5
Pick 845 PN	4.7	7.0	6.3	5.3	5.2
Pick-127	4.7	7.5	6.3	5.0	5.0
Pick-DDF	5.0	7.0	6.3	5.0	5.2
Pick-DM	5.0	7.0	7.0	4.5	5.3
Pick GH6	4.0	7.0	6.3	5.7	5.2
Pick TF9	4.7	6.7	5.7	5.4	4.8
Rebel	4.0	6.5	7.0	5.0	4.8
Rebel-II	5.0	6.7	7.0	5.7	5.2
Richmond	5.7	7.0	7.0	5.3	5.0
Sundance	5.3	7.0	6.7	5.0	5.2
Syn Ga	5.7	6.5	6.3	5.3	5.0
Taurus	5.0	7.0	6.7	5.3	5.2
Thoroughbred	5.7	7.0	6.7	5.3	5.8
Tip	6.0	7.0	6.3	5.7	4.5
Titan	5.5	6.5	6.5	6.0	5.5
Trailblazer	5.0	6.3	6.7	5.3	5.3
Tribute	6.0	7.7	6.7	5.3	5.7
Trident	6.3	7.0	6.3	5.7	5.3
Willamette	5.3	7.0	6.3	5.0	5.5
Wrangler	6.0	6.0	6.0	5.3	5.3
LSD .05 =	1.2	0.7	0.9	1.1	1.2

Table 3. Mean 1989 Color Ratings For 65 Tall Fescue Varieties Grown in Tucson, AZ. 1 = brown, 6 = acceptable color, 9 = dark green.

Name	Jan	Mar	Sept
Adventure	5.3	6.0	4.5
Apache	5.0	7.0	5.0
Arid	5.3	5.7	5.7
Aztec	4.7	7.0	5.3
Barnone	5.3	7.3	5.3
Bel-86-1	4.0	7.0	4.3
Bel-86-1	4.5	6.5	6.0
Bonanza	5.0	7.0	5.3
Carefree	4.3	7.0	5.0
Chieftan	4.3	6.7	5.0
Cimmaron	4.3	6.7	5.5
Emperor	5.7	7.3	4.7
Falcon	5.5	7.0	5.5
Fatima	5.0	7.0	5.0
Finelawn 5GL	5.3	7.0	5.3
Finelawn I	6.5	7.0	5.8
Hub 887	4.3	7.0	5.5
JD-2	5.3	7.3	4.3
Jaguar	6.0	7.0	5.3
Jaguar II	6.0	6.7	4.3
KWS-86-6	4.0	8.0	5.8
KWS-DUR	4.7	7.0	5.7
Ky-31	4.7	6.3	5.2
Legend	5.0	7.0	5.0
Mesa	4.3	7.0	5.0
Monarch	5.0	6.5	4.8
Normarc 25	4.7	7.0	5.5
Normarc 77	5.7	7.0	5.5
Normarc 99	4.0	7.5	5.3
Olympic	4.7	7.0	5.3
PE-7	4.7	7.0	5.3
PE-7E	4.3	7.3	5.3
PST-5AG	4.3	7.0	5.0
PST-5AP	5.3	6.5	5.3
PST-5BL	4.7	7.5	5.0

Table 3.--(continued)

Name	Jan	Mar	Sept
PST-5D1	4.3	7.3	5.5
PST-5D7	5.7	7.3	5.2
PST-5DM	6.0	6.5	5.5
PST-5EN	5.3	6.7	5.8
PST-5F2	4.7	7.0	5.3
PST-5HF	4.7	7.0	5.3
PST-5MW	4.7	7.0	5.5
PST-50L	4.7	7.0	5.3
PST-DBC	4.3	6.7	5.3
Pacer	5.3	7.0	4.5
Pick 845 PN	5.0	7.5	5.2
Pick-127	4.3	7.0	5.0
Pick-DDF	4.0	7.0	4.7
Pick-DM	4.0	7.0	5.3
Pick GH6	5.3	7.0	4.8
Pick TF9	4.7	7.0	5.0
Rebel	5.5	6.5	4.8
Rebel-II	5.3	7.0	5.3
Richmond	5.7	6.3	5.0
Sundance	4.7	7.0	5.2
Syn Ga	5.3	5.5	5.0
Taurus	4.3	7.0	5.2
Thoroughbred	5.0	6.5	5.7
Tip	5.7	6.5	4.5
Titan	5.5	7.0	5.5
Trailblazer	5.7	7.7	5.2
Tribute	5.7	7.3	5.8
Trident	6.3	7.0	5.2
Willamette	5.3	7.0	5.3
Wrangler	6.0	6.5	4.8
LSD .05 =	1.2	0.7	1.4

Table 4. Mean 1989 Density and Percentage Ground Cover of 65 Tall Fescue Varieties Grown in Tucson, AZ. Density: 1 = low; 6 = acceptable; 9 = high.

Name	Mar Density	Mar % GC	Sept Density	Sept % GC
Adventure	7.7	95.0	5.5	86.7
Apache	8.0	95.0	6.3	93.3
Arid	7.3	93.3	6.3	95.0
Aztec	8.0	95.0	6.7	93.3
Barnone	8.0	95.0	6.0	93.3
Bel-86-1	7.5	95.0	5.3	85.0
Bel-86-1	8.0	95.0	6.5	95.0
Bonanza	7.7	95.0	6.3	95.0
Carefree	8.0	95.0	6.3	90.0
Chieftan	8.0	95.0	6.0	95.0
Cimmaron	7.7	95.0	7.0	95.0
Emperor	8.0	95.0	5.7	88.3
Falcon	7.0	95.0	6.0	95.0
Fatima	7.7	95.0	6.7	95.0
Finclawn 5GL	8.0	95.0	6.5	95.0
Finclawn I	8.0	95.0	6.5	95.0
Hub 887	8.0	95.0	6.2	91.7
JD-2	7.7	93.3	6.2	81.7
Jaguar	7.5	93.3	5.3	92.5
Jaguar II	7.5	95.0	5.5	83.3
KWS-86-6	8.0	95.0	6.3	95.0
KWS-DUR	8.0	95.0	6.7	95.0
Ky-31	6.3	93.3	6.0	95.0
Legend	7.0	95.0	7.0	95.0
Mesa	8.0	95.0	6.8	90.0
Monarch	8.0	95.0	6.5	93.3
Normarc 25	8.0	95.0	6.3	95.0
Normarc 77	8.0	95.0	6.5	91.7
Normarc 99	8.0	95.0	7.0	95.0
Olympic	7.5	95.0	6.0	93.3
PE-7	7.5	95.0	6.3	93.3
PE-7E	8.0	95.0	7.0	95.0
PST-5AG	7.0	93.3	6.3	93.3
PST-5AP	8.0	95.0	6.5	93.3
PST-5BL	8.0	95.0	6.2	93.3

Table 4.--(continued)

Name	Mar Density	Mar % GC	Sept Density	Sept % GC
PST-5D1	8.0	95.0	6.5	91.7
PST-5D7	7.3	93.3	6.3	88.3
PST-5DM	7.0	92.5	6.3	95.0
PST-5EN	7.7	95.0	6.3	93.3
PST-5F2	8.0	95.0	7.2	95.0
PST-5HF	8.0	95.0	6.7	95.0
PSTG-5MW	7.7	95.0	6.7	95.0
PST-50L	7.7	95.0	6.3	93.3
PST-DBC	8.0	95.0	6.3	93.3
Pacer	7.3	95.0	5.5	95.0
Pick 845 PN	7.7	95.0	6.5	95.0
Pick-127	8.0	95.0	5.8	81.7
Pick-DDF	8.0	95.0	6.7	88.3
Pick-DM	8.0	95.0	6.5	90.0
Pick GH6	8.0	95.0	5.7	91.7
Pick TF9	7.7	93.3	6.5	93.3
Rebel	7.0	92.5	5.3	92.5
Rebel-II	7.3	93.3	6.5	95.0
Richmond	7.0	95.0	5.2	85.0
Sundance	8.0	95.0	6.8	93.3
Syn Ga	7.0	95.0	5.3	83.3
Taurus	8.0	95.0	6.8	95.0
Thoroughbred	7.5	95.0	6.7	93.3
Tip	7.5	95.0	6.2	91.7
Titan	6.5	92.5	6.5	95.0
Trailblazer	7.3	90.0	6.0	93.3
Tribute	8.0	95.0	6.7	93.3
Trident	7.5	95.0	5.7	95.0
Willamette	8.0	90.0	6.0	95.0
Wrangler	6.0	90.0	6.2	81.7
LSD .05 =	0.9	3.3	1.2	9.6

Table 5. Mean 1989 Response of 65 Tall Fescue Varieties Grown in Tucson, AZ to Pest Infestations. [1]

Name	Jan Mustard
Adventure	0.0
Apache	0.0
Arid	0.0
Aztec	0.0
Barnone	0.0
Bel-86-1	0.0
Bel-86-2	0.0
Bonanza	0.3
Carefree	0.0
Chieftan	0.0
Cimmaron	0.3
Emperor	1.0
Falcon	0.0
Fatima	0.0
Finelawn 5GL	0.7
Finelawn I	0.5
Hub 887	0.0
JD-2	0.5
Jaguar	0.0
Jaguar II	0.0
KWS-86-6	0.3
KWS-DUR	1.0
Ky-31	1.0
Legend	0.0
Mesa	0.0
Monarch	0.0
Normarc 25	0.0
Normarc 77	0.3
Normarc 99	0.0
Olympic	0.0
PE-7	0.0
PE-7E	0.0
PST-5AG	2.0
PST-5AP	0.3
PST-5BL	0.0
PST-5D1	0.0
PST-5D7	3.0
PST-5DM	3.5
PST-5EN	0.0
PST-5F2	0.0
PST-5HF	0.7
PST-5MW	0.0
PST-50L	0.0
PST-DBC	0.7
Pacer	0.0
Pick 845 PN	0.7
Pick-127	0.0
Pick-DDF	0.0
Pick-DM	0.0
Pick GH6	0.0
Pick TF9	0.7
Rebel	1.5
Rebel-II	0.0
Richmond	1.0
Sundance	0.0
Syn Ga	0.0
Taurus	0.0
Thoroughbred	0.0
Tip	0.0
Titan	1.0
Trailblazer	0.5
Tribute	0.0
Trident	0.0
Willamette	0.7
Wrangler	0.0
LSD .05 =	1.4

[1] Mustard = # mustard plants (Sisymbrium irio L.)/25 ft^2.

PE-7 0.0
PE-7E 0.0
PST-5AG 2.0
PST-5AP 0.3
PST-5BL 0.0
LSD .05 =