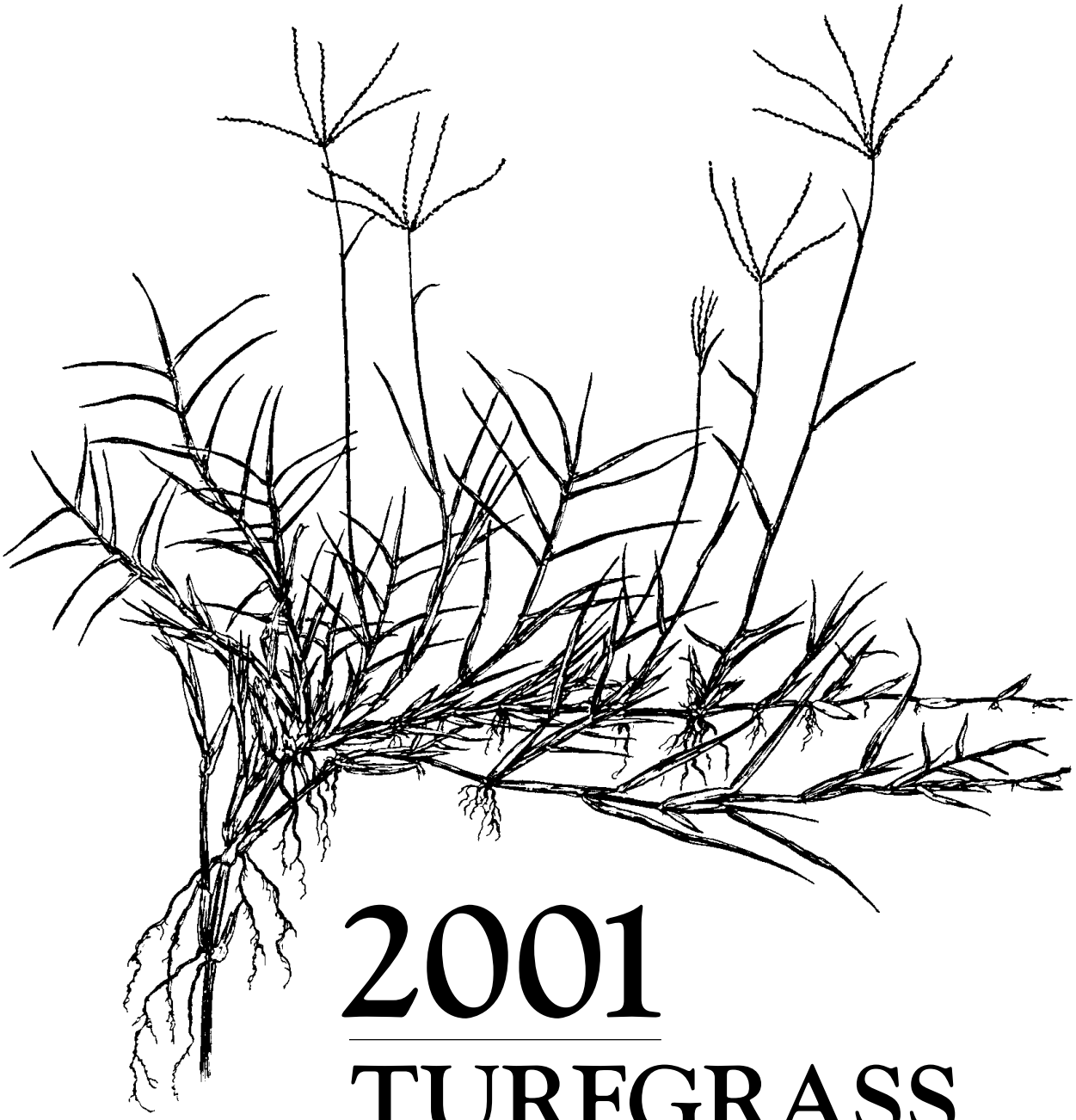
KANSAS STATE UNIVERSITY AGRICULTURAL EXPERIMENT STATION AND COOPERATIVE EXTENSION SERVICE



2001 TURFGRASS RESEARCH

Report of Progress 878

K-State Turfgrass Researchers

Researchers at Kansas State University are dedicated to improving turf quality in Kansas. Golf course turf research is conducted at field centers in Manhattan and Wichita. Members of the K-State turf team and their responsibilities are:

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Table of Contents

FOREWORD

With a summer noted for extended periods of temperatures over 100 °F, 2000 put turfgrass in our state through quite a test. As we enter the 2001 growing season, it's clear that some warm-season grasses were adversely affected by a cold winter. There is no rest for the weary attempting to growing quality turf in Kansas.

This publication contains results of projects done throughout 2000 by K-State turfgrass researchers. You can see many of these projects in progress on August 2, 2001, at the Kansas Turfgrass Field Day at the John C. Pair Horticultural Research Center, Wichita.

What questions can we answer for you? Maybe you're curious about the best performing tall fescue cultivars for lawns, bermudagrasses for fairways, or bentgrasses for greens. Maybe you need to determine which tall fescue or fine fescue cultivars are best adapted to our state. As a superintendent, maybe you'd like to know how to convert a ryegrass fairway to something else. Some suggestions lie inside. Keep this research report handy - it can be useful all year long. We also make this information available on our web site at:

http://www.oznet.ksu.edu/dp_hfrr/welcome.htm

As always, we're interested in hearing your ideas about future research projects.

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TITLE: Tall Fescue Cultivar Trial

OBJECTIVE: To evaluate tall fescue cultivars under Kansas conditions and submit data collected to the National Turfgrass Evaluation Program

PERSONNEL: Linda R. Parsons, Jack D. Fry, Ned A. Tisserat

SPONSOR: USDA National Turfgrass Evaluation Program

INTRODUCTION:

Tall fescue is the cool-season turfgrass best adapted to Kansas' transition zone. It is drought and heat tolerant and has few serious insect and disease problems. Efforts to improve cultivar quality include selecting for finer leaf texture, a rich green color, and better sward density, while still maintaining good stress tolerance and disease resistance. Identification of improved varieties that perform well in Kansas is of great interest to local distributors and consumers.

MATERIALS AND METHODS:

We seeded 390 study plots (5 by 5 ft) at the John C. Pair Horticultural Center in Wichita, KS on 11 September 1996 with 130 tall fescue cultivars and experimental numbers. Seeding rate was 4.4 lb seed/1000 ft^2. Prior to seeding, we incorporated 13-13-13 NPK into the study plots at a rate of 1 lb/1000 ft^2. We maintained fertility of the plots at 0.25 to 0.5 lb N/1000 ft^2 per growing month. Plots were mowed weekly during the growing season at 2.5 to 3.0 inches and returned clippings. We irrigated as necessary to prevent stress and controlled weeds, insects, and diseases only when they presented a threat to the trial.

In the months following seeding, we rated the fescue cultivars on seedling vigor; height, to help distinguish dwarf from standard cultivars; texture; genetic color; and density. During the ensuing years, we collected data on turf quality, spring green-up, color, texture, and resistance to pythium blight and brown patch. Rating was on a scale of 0 to 9, where 0=dead turf, 6=acceptable, and 9=optimum measure.

RESULTS:

The best overall performers for 2000 (Table 1) were Pick RT-95, Arid 3, Millennium, and Bravo. As the result of an unusually mild winter and early spring, most cultivars had greened up by 21 March, although AV-1 and JTTFA-96 did so the most rapidly. At summer's end we looked at turf color and found that BAR Fa6 US1, MB 213, MB 216, MB 26, MB 28, and MB 29 were the darkest green.

Performance of these tall fescue cultivars varied each year over the 5-year course of this study. The turfgrass growing season for the fescue was normally about seven months long, from March/April to October/November, depending upon the severity of spring and fall weather. In 2000, we rated spring green-up on 21 March; and in 1997 and 2000, began looking at monthly quality by the end of March. In 1998 and 1999, spring green-up did not occur until mid- to late-April so we did not start monthly quality ratings until the end of April. Turfgrass began to go dormant shortly after we rated quality at the end of October in both 1997 and 2000. However, we were still able to rate quality as late as 24 November 1998 and 15 November 1999.

We rated spring green-up in April 1998 and 1999 and March 2000 and found that on average, JTTFA-96, AV-1, Arid, DP 7952, CU9501T, and DLF-1were the earliest to green up (Table 2). We rated overall turfgrass quality monthly during the growing season from 1997 through 2000 and found that once established, the best performers over the course of the study were Airlie, Masterpiece, Millennium, and Rembrandt.

During the summer and early fall of 1996, we looked at the initial performance of the tall fescue cultivars in our study, and found that Arid, Kentucky-31 w/endo., Titan 2, and Safari demonstrated the greatest seed vigor (Table 3). OFI-931, MB 213, Millennium, Plantation, and Rembrandt had formed the most dense stands by the end of their first growing season. Their shorter height indicated that Pick FA N-93, Finelawn 5LZ, Pick FA UT-93, and Gazelle were the most dwarf selections.

As consumers seem most interested in dark green, finely textured turfgrass varieties, we looked at these characteristics regularly during the course of the study. We rated turfgrass color annually from 1996 through 2000 and found that MB 213, Finelawn 5LZ, MB 29, MB 216, MB 214, and MB 215 averaged the darkest color. BAR FA 6D, BAR FA 6L, BAR Fa6 US1, MB 29, Pick RT-95, Rembrandt, and Gazelle averaged the finest texture in 1996 through 1999 ratings.

Over the course of this study, adverse weather conditions contributed to disease susceptibility. In 1997, as a result of the extremely wet spring and early summer, most of the turf was affected by pythium blight. Tomahawk-E2, Kentucky-31 w/endo., AV-1, ISI-TF10, JSC-1, Kitty Hawk S.S.T., and Renegade proved among the most resistant and Rebel 2000, Gazelle, Bulldawg, and Plantation the least resistant to the blight. Many of the turfgrass plots developed brown patch in mid-summer of 1999. We found Kentucky-31 w/endo., Apache II, Olympic Gold, Red Coat, Tar Heel, and Titan 2 to be the most resistant; and OFI-951, OFI-FWY, DP 50-9011, Coronado, Arid 2, and Alamo E to be the least resistant to the disease.

Table 1. 2000 performance of tall fescue cultivars at Wichita, KS[1].

Cultivar/ Experimental Number	Green-Up	Genetic Color	Quality								
			3/30	4/26	5/30	6/20	7/24	8/29	9/27	10/30	Avg.
Pick RT-95*	6.7	7.3	6.7	6.3	6.7	6.3	7.3	7.0	5.3	6.7	6.5
Arid 3 (J-98)*	6.0	7.7	7.0	7.3	6.3	6.3	7.0	5.3	5.3	7.3	6.5
Millennium (TMI-RBR)*	6.3	7.0	6.3	7.0	6.3	6.0	6.7	5.7	5.7	8.3	6.5
Bravo (RG-93)*	7.0	6.3	6.0	7.0	5.7	5.7	6.3	6.7	6.3	8.0	6.5
Bonsai 2000 (Bullet)*	6.7	6.7	6.7	7.0	6.3	6.0	7.0	5.0	5.7	7.7	6.4
Mustang II*	6.7	7.0	6.7	6.7	6.0	6.0	7.0	5.7	6.0	7.3	6.4
Rembrandt (LTP-4026 E+)*	6.7	7.3	7.0	7.0	6.7	5.7	6.7	5.7	5.3	7.3	6.4
Airlie (MB 210)*	6.3	6.3	6.3	6.3	6.3	6.0	6.3	6.7	5.7	7.3	6.4
BAR FA6 US6F	6.7	7.3	6.7	6.7	6.3	6.0	6.7	5.7	5.3	7.7	6.4
Falcon II*	6.3	7.0	6.3	6.7	6.3	6.0	6.7	6.0	5.3	7.7	6.4
Glen Eagle (EC-101)*	6.7	6.7	6.7	6.3	6.3	6.3	6.3	5.7	5.7	7.7	6.4
MB 213	6.0	8.3	6.7	7.7	6.0	6.3	7.0	5.0	4.7	7.3	6.3
Plantation (Pennington-1901)*	6.3	8.0	6.7	6.7	6.3	6.0	6.7	5.7	5.3	7.0	6.3
Southern Choice*	6.3	7.0	6.3	7.0	6.3	6.0	6.3	5.7	5.3	7.3	6.3
BAR FA 6D	6.3	6.7	6.0	7.0	6.3	5.3	6.0	6.0	5.7	7.7	6.3
Durana (MB 211)*	6.3	8.0	6.3	7.3	6.7	5.7	6.0	5.7	5.0	7.3	6.3
MB 215	6.0	8.0	6.0	7.0	6.3	6.0	6.7	5.7	5.3	7.0	6.3
MB 28	6.3	8.3	6.7	7.3	6.3	6.3	6.0	5.3	4.7	7.3	6.3
Scorpio (ZPS-2PTF)*	6.3	7.7	6.7	6.7	6.0	6.0	6.3	6.0	5.0	7.3	6.3
Watchdog (Pick FA B-93)*	6.3	7.7	6.3	6.3	6.3	6.0	6.0	5.3	6.0	7.7	6.3
Gazelle*	6.7	8.0	6.3	7.0	6.3	6.0	5.3	5.7	5.7	7.3	6.2
ISI-TF10	6.3	7.7	6.0	6.3	6.7	5.7	6.3	6.0	5.7	7.0	6.2
Jaguar 3*	6.7	6.7	6.7	6.7	5.7	6.0	6.0	6.0	5.7	7.0	6.2
MB 26	6.7	8.3	6.7	8.0	6.3	6.0	6.0	4.3	5.0	7.3	6.2
Marksman*	6.7	6.7	6.3	6.3	6.3	5.7	7.0	6.0	4.7	7.3	6.2
OFI-96-31	6.3	7.3	6.7	7.0	6.3	6.0	5.7	5.3	5.3	7.3	6.2

Cultivar/ Experimental Number	Green-Up	Genetic Color	Quality								
			3/30	4/26	5/30	6/20	7/24	8/29	9/27	10/30	Avg.
PRO 8430	6.3	6.7	6.3	6.7	6.0	6.0	5.7	5.7	6.0	7.3	6.2
SR 8210*	6.3	6.7	6.7	6.7	6.3	5.7	6.3	5.3	5.7	7.0	6.2
Safari*	6.7	5.7	6.3	6.0	5.7	5.7	7.0	6.7	5.7	6.7	6.2
Shenandoah II (WRS2)*	6.7	7.7	6.7	6.3	6.0	6.0	6.3	5.7	5.7	7.0	6.2
ATF-020	6.7	6.7	6.3	7.3	6.0	6.0	6.7	5.0	4.7	7.3	6.2
Chapel Hill (TA-7)*	6.7	7.3	6.0	7.0	6.0	6.0	6.0	5.7	5.3	7.3	6.2
MB 214	5.7	8.0	6.3	7.0	6.7	6.0	6.3	4.7	5.3	7.0	6.2
Masterpiece (LTP-SD-TF)*	6.7	7.3	6.3	6.7	6.0	6.0	6.3	5.3	5.3	7.3	6.2
OFI-931	6.0	7.0	5.7	7.3	6.0	6.3	7.0	4.7	4.7	7.7	6.2
OFI-951	6.3	7.3	7.0	7.0	6.0	6.0	6.0	5.0	5.0	7.3	6.2
Pick FA N-93	5.3	7.0	6.0	7.0	6.3	5.7	6.0	6.3	5.3	6.7	6.2
R5AU	7.0	7.3	7.0	7.0	6.0	6.0	7.0	5.0	4.3	7.0	6.2
ATF-253	6.3	6.3	6.3	7.0	6.3	6.0	6.7	4.7	5.0	7.0	6.1
Anthem II (TMI-FMN)*	6.3	7.0	6.7	7.0	6.0	6.0	6.0	5.0	5.0	7.3	6.1
BAR Fa6 US3	6.3	7.7	6.3	6.7	6.3	6.0	6.7	5.7	4.7	6.7	6.1
Brandy (J-101)*	6.3	7.3	6.0	7.3	6.7	6.0	5.7	4.3	5.7	7.3	6.1
Finelawn 5LZ (ZPS-5LZ)*	6.3	8.0	6.0	7.0	6.0	6.0	6.3	5.7	5.0	7.0	6.1
MB 29	6.0	8.3	6.3	7.3	6.3	6.0	5.7	5.0	5.3	7.0	6.1
OFI-96-32	6.7	6.7	6.0	6.7	6.3	5.7	6.3	5.7	5.0	7.3	6.1
Olympic Gold (PST-5E5)*	6.7	7.0	6.3	7.0	6.3	6.0	7.0	5.0	4.7	6.7	6.1
ATF-022	6.3	6.3	7.0	6.3	6.0	6.0	6.3	5.7	4.7	6.7	6.1
CU9502T	7.0	6.3	6.0	6.3	6.3	5.7	6.7	5.7	4.7	7.3	6.1
Crossfire II*	6.7	7.0	6.3	7.0	6.7	6.0	6.0	5.0	4.7	7.0	6.1
Dominion (PST-5M5)*	6.7	7.0	6.3	7.0	7.0	6.0	6.3	4.0	5.0	7.0	6.1
Helix (WVPB-1D)*	6.7	6.3	6.0	6.7	5.7	5.7	6.3	5.7	5.3	7.3	6.1
Pick FA 15-92	6.0	7.7	6.3	6.3	6.3	6.0	6.0	5.0	5.3	7.3	6.1
Twilight II (TMI-TW)*	5.7	7.3	5.7	6.3	7.0	6.0	5.7	5.3	5.3	7.3	6.1
Velocity (AA-983)	6.0	7.0	6.0	6.7	6.3	5.7	6.3	5.0	5.3	7.3	6.1

Cultivar/ Experimental Number	Green-Up	Genetic Color	Quality								
			3/30	4/26	5/30	6/20	7/24	8/29	9/27	10/30	Avg.
Wyatt (ATF-188)*	6.0	6.7	6.0	6.3	6.3	5.7	5.7	5.7	5.7	7.3	6.1
ATF-257	6.0	6.3	6.3	7.0	6.3	6.3	6.0	4.7	4.7	7.0	6.0
PST-5TO	6.3	7.0	6.0	6.7	6.3	6.0	6.3	5.0	4.7	7.3	6.0
Pedestal (PC-AO)*	6.3	6.7	5.7	7.0	6.7	5.7	6.0	5.3	5.3	6.7	6.0
Pixie E+*	6.3	6.7	6.3	7.0	6.3	6.0	6.3	4.7	4.7	7.0	6.0
WX3-275	5.7	7.0	5.7	7.3	6.0	6.3	6.3	5.3	4.7	6.7	6.0
Arid II (J-3)*	6.7	7.7	6.3	7.3	6.0	6.0	6.3	4.7	4.3	7.0	6.0
BAR FA 6LV	6.0	7.3	6.3	6.3	6.0	6.3	6.3	5.0	4.7	7.0	6.0
CU9501T	7.0	7.0	6.0	6.7	6.3	6.0	6.7	5.0	4.3	7.0	6.0
Good-EN (Koos 96-14)*	6.0	6.3	5.7	6.7	5.7	6.0	6.3	5.3	5.0	7.3	6.0
Lion*	5.7	7.3	5.7	6.3	6.3	6.0	6.0	5.3	5.3	7.0	6.0
OFI-FWY	6.3	7.0	6.0	6.7	5.7	6.0	6.3	5.0	5.3	7.0	6.0
Titan 2*	6.0	6.3	6.0	6.0	6.0	5.7	6.0	5.7	5.3	7.3	6.0
Duster*	6.7	7.3	6.7	7.0	6.0	6.0	6.0	5.0	4.0	7.0	6.0
EA 41	6.0	8.0	6.0	6.7	6.0	5.7	5.7	5.0	5.7	7.0	6.0
JSC-1	6.7	6.7	6.0	6.7	6.0	5.0	6.3	5.3	5.0	7.3	6.0
Tomahawk-E*	6.7	7.0	6.3	7.0	6.0	5.3	6.3	5.3	4.7	6.7	6.0
WVPB-1B	7.0	6.7	6.0	6.0	6.3	6.0	6.0	5.0	5.3	7.0	6.0
Wolfpack (PST-R5TK)*	6.7	6.7	6.3	6.7	6.3	6.0	5.7	4.7	5.3	6.7	6.0
Alamo E*	6.0	7.0	6.7	7.3	6.0	6.0	5.7	4.3	4.7	6.7	5.9
Arizona (Pick FA 6-91)*	6.0	7.7	6.0	6.7	6.3	5.3	6.3	5.0	5.0	6.7	5.9
Axiom (TF-192)*	6.3	6.3	6.0	6.0	6.0	6.0	6.3	4.7	5.0	7.3	5.9
Aztec II (TMI-AZ)*	5.7	7.0	5.7	6.3	5.7	6.3	6.3	4.7	5.0	7.3	5.9
Cochise II*	6.3	6.7	6.3	6.3	5.7	5.7	6.0	5.3	5.3	6.7	5.9
Coronado*	6.0	7.7	6.3	6.3	5.7	5.7	6.0	5.7	5.0	6.7	5.9
DLF-1	6.7	6.0	6.0	6.3	6.0	6.3	6.0	4.7	5.0	7.0	5.9
MB 212	6.0	7.7	5.7	7.0	6.0	6.0	6.0	5.3	4.7	6.7	5.9
Pick FA XK-95	6.7	7.3	6.3	6.0	6.0	6.0	6.3	5.3	4.7	6.7	5.9

Cultivar/ Experimental Number	Green-Up	Genetic Color	Quality								
			3/30	4/26	5/30	6/20	7/24	8/29	9/27	10/30	Avg.
Rebel 2000 (AA-989)*	6.3	7.7	6.0	6.7	6.3	5.7	6.3	4.7	4.3	7.3	5.9
Rebel Sentry (AA-A91)*	6.7	7.3	6.3	7.0	6.0	6.0	6.7	4.7	4.3	6.3	5.9
Red Coat (ATF-038)*	6.3	7.0	6.7	7.0	6.3	6.0	6.0	4.7	4.0	6.7	5.9
Renegade*	6.7	6.7	5.7	6.3	6.0	6.0	6.0	5.3	4.7	7.3	5.9
Sunpro*	6.0	7.0	6.0	6.0	5.7	5.7	6.3	6.0	5.3	6.3	5.9
Tar Heel*	5.7	7.0	5.7	6.3	6.0	5.7	6.0	5.3	5.3	7.0	5.9
Tulsa*	6.0	6.3	6.3	7.0	6.3	6.0	6.0	4.0	4.5	6.3	5.9
Coyote*	6.0	7.0	6.0	6.0	6.0	6.0	6.0	5.3	5.0	6.7	5.9
Genesis*	6.0	7.3	6.0	6.0	6.0	5.7	6.3	5.7	4.7	6.7	5.9
OnCue (PST-523)*	6.7	6.3	6.7	7.0	5.7	5.7	5.7	5.0	4.7	6.7	5.9
SRX 8084	6.0	6.3	6.0	6.3	5.7	5.7	5.3	5.7	6.0	6.3	5.9
SRX 8500	5.7	6.7	5.7	6.3	6.3	5.7	6.3	5.0	4.7	7.0	5.9
Wildfire (ATF-196)*	6.0	7.0	6.0	6.3	6.7	6.0	5.7	5.3	4.0	7.0	5.9
Apache II*	6.0	6.7	5.7	6.3	5.7	5.3	6.3	5.7	5.0	6.7	5.8
Bandana (PST-R5AE)*	6.7	7.0	6.7	6.0	5.7	6.0	6.3	4.7	4.7	6.7	5.8
Empress*	6.3	6.7	6.0	6.3	6.0	6.0	6.0	4.7	5.0	6.7	5.8
Equinox (TMI-N91)*	6.3	6.7	5.7	6.0	5.7	5.7	6.0	5.0	5.7	7.0	5.8
Finelawn Petite*	6.0	7.0	6.0	6.3	5.7	6.0	6.0	4.7	5.0	7.0	5.8
ISI-TF11	5.3	6.7	6.0	6.3	6.0	6.0	6.0	4.3	5.0	7.0	5.8
JTTFC-96	6.7	6.3	5.7	6.0	6.0	5.7	6.0	5.0	5.0	7.3	5.8
Kitty Hawk S.S.T. (SS45DW)*	6.0	6.7	6.0	6.7	6.0	6.0	6.0	4.7	4.7	6.7	5.8
MB 216	6.0	8.3	6.0	6.3	6.3	6.0	6.0	5.0	4.3	6.7	5.8
PSII-TF-10	6.0	7.0	6.0	6.0	5.7	6.0	6.3	5.0	5.0	6.7	5.8
Reserve (ATF-182)*	6.7	6.7	6.3	6.3	6.0	6.3	5.3	4.7	4.3	7.3	5.8
Arabia (J-5)*	5.7	7.7	6.0	6.7	6.0	6.0	6.3	4.3	4.3	6.7	5.8
Comstock (SSDE31)*	5.7	7.0	6.0	6.0	6.3	6.0	6.0	5.3	4.3	6.3	5.8
DP 50-9011	6.3	6.7	6.0	6.7	5.7	6.0	6.0	4.7	5.0	6.3	5.8
ISI-TF9	6.7	7.0	6.0	6.0	6.0	5.7	5.7	4.7	5.3	7.0	5.8

Cultivar/ Experimental Number	Green-Up	Genetic Color	Quality								
			3/30	4/26	5/30	6/20	7/24	8/29	9/27	10/30	Avg.
WPEZE (WVPB-1C)*	6.7	6.7	5.7	6.0	6.0	6.0	6.0	5.0	5.0	6.7	5.8
BAR Fa6 US2U	6.0	8.0	6.0	6.7	6.0	5.7	6.3	5.0	4.0	6.3	5.8
BAR Fa6D USA	6.0	7.3	6.0	6.3	6.3	5.7	6.0	5.0	4.0	6.7	5.8
Bulldawg (Pick GA-96)*	6.3	7.3	6.3	6.3	6.7	6.0	6.0	4.3	3.7	6.7	5.8
Coronado Gold (PST-5RT)*	6.3	7.3	6.0	6.7	6.0	5.7	5.7	4.7	4.7	6.7	5.8
Overtime mix	6.3	6.0	6.3	6.3	5.7	6.0	6.3	4.7	4.7	6.0	5.8
Shenandoah*	6.3	6.3	6.0	6.0	5.7	5.7	5.7	5.7	5.0	6.3	5.8
Shortstop II*	6.3	7.3	6.0	6.0	6.3	5.7	6.3	4.3	4.7	6.7	5.8
AV-1	7.3	6.0	5.7	6.0	5.7	5.0	6.0	5.3	5.0	7.0	5.7
Bonsai*	5.7	6.7	6.0	6.3	6.0	5.7	6.0	4.3	5.0	6.3	5.7
Pick FA 20-92	5.7	7.7	6.3	6.3	6.0	6.0	6.7	4.3	3.7	6.3	5.7
PSII-TF-9	6.3	7.0	6.0	6.3	6.0	6.0	6.3	4.3	4.0	6.3	5.7
DP 7952	7.0	5.7	5.3	5.3	6.3	5.7	5.7	5.0	4.5	6.7	5.6
Pick FA UT-93	6.0	7.0	6.0	6.0	6.0	5.7	6.0	4.7	4.3	6.3	5.6
Leprechaun*	6.3	6.7	5.7	6.0	5.7	5.3	6.0	5.0	4.7	6.3	5.6
BAR Fa6 US1	6.3	8.3	6.3	6.7	5.7	6.0	6.3	4.7	3.7	5.0	5.5
Regiment*	6.3	6.3	6.0	6.3	6.7	6.0	5.7	4.0	3.0	5.7	5.5
JTTFA-96	7.3	5.3	4.7	5.7	5.7	5.0	5.3	5.0	5.3	7.3	5.5
Arid*	7.0	5.0	4.7	5.0	6.0	5.7	6.3	4.7	4.7	6.7	5.5
Kentucky-31 w/endo.*	6.7	4.0	4.0	4.0	4.7	4.0	4.0	4.0	4.0	4.7	4.2
LSD[3]	*0.9*	*0.8*	*0.8*	*0.9*	*0.9*	*0.7*	*1.0*	*1.2*	*1.3*	*1.3*	*0.5*

[1] Ratings based on a scale of 0-9 with 9=earliest green up, darkest color, and best overall quality.

[2] Cultivars marked with "*" will be commercially available in 2001.

[3] To determine statistical differences among entries, subtract one entry's mean from another's. A statistical difference occurs when the value is larger than the corresponding LSD value.

Table 2. Performance of tall fescue cultivars at Wichita, KS over the period 1997-2000[1].

Cultivar/ Experimental Number	Avg. Green-up '98-'00	Average Monthly Quality 1997-2000									
		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Avg.
Airlie (MB 210)*	6.8	6.5	6.8	7.2	6.6	6.8	6.3	6.8	7.3	5.7	6.7
Masterpiece (LTP-SD-TF)*	7.0	6.5	7.4	6.8	6.3	6.4	5.7	6.8	7.8	6.5	6.7
Millennium (TMI-RBR)*	6.8	6.5	7.3	7.4	6.5	6.4	5.6	6.7	7.5	6.0	6.7
Rembrandt (LTP-4026 E+)*	6.9	7.0	7.2	7.5	6.5	6.3	5.5	6.6	7.3	6.0	6.7
MB 213	6.7	6.3	7.5	7.6	6.3	6.5	5.3	6.3	7.3	6.0	6.6
Olympic Gold (PST-5E5)*	7.1	6.2	7.1	7.0	6.7	6.9	5.8	6.5	7.1	5.5	6.6
Plantation (Pennington-1901)*	7.0	6.7	7.1	7.5	6.6	6.3	5.3	6.4	7.1	6.3	6.6
Falcon II*	7.1	6.8	7.0	6.7	6.5	6.5	6.1	6.3	7.3	5.8	6.6
BAR FA 6D	7.0	6.2	7.3	7.1	6.3	6.0	5.7	6.6	7.5	6.0	6.6
Dominion (PST-5M5)*	6.8	6.5	7.3	6.8	6.6	6.5	5.3	6.3	7.3	6.3	6.6
Southern Choice*	7.0	6.7	7.2	7.3	6.3	6.4	5.7	6.1	7.1	6.2	6.6
Mustang II*	7.1	6.8	6.9	6.6	6.3	6.7	5.6	6.8	7.1	6.2	6.6
Bonsai 2000 (Bullet)*	7.0	6.5	7.0	7.1	6.4	6.3	5.6	6.4	7.3	6.2	6.5
Bravo (RG-93)*	7.2	6.3	7.0	6.7	6.2	6.3	5.8	6.7	7.3	6.2	6.5
MB 28	6.6	6.5	7.2	7.3	6.3	6.3	5.7	6.2	7.1	5.8	6.5
Jaguar 3*	7.1	6.5	7.0	6.6	6.5	6.4	5.5	6.3	7.3	6.3	6.5
Scorpio (ZPS-2PTF)*	7.1	6.3	6.7	6.5	6.7	6.2	5.8	6.2	7.5	6.3	6.5
Arid 3 (J-98)*	6.4	6.5	7.2	7.3	6.4	6.1	5.3	5.8	7.2	6.2	6.5
Anthem II (TMI-FMN)*	6.8	6.8	7.1	6.8	6.4	6.0	5.5	6.3	7.2	6.0	6.4
MB 212	6.7	5.8	6.8	6.8	6.6	6.3	5.9	6.3	7.1	5.7	6.4
PST-5TO	6.8	6.0	6.8	6.6	6.6	6.3	5.6	6.4	7.3	6.0	6.4
Crossfire II*	7.0	6.3	6.9	6.8	6.6	6.7	5.2	6.2	6.9	6.2	6.4
CU9501T	7.3	6.3	6.8	6.6	6.7	6.4	5.6	6.2	7.1	6.0	6.4
OFI-931	6.2	6.3	7.1	6.8	6.3	6.5	5.7	6.2	7.0	5.5	6.4
OFI-96-31	7.2	6.8	7.3	7.3	6.1	5.9	5.3	6.0	7.0	6.0	6.4
Shenandoah II (WRS2)*	6.8	6.3	6.7	6.3	6.5	6.4	5.7	6.4	7.3	6.0	6.4

Cultivar/ Experimental Number	Avg. Green-up '98-'00	Average Monthly Quality 1997-2000									
		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Avg.
ATF-253	6.9	6.0	6.8	6.5	6.3	6.7	5.5	6.3	7.2	6.0	6.4
CU9502T	7.1	6.5	6.8	6.6	6.3	6.5	5.7	5.9	7.2	6.3	6.4
Durana (MB 211)*	6.9	6.2	7.2	7.3	6.4	5.9	5.4	6.2	7.0	5.7	6.4
Glen Eagle (EC-101)*	6.9	6.8	6.6	6.8	6.2	6.2	5.7	6.3	7.2	6.0	6.4
Wolfpack (PST-R5TK)*	7.0	6.2	6.9	6.7	6.5	6.3	5.3	6.3	7.3	6.0	6.4
Aztec II (TMI-AZ)*	6.9	6.2	6.9	6.6	6.4	6.0	5.7	6.3	7.0	6.5	6.4
Empress*	6.6	6.3	6.8	6.9	6.3	6.1	5.5	6.5	7.1	5.7	6.4
Tar Heel*	6.4	5.8	6.7	6.3	6.5	6.6	6.0	6.3	7.2	5.7	6.4
BAR FA 6LV	6.8	6.3	6.8	6.7	6.8	6.3	5.4	6.0	7.1	6.0	6.4
Bandana (PST-R5AE)*	6.8	6.7	6.8	6.7	6.5	6.3	5.2	6.2	7.1	6.3	6.4
MB 214	6.3	6.2	6.8	7.0	6.5	6.0	5.5	6.5	7.0	5.5	6.4
OFI-96-32	7.0	6.5	6.9	6.8	6.0	6.3	5.9	6.3	7.1	5.5	6.4
R5AU	6.9	6.8	6.8	7.2	6.6	6.4	5.0	5.8	7.0	6.0	6.4
Safari*	7.2	6.8	6.3	6.6	6.3	6.3	6.1	6.6	6.8	5.8	6.4
Genesis*	6.8	6.7	6.6	6.3	6.5	6.3	5.9	6.1	7.1	6.0	6.4
MB 215	6.4	6.0	6.9	7.0	6.4	6.2	5.5	6.2	6.8	6.0	6.4
BAR Fa6D USA	6.7	5.8	6.8	6.5	6.5	6.3	5.6	6.4	7.1	5.7	6.4
Twilight II (TMI-TW)*	6.8	6.0	6.9	7.3	6.1	5.9	5.6	6.2	7.0	5.8	6.4
MB 29	6.6	6.2	6.9	6.5	6.3	6.2	5.6	6.3	7.0	5.8	6.4
Rebel Sentry (AA-A91)*	7.1	6.5	7.2	6.8	6.5	6.2	5.3	5.8	7.0	5.8	6.4
Titan 2*	6.4	6.3	6.4	6.6	6.3	6.4	5.8	6.2	7.1	6.0	6.4
ATF-257	6.7	6.3	6.9	6.3	6.3	6.4	5.5	5.9	7.1	6.2	6.3
ISI-TF11	6.2	6.5	6.8	6.7	6.3	6.3	5.3	6.2	7.0	5.8	6.3
Kitty Hawk S.S.T. (SS45DW)*	6.6	6.3	6.6	6.3	6.3	6.2	6.2	6.2	6.9	6.0	6.3
Marksman*	7.2	6.7	6.8	6.7	6.1	6.2	5.8	6.2	6.9	5.7	6.3
OnCue (PST-523)*	7.1	6.7	7.0	6.8	6.3	6.2	5.4	5.9	6.9	5.8	6.3
PRO 8430	6.7	6.2	6.8	6.7	6.3	6.1	5.6	6.3	7.0	6.0	6.3
Pedestal (PC-AO)*	6.9	6.0	6.8	6.9	6.3	6.0	5.5	6.3	6.9	6.0	6.3

Cultivar/ Experimental Number	Avg. Green-up '98-'00	Average Monthly Quality 1997-2000									
		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Avg.
Pick RT-95*	6.8	6.3	6.4	6.8	6.1	6.2	5.9	6.2	6.8	6.3	6.3
Velocity (AA-983)	6.6	6.0	6.9	6.8	6.3	6.4	5.2	6.1	7.2	5.8	6.3
Chapel Hill (TA-7)*	6.8	6.5	6.7	6.6	6.3	6.3	5.7	6.3	6.9	5.5	6.3
Rebel 2000 (AA-989)*	6.8	6.2	7.2	7.0	6.1	6.4	4.9	6.0	7.0	6.0	6.3
Coronado*	6.6	6.0	6.8	6.3	6.3	6.0	5.9	6.4	7.0	5.7	6.3
Reserve (ATF-182)*	6.9	6.3	6.8	6.8	6.2	6.1	5.5	5.9	7.1	6.3	6.3
Apache II*	6.4	6.0	6.8	6.5	6.2	6.3	5.7	6.3	7.0	5.7	6.3
BAR FA6 US6F	7.2	6.7	6.8	6.8	6.3	5.8	5.3	6.3	7.0	5.8	6.3
BAR Fa6 US2U	6.6	6.3	6.8	6.9	6.3	6.3	5.8	5.7	6.7	5.7	6.3
Coronado Gold (PST-5RT)*	6.8	6.0	6.8	6.7	6.3	6.1	5.6	6.2	6.9	6.2	6.3
Duster*	6.8	6.7	7.0	6.8	6.3	5.8	5.4	6.0	7.1	5.5	6.3
WVPB-1B	7.1	6.5	6.4	6.6	6.3	6.1	5.7	6.2	7.1	6.0	6.3
Comstock (SSDE31)*	6.4	6.5	6.7	6.7	6.1	6.3	5.3	6.3	6.9	5.8	6.3
ISI-TF10	7.1	6.2	6.9	6.6	6.1	5.8	5.8	6.4	6.8	5.7	6.3
Renegade*	6.8	6.3	6.8	6.6	6.2	6.1	5.7	6.2	7.2	5.3	6.3
SR 8210*	6.7	6.7	6.9	6.5	6.1	5.8	5.7	6.6	6.7	5.7	6.3
Arid II (J-3)*	7.1	6.3	7.3	7.2	6.2	5.8	4.9	5.9	6.9	5.8	6.3
Brandy (J-101)*	6.8	6.0	7.3	7.2	6.0	5.8	4.9	6.3	7.0	5.8	6.3
Shenandoah*	7.1	6.7	6.5	6.3	6.3	6.2	5.7	6.3	6.9	6.0	6.3
Tulsa*	6.6	6.3	7.0	6.8	6.6	6.0	5.0	6.3	6.7	5.7	6.3
ATF-020	6.9	6.2	7.0	6.3	6.1	6.3	5.4	6.2	6.9	5.8	6.3
Arizona (Pick FA 6-91)*	6.7	5.8	6.8	6.8	6.3	6.1	5.4	6.0	7.0	5.8	6.3
BAR Fa6 US3	6.6	6.2	6.7	6.8	6.5	6.0	5.6	5.8	6.8	6.0	6.3
Finelawn Petite*	6.4	6.3	6.6	6.1	6.3	6.3	5.8	6.4	7.0	5.5	6.3
ISI-TF9	6.8	6.5	6.6	6.7	6.2	6.0	5.5	6.3	7.0	5.7	6.3
Lion*	6.2	5.8	6.6	6.8	6.5	5.8	5.7	6.3	6.9	5.5	6.3
Gazelle*	6.6	5.8	7.1	6.8	6.8	5.2	5.2	6.1	7.3	5.8	6.3
ATF-022	6.6	6.7	6.6	6.5	6.3	6.2	5.5	6.2	6.8	5.7	6.3

Cultivar/ Experimental Number	Avg. Green-up '98-'00	Average Monthly Quality 1997-2000									
		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Avg.
BAR Fa6 US1	6.4	6.0	6.7	6.4	6.7	6.4	5.4	5.8	6.7	6.2	6.3
Good-EN (Koos 96-14)*	6.7	6.2	6.8	6.5	6.2	6.3	5.4	6.3	6.8	5.7	6.3
OFI-FWY	6.8	6.2	6.8	6.5	6.2	6.2	5.6	6.1	6.9	5.7	6.3
Pixie E+*	6.7	6.7	6.8	6.7	6.5	5.8	5.1	6.0	7.1	5.8	6.3
Tomahawk-E*	6.8	6.3	6.6	6.2	6.3	6.1	5.8	6.2	6.9	5.7	6.3
Watchdog (Pick FA B-93)*	6.8	6.5	6.8	6.6	6.4	5.7	5.1	6.1	7.3	6.0	6.3
JSC-1	6.8	6.7	6.6	6.4	5.9	6.3	5.7	6.2	6.8	5.7	6.3
MB 216	6.4	6.0	7.0	6.8	6.3	5.8	5.7	5.8	6.8	5.8	6.3
Pick FA XK-95	6.8	6.2	6.6	6.7	6.2	6.1	5.3	5.9	7.2	6.2	6.3
MB 26	6.9	6.0	7.4	6.5	6.3	5.5	5.3	5.8	7.1	6.2	6.2
Wyatt (ATF-188)*	6.8	6.3	6.8	6.7	6.0	6.0	5.2	6.2	7.0	6.0	6.2
Axiom (TF-192)*	6.7	6.3	6.6	6.8	6.2	6.0	5.2	5.8	7.1	6.0	6.2
OFI-951	6.6	6.5	6.8	6.8	6.4	5.8	5.2	5.8	7.0	5.8	6.2
Overtime mix	7.1	6.8	6.6	5.9	6.2	6.2	5.7	6.0	6.9	6.0	6.2
SRX 8500	6.2	6.2	6.7	6.7	6.1	6.1	5.3	6.1	6.9	5.8	6.2
Coyote*	6.4	5.8	6.7	6.7	6.5	5.9	5.4	5.9	6.9	5.7	6.2
DLF-1	7.3	6.7	6.6	6.1	6.0	6.0	5.8	6.2	6.8	5.8	6.2
WX3-275	6.4	5.7	6.7	6.5	6.4	6.3	5.3	6.0	6.9	5.7	6.2
PSII-TF-10	6.3	6.5	6.5	6.4	6.3	6.3	5.3	6.0	6.8	5.5	6.2
Helix (WVPB-1D)*	6.9	6.5	6.8	6.5	5.9	6.1	5.3	6.0	6.8	5.8	6.2
Red Coat (ATF-038)*	6.9	6.5	6.7	6.4	6.4	5.8	5.4	5.9	6.8	5.8	6.2
WPEZE (WVPB-1C)*	6.7	6.2	6.4	6.8	6.3	6.3	5.3	6.0	6.7	5.5	6.2
Finelawn 5LZ (ZPS-5LZ)*	6.8	5.5	7.0	6.6	6.3	5.8	5.2	5.9	7.0	5.8	6.2
Alamo E*	6.7	6.3	7.1	6.6	6.2	5.6	5.2	5.8	6.8	5.7	6.2
JTTFC-96	7.1	6.5	6.4	6.3	6.3	6.3	5.3	6.1	6.5	5.8	6.2
Cochise II*	6.7	6.2	6.5	6.3	6.2	5.8	5.3	6.2	6.9	5.8	6.1
Leprechaun*	6.7	6.2	6.4	6.3	6.2	5.9	5.8	5.9	6.8	5.7	6.1
Pick FA 15-92	6.3	6.2	6.8	6.9	6.2	5.4	5.2	5.8	7.0	5.5	6.1

Cultivar/ Experimental Number	Avg. Green-up '98-'00	Average Monthly Quality 1997-2000									
		Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Avg.
SRX 8084	6.2	6.2	6.3	6.3	6.2	5.7	5.8	6.3	6.8	5.5	6.1
Bulldawg (Pick GA-96)*	6.6	6.2	6.6	6.9	6.4	6.1	4.8	5.7	6.8	5.5	6.1
PSII-TF-9	6.4	6.7	6.6	6.3	6.0	6.0	5.3	5.8	6.9	5.7	6.1
Equinox (TMI-N91)*	6.7	6.2	6.4	6.2	5.9	5.8	5.5	6.4	6.9	5.7	6.1
Pick FA 20-92	6.3	6.0	6.6	6.5	6.3	6.1	5.3	5.7	6.8	5.7	6.1
DP 50-9011	6.8	6.7	6.7	6.6	5.4	5.7	5.6	6.1	6.7	5.8	6.1
Regiment*	6.7	6.5	6.8	6.9	6.3	5.8	4.9	5.7	6.1	6.2	6.1
Bonsai*	6.6	6.0	6.3	6.3	6.2	5.9	5.6	5.8	6.8	5.8	6.1
Wildfire (ATF-196)*	6.4	6.0	6.7	6.8	6.1	5.6	5.2	5.3	6.8	6.2	6.1
Sunpro*	6.7	5.8	6.3	6.4	6.0	6.0	5.3	5.8	6.6	5.8	6.0
EA 41	6.6	5.8	6.3	6.3	6.1	5.4	5.4	6.1	6.6	5.8	6.0
Pick FA N-93	6.1	5.3	6.1	6.7	6.1	5.4	5.5	5.9	6.8	5.7	6.0
Shortstop II*	6.7	5.7	6.1	6.8	6.3	5.8	4.8	5.7	6.9	5.7	6.0
Arabia (J-5)*	6.2	5.7	6.5	6.6	5.9	5.9	4.8	5.5	6.8	5.5	6.0
DP 7952	7.4	6.7	5.4	6.5	6.0	5.8	5.1	6.0	6.3	5.8	5.9
AV-1	7.4	6.7	5.9	5.8	5.3	5.9	5.2	5.5	6.2	6.0	5.8
Arid*	7.4	6.2	5.7	5.8	5.8	5.8	5.3	5.3	5.9	6.2	5.7
Pick FA UT-93	6.8	5.5	6.1	6.1	6.0	5.5	4.8	5.3	6.3	5.0	5.7
JTTFA-96	7.6	6.3	5.9	5.6	5.3	5.3	4.6	5.2	5.8	5.2	5.4
Kentucky-31 w/endo.*	7.0	6.0	4.6	4.7	4.3	4.5	4.2	4.4	4.4	4.3	4.5
LSD[3]	*0.6*	*0.6*	*0.5*	*0.6*	*0.5*	*0.6*	*0.9*	*0.7*	*0.5*	*0.5*	*0.3*

[1] Ratings based on a scale of 0-9 with 9=earliest green up, darkest color, and best overall quality.

[2] Cultivars marked with "*" will be commercially available in 2001.

[3] To determine statistical differences among entries, subtract one entry's mean from another's. A statistical difference occurs when the value is larger than the corresponding LSD value.

Table 3. Further summary of tall fescue cultivar performance at Wichita, KS over the 5-year period 1996-2000[1].

Cultivar/ Experimental Number	Seed Vigor ('96)	Height ('96)	Fall Density ('96)	Genetic Color ('96-'00)	Texture ('96-'99)	Pythium ('97)	Brown Patch ('99)
ATF-020	6.7	5.7	6.3	6.8	6.2	3.3	7.7
ATF-022	5.7	7.0	7.0	6.4	6.3	3.3	8.3
ATF-253	5.7	6.7	7.3	6.4	5.9	4.7	8.3
ATF-257	6.3	7.7	7.0	6.4	6.0	2.7	8.3
AV-1	6.3	8.0	6.7	5.5	5.6	6.7	7.3
Airlie (MB 210)*	6.3	7.0	7.7	7.1	6.5	5.3	8.3
Alamo E*	6.3	7.0	7.7	7.0	6.4	5.0	6.3
Anthem II (TMI-FMN)*	6.7	7.3	7.0	6.9	6.7	4.3	6.7
Apache II*	7.0	6.3	7.3	6.8	6.3	5.7	8.7
Arabia (J-5)*	5.7	5.3	6.3	7.8	6.6	4.7	7.0
Arid 3 (J-98)*	6.0	5.7	7.0	7.6	6.8	3.7	7.0
Arid II (J-3)*	5.3	6.0	6.7	7.7	6.3	3.3	6.3
Arid*	9.0	9.0	7.7	4.7	5.0	4.0	8.3
Arizona (Pick FA 6-91)*	6.0	5.3	6.3	7.7	6.9	5.7	7.0
Axiom (TF-192)*	5.7	6.7	7.0	6.3	6.0	2.7	7.3
Aztec II (TMI-AZ)*	7.7	7.3	7.3	6.7	6.8	4.7	7.0
BAR FA 6D	6.3	5.7	6.7	7.2	7.2	5.3	8.0
BAR FA 6LV	6.3	7.0	8.0	7.9	7.2	4.7	7.7
BAR FA6 US6F	5.7	5.7	7.7	7.5	6.9	4.0	8.0
BAR Fa6 US1	5.0	5.3	6.7	7.9	7.2	5.0	7.7
BAR Fa6 US2U	5.7	5.0	6.7	7.7	6.9	3.3	7.7
BAR Fa6 US3	5.3	5.3	6.7	7.5	6.7	4.3	7.3
BAR Fa6D USA	6.3	5.3	7.3	7.6	6.7	5.3	8.3
Bandana (PST-R5AE)*	6.3	6.3	7.0	7.3	6.5	2.7	8.0
Bonsai 2000 (Bullet)*	7.7	7.7	7.7	6.7	6.7	4.3	7.3
Bonsai*	5.7	6.3	6.0	6.6	6.2	5.0	6.7

Cultivar/ Experimental Number	Seed Vigor ('96)	Height ('96)	Fall Density ('96)	Genetic Color ('96-'00)	Texture ('96-'99)	Pythium ('97)	Brown Patch ('99)
Brandy (J-101)*	6.3	6.0	7.7	7.3	6.8	2.0	7.0
Bravo (RG-93)*	7.0	7.3	8.0	6.9	6.3	4.0	7.7
Bulldawg (Pick GA-96)*	5.3	5.7	6.0	7.0	6.5	1.3	8.0
CU9501T	7.7	6.7	7.0	7.0	6.2	4.0	8.0
CU9502T	7.7	7.7	7.7	6.1	6.7	5.7	8.3
Chapel Hill (TA-7)*	7.3	6.7	7.3	7.3	6.3	3.3	8.3
Cochise II*	5.3	5.7	5.7	6.8	6.3	3.7	7.0
Comstock (SSDE31)*	7.7	8.0	7.3	6.8	5.8	4.0	7.7
Coronado Gold (PST-5RT)*	5.7	6.7	7.3	7.2	6.4	4.0	8.0
Coronado*	5.3	5.7	6.3	7.5	6.6	5.0	6.3
Coyote*	5.7	6.3	7.3	7.6	6.8	3.3	7.7
Crossfire II*	6.3	7.0	7.3	6.9	6.2	3.3	8.3
DLF-1	7.3	8.3	7.3	6.1	6.0	5.7	7.7
DP 50-9011	7.3	8.3	7.3	6.5	6.3	5.3	6.3
DP 7952	7.7	8.7	7.3	5.5	5.4	6.3	7.0
Dominion (PST-5M5)*	6.3	6.7	7.7	6.8	6.2	5.0	7.7
Durana (MB 211)*	6.3	6.7	7.0	7.7	6.4	3.3	7.3
Duster*	7.0	7.0	7.3	7.3	6.5	3.0	7.3
EA 41	6.3	6.3	7.0	7.8	6.6	4.3	8.0
Empress*	6.7	7.0	7.7	6.8	6.6	4.0	7.0
Equinox (TMI-N91)*	7.3	7.7	7.7	6.6	6.3	4.3	7.3
Falcon II*	7.3	8.3	7.7	6.7	6.4	6.0	7.7
Finelawn 5LZ (ZPS-5LZ)*	4.7	4.0	5.3	8.3	6.8	2.3	7.0
Finelawn Petite*	7.0	7.3	7.3	6.8	5.9	6.0	7.3
Gazelle*	4.7	4.3	5.7	7.7	7.0	1.3	7.3
Genesis*	7.0	6.3	7.7	6.9	6.3	4.7	8.0
Glen Eagle (EC-101)*	6.0	7.3	7.7	6.5	6.1	3.3	7.0
Good-EN (Koos 96-14)*	6.0	6.7	6.7	6.6	6.0	6.3	7.3

Cultivar/ Experimental Number	Seed Vigor ('96)	Height ('96)	Fall Density ('96)	Genetic Color ('96-'00)	Texture ('96-'99)	Pythium ('97)	Brown Patch ('99)
Helix (WVPB-1D)*	7.3	7.7	8.0	6.4	5.7	4.3	7.3
ISI-TF10	6.7	6.7	7.0	7.0	6.5	6.7	8.3
ISI-TF11	7.0	7.7	8.0	6.6	6.0	4.0	7.3
ISI-TF9	7.3	7.3	7.3	6.6	6.1	4.0	8.0
JSC-1	6.7	8.0	7.7	6.1	5.7	6.7	8.0
JTTFA-96	7.3	7.0	6.3	5.1	5.6	2.3	7.0
JTTFC-96	7.7	8.0	7.3	5.6	5.8	6.3	8.3
Jaguar 3*	6.0	7.0	6.7	6.9	6.3	4.0	7.3
Kentucky-31 w/endo.*	9.0	9.0	6.7	3.8	3.8	7.0	9.0
Kitty Hawk S.S.T. (SS45DW)*	7.0	6.7	6.7	6.7	6.3	6.7	7.3
Leprechaun*	7.3	7.0	7.0	6.6	6.1	5.7	6.7
Lion*	5.7	6.3	6.7	7.2	5.8	3.7	7.3
MB 212	7.0	7.3	7.7	7.6	6.6	4.3	7.3
MB 213	6.0	7.0	8.3	8.5	6.5	4.7	7.3
MB 214	6.3	6.0	7.3	8.0	6.6	4.7	7.7
MB 215	6.7	6.3	7.7	8.0	6.3	3.0	7.7
MB 216	6.3	6.7	7.0	8.2	5.9	5.3	7.7
MB 26	5.3	5.3	6.0	7.8	6.8	4.7	7.7
MB 28	6.0	7.3	8.0	7.9	6.3	4.0	6.7
MB 29	6.7	6.7	7.7	8.3	7.1	5.3	8.0
Marksman*	6.7	7.7	8.0	6.5	6.3	5.0	6.7
Masterpiece (LTP-SD-TF)*	6.7	6.0	7.7	7.2	6.5	5.7	7.7
Millennium (TMI-RBR)*	6.7	6.3	8.3	7.1	6.9	3.0	7.3
Mustang II*	6.7	7.0	8.0	6.6	6.5	2.0	7.3
OFI-931	7.7	7.0	8.7	7.1	6.7	6.3	7.3
OFI-951	5.3	5.3	6.3	7.3	6.8	2.7	5.3
OFI-96-31	6.3	6.7	7.7	7.3	6.3	5.0	7.0
OFI-96-32	6.3	7.0	7.3	6.9	6.3	5.0	7.3

Cultivar/ Experimental Number	Seed Vigor ('96)	Height ('96)	Fall Density ('96)	Genetic Color ('96-'00)	Texture ('96-'99)	Pythium ('97)	Brown Patch ('99)
OFI-FWY	5.7	7.0	7.7	6.8	6.5	5.0	6.3
Olympic Gold (PST-5E5)*	6.3	6.3	7.0	7.1	6.4	5.7	8.7
OnCue (PST-523)*	6.7	6.3	7.7	6.6	6.3	3.3	7.3
Overtime mix	8.0	8.3	7.0	5.9	5.8	6.3	8.3
PRO 8430	6.3	6.3	6.3	6.7	6.2	6.0	7.7
PSII-TF-10	6.0	6.7	7.0	6.9	6.1	5.0	7.0
PSII-TF-9	7.0	7.0	7.7	6.7	5.6	4.0	7.0
PST-5TO	5.7	7.0	7.0	6.9	6.4	5.0	8.3
Pedestal (PC-AO)*	6.3	7.3	6.7	6.7	6.0	4.3	7.7
Pick FA 15-92	5.7	5.3	6.0	7.3	6.5	3.3	7.0
Pick FA 20-92	5.7	6.0	6.0	7.7	6.8	4.7	7.3
Pick FA N-93	4.0	3.3	5.0	7.7	6.8	3.7	6.7
Pick FA UT-93	5.3	4.3	5.3	7.4	6.7	2.0	7.3
Pick FA XK-95	6.0	5.7	7.0	7.6	6.4	3.7	7.3
Pick RT-95*	5.3	5.3	7.0	7.3	7.1	4.3	7.0
Pixie E+*	7.3	7.3	7.7	6.8	6.0	2.7	7.3
Plantation (Pennington-1901)*	6.7	6.7	8.3	7.9	6.8	1.7	7.7
R5AU	7.7	7.3	7.7	7.1	6.3	2.7	8.3
Rebel 2000 (AA-989)*	6.3	6.0	7.7	7.4	6.2	1.0	8.0
Rebel Sentry (AA-A91)*	7.0	6.7	8.0	7.8	6.3	3.3	8.0
Red Coat (ATF-038)*	6.3	6.3	7.3	6.7	6.3	3.3	8.7
Regiment*	7.3	7.7	8.0	6.4	6.8	2.0	7.3
Rembrandt (LTP-4026 E+)*	7.0	6.7	8.3	7.3	7.1	2.3	7.7
Renegade*	8.0	8.0	8.0	6.2	6.0	6.7	7.7
Reserve (ATF-182)*	6.3	5.7	7.3	6.5	6.4	4.0	7.7
SR 8210*	7.3	7.7	8.0	6.4	6.5	4.3	7.0
SRX 8084	6.7	7.0	7.3	6.8	6.3	4.3	7.3
SRX 8500	6.0	5.0	6.3	6.9	6.8	3.0	7.3

Cultivar/ Experimental Number	Seed Vigor ('96)	Height ('96)	Fall Density ('96)	Genetic Color ('96-'00)	Texture ('96-'99)	Pythium ('97)	Brown Patch ('99)
Safari*	8.3	8.0	7.7	6.1	6.1	6.0	8.3
Scorpio (ZPS-2PTF)*	6.0	6.3	6.7	7.6	6.7	4.3	7.7
Shenandoah II (WRS2)*	6.3	6.0	7.7	7.7	6.5	4.7	8.0
Shenandoah*	7.7	7.3	8.0	6.1	6.1	4.3	7.7
Shortstop II*	5.7	5.0	5.3	7.2	6.8	2.0	7.3
Southern Choice*	7.7	7.0	8.0	7.3	6.3	2.7	7.3
Sunpro*	5.3	5.7	5.7	7.6	6.3	3.0	7.3
Tar Heel*	6.7	5.3	6.0	6.7	6.1	4.0	8.7
Titan 2*	8.7	8.3	8.0	6.3	5.8	4.3	8.7
Tomahawk-E*	5.0	6.0	6.7	6.7	6.6	7.3	7.3
Tulsa*	6.7	6.7	7.0	6.3	6.7	3.0	8.0
Twilight II (TMI-TW)*	5.7	6.3	6.3	7.2	6.3	4.0	7.3
Velocity (AA-983)	5.3	5.0	7.3	7.5	6.3	2.7	7.7
WPEZE (WVPB-1C)*	6.7	7.7	7.0	6.7	5.8	3.3	7.7
WVPB-1B	7.3	7.7	7.0	6.4	6.1	5.7	7.7
WX3-275	7.0	7.3	7.3	6.9	6.2	5.3	7.3
Watchdog (Pick FA B-93)*	5.3	5.3	6.3	7.3	6.7	2.0	7.7
Wildfire (ATF-196)*	5.7	6.3	6.3	6.9	6.4	3.3	7.3
Wolfpack (PST-R5TK)*	6.3	7.3	7.7	6.6	5.9	2.7	8.3
Wyatt (ATF-188)*	5.7	6.3	6.3	6.6	6.2	2.7	7.0
LSD[3]	*1.0*	*1.2*	*1.3*	*0.5*	*0.5*	*3.2*	*1.4*

[1] Ratings based on a scale of 0-9 with 9=greatest seed vigor, least height, best fall density, darkest color, finest texture, and greatest resistance to Pythium and Brown Patch.

[2] Cultivars marked with "*" will be commercially available in 2001.

[3] To determine statistical differences among entries, subtract one entry's mean from another's. A statistical difference occurs when the value is larger than the corresponding LSD value.

TITLE: Fine Leaf Fescue Cultivar Trial

OBJECTIVE: To evaluate fine leaf fescue under Kansas conditions and submit data collected to the National Turfgrass Evaluation Program

PERSONNEL: Alan Zuk

SPONSOR: National Turfgrass Evaluation Program

INTRODUCTION:

Fineleaf fescues are a shade tolerant, cool-season grass with a slow, nonaggressive growth habit and a high density upon establishment. Blade width is usually narrower than 2 mm. Leaf curling often occurs during dry periods and this can cause a wiry appearance. They also do not tolerate wet, poorly drained soils, are susceptible to summer heat stress and various diseases, have a fair wear tolerance, and a fair to poor recuperative potential. Fineleaf fescues are better adapted to northern climates and are often thinned severely by our hot summers.

MATERIALS AND METHODS:

In this trial, 79 fineleaf fescue cultivars were seeded at the Rocky Ford Turfgrass Research Center, Manhattan, KS on 9 October 1998. The trial is mowed at 3 inches and fertilized annually with 3 lb N/1000 ft^2. Genetic color, green-up, summer and fall density, and quality were rated on a scale of 0-9.

RESULTS:

Results for the 79 fineleaf fescue cultivars are presented in Table 1.

Genetic color

ISI FRR 7 and Quatro had the highest average genetic color rating at 9 each; Dawson E had the lowest with 6.

Green-up

ABT-CR-2, Brittany, Culombra and Pick FF A-97 had the highest average greenup ratings at 9 each; Bighorn had the lowest average rating at 6.7.

Summer density

ABT-HF-1 and Defiant had the highest average summer density ratings at 8.3 each; ACF 083 had the lowest average rating at 2.3.

Fall density

ABT-CR-2, ISI FL 12, ISI FRR 5, Shademaster II and SRX 52LAV had the highest fall density ratings at 9 each; ACF 083 had the lowest average rating at 3.7.

Quality

ISI FRR 5 had the highest average quality rating throughout the growing season at 7.6; ACF 083 had the lowest average rating at 4.4.

Table 1. Performance of fineleaf fescue cultivars under lawn conditions at Manhattan, KS in 2000.

Cultivar[2]	Genetic Color	Greenup	Summer Density	Fall Density	Turf Quality[1]							
					Apr	May	Jun	Jul	Aug	Sep	Oct	Mean
4001	8.0	8.0	7.7	8.7	7.3	8.0	8.3	8.0	5.3	5.7	8.3	7.3
ABT-CHW-1	7.7	8.7	4.0	7.0	8.0	7.7	7.3	7.3	4.3	5.7	8.3	6.3
ABT-CHW-2	7.7	8.7	4.3	7.7	7.3	7.7	6.3	5.0	3.3	4.0	5.3	5.6
ABT-CHW-3	7.7	8.7	4.7	7.3	8.0	8.0	6.7	6.7	3.7	3.7	6.0	6.1
ABT-CR-2	8.7	9.0	5.7	9.0	8.0	8.7	7.3	6.7	4.0	4.3	8.3	6.8
ABT-CR-3	8.0	7.7	5.0	7.3	7.0	7.7	8.0	7.7	3.0	3.0	6.0	6.0
ABT-HF-1	8.7	8.3	8.3	8.7	6.3	8.3	8.0	8.0	5.0	6.0	8.0	7.1
ABT-HF-2	8.0	7.7	5.0	8.0	5.7	6.3	6.7	6.7	5.0	4.7	7.0	6.0
ABT-HF3	7.0	7.3	7.0	7.3	6.0	7.0	6.7	7.7	4.0	4.0	6.3	5.8
ABT-HF-4	7.0	7.7	7.7	8.3	6.3	8.0	6.7	6.7	4.7	4.7	6.7	6.2
ACF083	7.3	8.0	2.3	3.7	7.0	6.7	5.3	5.0	2.0	2.0	3.0	4.4
ACF092	7.3	7.7	5.7	8.3	7.3	7.3	5.3	6.0	3.3	4.0	7.3	5.8
Ambassador	8.0	8.0	4.3	6.7	7.7	8.3	8.0	8.0	4.0	3.3	5.3	6.4
ASC 082	8.3	7.7	5.7	8.7	6.7	7.7	6.7	6.7	3.7	4.0	7.3	6.1
ASC 087	7.0	7.7	2.7	6.0	6.7	7.7	8.0	7.0	2.3	3.3	4.7	5.7
ASC 172	7.7	7.7	4.7	6.7	4.7	6.0	5.7	5.0	3.3	3.0	4.7	4.6
ASR 049	7.3	8.3	5.0	6.3	7.0	8.3	8.3	5.7	3.3	3.0	5.0	5.8
Attila E	7.7	7.7	7.3	8.7	7.3	8.0	8.0	7.7	5.0	5.3	7.7	7.0
Banner III	7.3	8.3	3.0	5.3	7.3	7.7	6.3	4.7	2.3	2.3	4.0	5.0
BAR CF8 FUS1	7.7	8.0	3.7	7.7	7.3	7.3	7.0	7.0	3.0	3.7	6.7	6.0
BAR CHF8 FUS2	7.7	8.0	5.0	7.3	7.3	7.7	6.7	6.0	4.0	3.7	6.0	5.9
BAR HF8 FUS	7.3	8.7	7.0	7.7	8.0	8.0	7.0	7.3	5.0	4.3	6.3	6.6
BAR SCF8 FUS3	7.3	7.7	4.3	6.3	6.3	7.3	6.7	6.7	3.7	3.0	4.3	5.4
Bighorn	6.7	6.7	4.7	6.3	5.3	6.3	6.3	6.7	3.7	3.7	5.0	5.3
Boreal	7.0	7.3	4.0	6.3	5.7	7.3	6.7	5.0	3.0	3.0	4.3	5.0
Bridgeport	7.7	8.3	3.7	8.0	8.0	8.0	6.7	7.0	3.0	3.7	7.3	6.2
Brittany	7.7	9.0	2.7	5.3	8.0	7.3	6.7	5.3	2.7	2.7	4.3	5.3
Common Creeping Red	6.7	7.7	3.0	7.7	5.7	7.7	6.7	5.3	2.7	3.0	5.3	5.2

Cultivar[2]	Genetic Color	Greenup	Summer Density	Fall Density	Apr	Turf Quality[1] May	Jun	Jul	Aug	Sep	Oct	Mean
Culombra	7.7	9.0	3.7	8.3	7.7	8.3	7.3	7.0	3.7	4.0	7.3	6.5
Dawson E+	6.0	7.3	4.7	7.3	6.0	8.0	8.0	5.3	3.3	4.0	5.0	5.7
Defiant	8.0	8.7	8.3	8.7	7.3	8.0	8.3	8.3	5.7	5.7	8.3	7.4
DGSC 94	7.7	7.0	4.7	8.0	6.7	7.3	7.3	6.3	3.7	3.7	7.0	6.0
Discovery	7.3	8.0	4.7	6.3	7.0	7.7	6.7	6.0	4.0	3.0	5.0	5.6
Florentine	7.3	7.7	3.7	6.7	7.3	7.3	6.7	6.0	3.0	2.7	5.0	5.4
Heron	8.0	8.0	6.0	6.7	7.0	7.7	8.0	7.3	4.0	4.0	5.7	6.2
Intrigue	7.0	8.3	4.0	6.7	8.0	7.7	7.7	7.3	3.7	3.0	5.3	6.1
ISI FL 11	7.7	8.3	7.7	8.0	7.3	8.0	7.3	7.0	4.0	4.7	6.3	6.4
ISI FL 12	7.7	8.3	7.7	9.0	7.7	8.0	7.3	7.3	5.0	5.7	8.3	7.0
ISI FRR 5	8.7	8.7	5.7	9.0	8.3	8.7	8.7	8.3	4.7	6.0	8.7	7.6
ISI FRR 7	9.0	8.3	6.3	8.3	7.7	8.7	8.0	8.3	4.3	5.0	7.7	7.1
Jamestown II	6.3	8.3	3.7	5.7	7.7	7.3	6.7	6.0	3.7	2.7	4.3	5.5
Jasper II	8.3	8.0	5.3	8.0	8.3	9.0	8.3	7.7	4.0	4.7	7.0	7.0
Longfellow II	8.7	8.0	5.0	7.7	8.0	8.3	7.3	8.0	4.0	3.7	6.0	6.5
Magic	7.7	8.0	4.0	6.3	7.7	8.3	7.3	8.0	4.7	3.0	6.0	6.3
MB-62	8.3	8.0	3.0	8.3	7.7	8.0	7.0	6.0	2.7	3.0	6.0	5.8
MB-82	7.7	8.0	5.7	6.3	6.3	7.3	7.3	7.3	4.0	3.7	6.0	6.0
Minotaur	7.0	7.3	7.7	7.7	6.3	7.0	6.3	6.7	4.3	4.7	7.0	6.0
Nordic (E)	7.7	8.0	6.0	8.0	6.7	7.3	8.3	8.3	3.7	4.7	6.3	6.5
Ospery	7.3	8.0	6.0	7.3	6.7	7.3	7.3	6.3	4.3	5.0	5.3	6.0
Oxford	8.3	7.3	6.7	8.0	6.3	8.0	7.7	7.3	4.3	4.7	6.7	6.4
Pathfinder	7.7	8.3	5.0	8.0	7.7	8.0	8.0	7.3	4.3	3.7	7.0	6.6
PICK FF A-97	7.3	9.0	6.7	8.7	7.3	8.0	7.0	7.3	4.3	5.0	7.3	6.6
PICK FRC 4-92	8.0	8.3	3.0	5.7	7.3	8.0	6.7	5.0	2.3	2.7	4.7	5.2
PICK FRC A-93	8.7	8.3	3.7	6.0	7.0	7.7	7.7	8.0	3.3	3.0	5.0	6.0
PST-47TCR	8.7	7.3	4.7	7.0	7.0	8.0	6.7	7.3	3.0	3.3	6.7	6.0
PST-4FR	8.7	8.7	3.0	8.0	7.7	8.0	7.3	7.3	3.0	3.0	5.6	6.0
PST-4HM	7.7	8.3	6.3	7.3	7.0	8.3	7.3	7.7	4.0	4.7	7.0	6.6

Cultivar[2]	Genetic Color	Greenup	Summer Density	Fall Density	Apr	Turf Quality[1] May	Jun	Jul	Aug	Sep	Oct	Mean
PST-4MB	7.3	7.7	7.3	8.3	6.7	8.0	7.3	7.7	3.7	5.7	8.0	6.7
PST-ELF	8.0	7.7	6.3	8.7	8.0	7.7	8.3	7.7	4.3	4.7	7.3	6.9
Quatro	9.0	7.0	7.0	7.3	6.0	7.3	7.3	7.3	.0	4.3	6.3	6.1
Reliant II	7.3	7.7	6.7	7.7	6.3	6.7	7.0	7.0	4.7	4.7	6.2	6.1
Rescue 911	7.0	8.0	6.3	7.0	6.3	7.3	7.3	7.0	4.7	4.3	6.3	6.2
Salsa	7.7	7.7	5.7	8.3	6.7	8.3	8.3	8.0	4.0	4.0	6.7	6.6
Sandpiper	7.3	8.3	3.0	7.3	8.0	7.3	7.0	6.3	3.0	3.0	5.7	5.8
Scaldis	8.3	8.3	6.7	8.3	7.0	7.7	7.7	7.l7	4.3	4.3	7.3	6.6
Scaldis II (AHF)	7.0	7.3	5.3	7.3	6.3	7.7	7.0	7.0	4.0	3.7	6.0	6.0
Seabreeze	6.3	7.0	3.3	4.7	6.0	6.7	7.0	6.3	2.7	3.0	4.0	5.1
Shademark	7.0	7.0	4.7	8.7	7.7	7.7	7.3	6.7	3.7	3.3	7.7	6.3
Shademaster II	7.3	7.0	4.0	9.0	7.0	7.7	7.7	6.7	3.0	3.7	7.3	6.1
Shadow II	7.3	8.0	3.3	5.3	7.7	7.7	6.3	5.3	2.7	2.7	4.0	5.2
SR 3200	7.0	7.3	6.3	8.0	6.7	7.3	6.7	6.3	4.3	5.0	6.3	6.1
SR 5100	8.0	8.7	4.3	7.0	7.7	8.7	6.3	7.0	4.0	4.0	6.0	6.2
SR 6000	6.7	7.0	5.3	7.0	4.3	7.0	6.0	4.7	3.0	3.3	5.3	4.8
SRX 3961	7.0	8.7	6.0	8.0	7.3	8.0	7.7	7.7	5.0	4.0	6.0	6.5
SRX 52961	8.7	7.3	3.6	8.0	7.7	7.7	7.3	7.7	3.7	4.3	6.7	6.4
SRX 52LAV	8.0	7.3	5.0	9.0	7.3	8.0	8.7	8.0	5.0	4.3	8.0	7.0
Stonehendge (AHF)	7.7	8.7	6.0	8.0	6.7	7.7	7.3	8.3	4.3	5.0	6.7	6.6
Tiffany	7.3	8.0	2.7	5.3	7.7	7.7	6.7	6.3	2.3	2.7	3.7	5.3
Treazure (E)	7.7	8.7	5.3	8.3	7.7	8.3	7.3	7.0	4.3	4.3	6.3	6.5
LSD Value[2] (P =0.05)	1.1	1.7	2.7	3.2	1.9	3.3	1.4	1.5	2.0	1.9	3.3	1.2

[1]Quality rated on a scale of 0 - 9 with 9 = best.
[2]To determine statistical differences among entries, subtract one entry's mean from another's. A statistical difference occurs when the value is larger than the corresponding.

TITLE: Perennial Ryegrass Cultivar Trial

OBJECTIVE: Evaluate new and standard ryegrass cultivars for performance in Kansas

PERSONNEL: Joon Lee and Jack Fry

SPONSOR: National Turfgrass Evaluation Program

INTRODUCTION:

Perennial ryegrass continues to be widely used in the Midwest for golf course fairways and tees and sports turfs, despite concerns about disease susceptibility. There is interest in identifying cultivars that are resistant to grey leaf spot, brown patch, and pythium, while at the same time possessing good resistance to environmental stresses.

MATERIALS AND METHODS:

On 17 September 1999, 134 perennial ryegrass entries were planted at the Rocky Ford Turfgrass Research Center. Turf was mowed at 0.5 inch three days weekly, received 1 lb N from urea in September, November, and May, and was irrigated to prevent drought stress. A preemergence herbicide was used in spring, 2000; no fungicides or insecticides were used. Turf was rated for visual quality from April to September using a 0 to 9 scale, where 7 = acceptable quality for a golf course fairway or tee.

RESULTS:

Statistical differences in turf quality were observed in June and July. In June, cultivars that exhibited lower quality than the highest rated entry (Roberts-627) were DP 17-9496, PST-2BR, ABT-99-4.625, APR 1234, and Linn. In July, cultivars that had lower quality ratings than the highest rated cultivar (Roberts-627) were the same as those in June, with the exception of PST-2BR. ABT-99-4.724 was also rated lower in July than Roberts-627.

This study will continue in 2001. Additional parameters to be evaluated in 2001 will include genetic color and leaf texture.

Table 1. Turfgrass quality ratings of perennial ryegrass cultivars in the 1999 National Perennial Ryegrass Tests at Manhattan, KS

Cultivar	April	May	June	July	Aug	Sept	Oct	Mean
Brightstar II	6.7[1]	6.7	5.3	5.3	4.7	5.3	5.3	5.6
Buccaneer	7.7	6.3	5.0	5.0	4.7	4.7	5.7	5.6
Calypso II	7.3	6.3	5.3	5.3	4.0	4.7	6.0	5.6
CAS-LP84	7.7	6.7	5.0	5.7	4.7	4.7	5.0	5.6
CIS-PR-75	6.3	7.0	5.7	5.3	4.3	5.0	5.3	5.6
Fiesta 3	7.0	6.3	5.7	5.3	4.3	5.0	5.7	5.6
MP58	6.7	6.3	5.7	5.3	4.7	5.0	5.7	5.6
Paragon	6.7	6.3	5.7	5.0	4.7	5.0	5.7	5.6
Passport	7.3	7.0	6.0	5.3	4.3	4.3	5.0	5.6
Skyhawk	6.0	6.7	5.3	5.3	4.7	5.0	6.0	5.6
SRX-4801	7.0	7.0	5.7	5.7	4.0	4.7	5.3	5.6
B1	7.0	7.0	5.3	5.0	4.3	4.7	5.3	5.5
BY-100	6.7	6.3	5.7	5.3	4.3	4.7	5.3	5.5
Catherdral II	6.7	6.3	5.3	5.3	4.3	5.0	5.3	5.5
Edge	6.5	6.5	5.0	5.0	4.5	5.0	6.0	5.5
KOOS R-71	7.3	6.7	5.3	5.3	4.3	4.3	5.3	5.5
Line Drive	6.7	6.7	5.7	5.0	4.3	4.7	5.3	5.5
Pennington-1130	7.0	6.0	5.7	5.3	4.0	5.0	5.3	5.5
Premier II	7.0	7.0	6.0	4.7	4.3	4.3	5.0	5.5
Promise	7.0	7.0	5.7	4.7	4.0	4.7	5.7	5.5
PST-2CRR	6.7	6.3	5.7	5.3	4.0	5.0	5.7	5.5
PST-2SBE	6.3	6.3	5.7	5.3	4.7	4.7	5.3	5.5
Seville II	6.7	6.3	5.7	5.0	4.7	4.7	5.3	5.5
SRX 4820	6.3	6.7	5.3	5.0	4.3	5.0	5.7	5.5
Yatsugreen	6.7	6.0	5.3	5.3	4.3	5.0	5.7	5.5
ABT-99-4.461	6.3	7.0	5.3	5.0	4.3	4.3	5.3	5.4
ABT-99-4.633	6.3	6.3	5.7	4.7	4.7	4.7	5.3	5.4
Affinity	7.0	6.3	5.3	5.3	4.3	4.7	5.0	5.4
AG-P981	7.0	6.3	5.0	5.0	4.0	5.0	5.3	5.4
APR 1236	6.7	6.3	5.3	5.3	4.7	4.3	5.3	5.4
APR 777	6.3	6.3	5.3	5.7	4.3	4.7	5.3	5.4
Catalina	7.3	6.7	5.0	5.0	4.0	4.3	5.3	5.4
CIS-PR-84	6.0	7.0	5.3	5.0	4.3	4.7	5.3	5.4
Headstart	7.3	6.7	5.3	5.0	4.3	4.0	5.0	5.4
Jet	6.7	6.3	5.7	5.0	4.3	4.3	5.3	5.4
MP103	6.7	6.7	6.0	5.3	4.0	4.0	5.0	5.4
Premier	7.0	6.3	5.3	5.0	4.0	4.3	5.7	5.4
PST-2CRL	7.0	6.3	5.3	5.0	4.3	4.7	5.0	5.4
PST-2JH	7.0	6.3	5.3	5.0	4.3	5.0	5.0	5.4
PST-2LA	6.3	6.3	5.7	5.3	4.3	4.7	5.3	5.4
SR4500	6.7	6.0	6.0	5.3	4.0	4.0	5.0	5.4
WVPB-R-84	6.7	6.0	5.0	5.0	4.7	4.7	5.7	5.4
6011	6.0	6.3	5.7	5.0	4.3	4.7	5.0	5.3
ABT-99-4.464	6.3	6.3	5.0	5.0	4.0	4.7	5.7	5.3
ABT-99-4.600	6.7	6.3	5.3	5.0	4.3	4.7	4.7	5.3
ABT-99-4.834	7.0	7.3	5.3	5.0	4.0	4.0	4.7	5.3
Affirmed	6.3	6.3	5.0	5.0	4.7	4.3	5.3	5.3
EP53	6.7	6.3	5.7	5.0	4.0	4.3	5.0	5.3

Cultivar	April	May	June	July	Aug	Sept	Oct	Mean
EP57	6.3	6.7	5.3	4.7	4.3	4.7	5.3	5.3
EPD	5.7	6.3	5.7	5.0	4.3	4.7	5.7	5.3
LPR 98-143	6.0	6.3	5.0	5.0	4.7	4.7	5.3	5.3
LTP-ME	7.0	6.7	5.3	5.0	4.0	4.3	5.0	5.3
LTP 98-501	8.0	7.7	6.7	5.7	5.0	5.7	6.0	6.4
Roberts-627	7.7	8.0	7.0	6.7	4.7	5.3	5.7	6.4
CIS-PR-80	7.7	7.3	6.0	6.3	5.0	5.3	6.3	6.3
JR-151	7.7	7.0	6.3	6.3	5.0	5.7	6.3	6.3
Pennant II	8.0	7.0	6.3	6.0	5.0	5.7	6.3	6.3
ABT-99-4.629	6.7	6.3	6.0	6.0	5.7	6.3	6.3	6.2
Majesty	7.0	6.3	6.0	6.3	5.7	6.0	6.3	6.2
PST-2L96	6.7	7.0	6.0	5.7	5.0	6.0	7.0	6.2
ABT-99-4.115	8.3	7.0	6.3	5.3	4.7	5.3	6.0	6.1
ABT-99-4.721	7.0	7.0	5.7	5.7	5.0	6.0	6.7	6.1
Ascend	7.0	7.0	6.0	6.0	5.0	5.7	6.0	6.1
CIS-PR-85	7.7	7.7	6.3	5.7	4.7	5.3	5.7	6.1
DLF-LDD	7.7	7.3	6.3	6.0	4.7	7.0	5.7	6.1
PST-CATS	7.3	6.7	6.0	5.7	5.0	5.7	6.7	6.1
SRX 4120	7.3	6.3	6.0	5.7	5.7	6.0	6.0	6.1
ABT-99-4.339	7.3	7.3	6.0	5.3	4.0	5.3	6.3	6.0
Churchill	7.3	7.0	6.7	5.3	4.7	5.0	5.7	6.0
CIS-PR-69	7.7	6.7	6.7	5.7	4.7	5.0	5.7	6.0
CIS-PR-72	5.0	6.7	5.7	5.3	4.7	5.7	6.0	6.0
LPR 98-144	7.3	7.0	6.3	5.3	5.0	5.3	6.0	6.0
NJ-6401	7.0	7.3	6.0	6.0	4.7	4.7	6.0	6.0
Pick PR B-97	6.7	6.7	5.7	5.7	5.0	5.7	6.7	6.0
Pick RC2	7.0	7.3	6.3	5.7	5.0	5.0	5.7	6.0
SRX 4RHT	7.7	7.0	6.0	5.7	4.7	5.0	6.0	6.0
APR 1232	7.3	7.0	5.7	5.0	4.7	5.3	6. 0	5.9
APR 1233	7.3	6.7	5.3	5.3	5.0	5.3	6.3	5.9
BAR 9 B2	7.0	7.0	6.0	5.7	4.7	5.3	5.3	5.9
CIS-PR-78	7.7	7.3	6.3	5.3	4.0	5.0	5.7	5.9
DP 17-9391	7.0	6.3	5.7	6.0	5.0	5.7	5.7	5.9
Manhattan 3	6.7	6.7	5.7	5.7	4.7	5.7	6.3	5.9
MP107	7.3	6.7	5.7	5.3	4.7	5.3	6.0	4.9
Nexus	7.3	7.0	5.7	5.3	4.7	5.0	6.0	5.9
Pick PR QH-97	7.3	7.0	5.7	5.7	5.0	5.0	5.7	5.9
Racer	7.3	6.7	5.7	5.3	5.3	5.3	5.7	5.9
ABT-99-4.709	7.7	7.3	5.0	5.0	4.7	5.3	5.7	5.8
ABT-99-4.753	7.3	7.3	6.0	5.7	4.3	4.7	5.3	5.8
ABT-99-4.903	7.3	6.7	5.3	6.0	4.7	5.0	5.7	5.8
ABT-99-4.965	6.7	6.7	5.0	5.3	5.0	5.3	6.3	5.8
APR 1231	7.3	6.7	5.7	5.7	4.7	5.0	5.7	5.8
APR 776	6.7	7.0	5.7	5.7	4.7	5.0	5.7	5.8
Charger II	7.0	7.0	6.0	5.7	4.3	5.3	5.3	5.8
JR-317	7.0	7.3	5.7	5.3	4.7	5.0	5.3	5.8
Palmer III	7.0	6.7	6.0	5.3	4.0	5.3	6.3	5.8
Pizzazz	6.0	6.7	5.7	6.0	5.0	5.3	6.0	5.8
Pleasure XL	7.3	6.7	5.7	5.7	5.0	4.7	5.3	5.8
PST-2SLX	6.7	6.3	5.7	5.3	4.7	5.3	6.3	5.8
R8000	6.7	7.3	6.0	5.3	4.3	5.0	5.7	5.8
Secretariat	7.3	6.7	6.0	5.7	4.7	4.7	5.7	5.8

Cultivar	April	May	June	July	Aug	Sept	Oct	Mean
ABT-99.4960	7.3	6.7	5.3	4.7	4.7	5.7	5.7	5.7
Mepy	8.0	6.7	5.7	5.0	4.3	5.0	5.3	5.7
Pick MDR	7.3	7.3	6.0	5.3	4.3	4.7	5.0	5.7
Pick PRNGS	7.0	6.3	5.7	5.7	4.7	4.7	6.0	5.7
Wilmington	7.0	6.0	5.7	5.3	4.7	5.3	6.0	5.7
WVPB-R-82	7.0	6.7	5.3	5.0	4.7	5.0	6.0	5.7
MDP	6.7	6.0	5.7	5.0	4.0	4.7	5.3	5.3
Panther	6.0	5.7	5.0	5.0	4.0	4.7	5.0	5.3
PST-2M4	6.7	6.0	5.7	5.0	4.3	4.3	5.0	5.3
Radiant	6.0	6.7	5.3	5.0	4.3	4.7	5.0	5.3
Allsport	6.3	6.3	5.0	5.3	4.0	4.7	5.0	5.2
APR 1237	7.0	6.3	5.3	5.3	4.0	3.7	4.7	5.2
Divine	6.7	5.7	5.0	5.0	4.3	4.7	5.3	5.2
DP LP-1	7.7	7.0	5.0	4.7	3.7	4.0	4.7	5.2
Elfkin	6.3	5.7	5.0	5.0	4.3	5.0	5.3	5.2
Exacta	6.7	6.0	5.7	5.3	4.0	4.3	4.7	5.2
JR-128	6.3	6.0	5.0	5.0	4.3	4.7	5.3	5.2
JR-187	6.7	6.3	5.0	4.7	4.7	4.3	5.0	5.2
Phantom	6.7	6.7	5.3	5.0	3.7	4.3	5.0	5.2
Pick EX2	6.7	6.3	5.0	5.3	4.0	4.3	5.0	5.2
PST-2A6B	6.3	6.7	5.0	4.7	4.3	4.3	5.0	5.2
ABT-99-4.560	7.0	6.0	5.3	4.7	4.0	4.0	4.7	5.1
ABT-99-4.815	6.0	6.0	5.7	5.0	4.0	4.3	4.7	5.1
DP 17-9496	6.7	6.0	4.3	4.3	4.0	4.7	5.7	5.1
Pick PR 1-94	6.7	6.0	5.0	5.0	4.0	4.3	5.0	5.1
PST-2BR	5.7	6.0	4.7	5.3	4.3	4.7	5.3	5.1
APR 12235	6.7	6.0	4.7	4.3	4.3	4.3	4.3	5.0
PST-2RT	6.3	6.3	5.3	4.7	4.0	4.0	4.3	5.0
ABT-99-4.724	6.0	6.0	5.0	4.3	3.7	4.0	5.0	4.9
ABT-99-4.625	6.3	5.7	4.7	4.0	3.7	4.0	5.3	4.8
APR 1234	6.7	5.3	4.7	4.3	4.0	4.0	4.3	4.8
Linn	6.3	5.7	4.0	4.0	3.3	3.3	4.7	4.5
LSD[2]	NS[3]	NS	2.1	1.6	NS	NS	NS	NS

[1]Ratings based on a scale of 0-9 with 9 = best green-up, color, texture, and quality.
[2]To determine statistical differences among entries, subtract one entry's mean from another's. A statistical difference occurs when the value is larger than the corresponding LSD value.
[3]NS - no statistical difference for this rating month.

TITLE: Bentgrass Cultivar Evaluation for Putting Greens

OBJECTIVE: Evaluate new and standard putting green cultivars for use on putting greens in Kansas

PERSONNEL: Jack Fry

SPONSOR: National Turfgrass Evaluation Program

INTRODUCTION:

Interest continues in new bentgrasses that are available for use on putting greens. In this test, 29 cultivars were evaluated.

MATERIALS AND METHODS:

We seeded 26 creeping bentgrass and 3 velvet bentgrass cultivars in September 1998 at 1.5 lb/1000 ft^2 at the Rocky Ford Research Center in Manhattan. A total of 4.5 lb N/1000 ft^2 was applied. Mowing was done six days weekly at 5/32 inch. Insecticides were applied as needed. Fungicides were applied after an initial dollar spot outbreak. Plots were rated for genetic color, dollar spot, and quality from April through September. All ratings were made on a 0 to 9 scale, where 0 = worst; 9 = best.

RESULTS:

There were no differences in genetic color ratings. L-93 received the highest rating for dollar spot resistance. Cultivars equivalent to L-93 were Penn G-1, Penn A-2, PST-A2E, Bavaria, Penncross, SRX 1NJH, BAR AS 8FUS2, Pennlinks, Pick MVB, and SRX 1BPAA.

No differences were observed in turf quality in April. In May, entries receiving the highest quality ratings were L-93, Penn G-1, Penn A-2, PST A2E, Penncross, BAR AS 8 FUS2, Pennlinks, SRX 1BPAA, and ABT-CRB-1. In June, all cultivars were similar except SR 1119, Backspin, Providence, Century, SYN 96-2, and Crenshaw, which had lower quality ratings. Cultivars that were not equivalent to the highest rated cultivars in July were Penncross, BAR AS 8FUS2, Pennlinks, Pick MVB, SR7200, Imperial, Backspin, Providence, SYN 96-1, SYN 96-3, Century, SYN 96-2, and Crenshaw. Cultivars not equivalent to the highest rated group in August were SR 7200, SRX 1BPAA, BAR CB 8US3, Imperial, Providence, SYN 96-1, Century, SYN 96-2, and Crenshaw. In September, BAR AS 8 FUS2, ABT-CRB-1, BAR CB 8US3, Century, and Crenshaw had ratings that were lower than the highest group.

Table 1. Turfgrass quality and other ratings of bentgrass cultivars in the 1998 National Bentgrass (Greens) test at Manhattan, KS.

Name	Genetic color	Dollar spot	Turf quality April	May	June	July	Aug	Sept	Mean
L-93	7.0[1]	6.3	5.3	5.7	7.0	6.3	5.7	6.7	6.1
Penn G-1	6.7	5.3	6.0	5.7	7.0	6.3	5.3	6.3	6.1
Penn A-1	7.3	4.7	5.7	4.3	7.0	6.0	5.7	6.3	5.8
Penn G-6	6.7	4.0	5.7	4.0	7.0	6.0	5.3	6.7	5.8
Penn A-2	6.7	5.7	5.7	5.0	6.7	6.0	5.0	6.0	5.7
PST-A2E	6.7	5.3	6.0	4.7	5.3	5.7	5.3	6.0	5.5
Bavaria	6.3	5.0	6.0	4.3	5.3	5.7	5.0	6.0	5.4
ISI AP-5	6.7	4.7	5.3	4.3	6.0	5.3	4.7	6.0	5.3
Penncross	6.0	5.0	5.7	4.7	6.0	5.0	4.7	5.7	5.3
Pick CB 13-94	6.0	4.3	6.0	4.0	6.0	5.3	4.7	5.7	5.3
SR 1119	7.0	4.0	5.0	4.0	5.0	6.0	5.0	6.0	5.2
SRX 1NJH	6.3	5.0	5.7	4.3	5.3	6.0	4.7	5.3	5.2
BAR AS 8FUS2	6.3	5.3	5.7	4.7	6.0	5.0	4.3	5.0	5.1
Penn A-4	6.3	4.0	5.0	4.0	5.7	5.7	4.7	5.7	5.1
Pennlinks	5.7	5.7	4.7	5.0	5.3	5.0	4.7	5.7	5.1
Pick MVB	6.3	4.7	4.7	4.3	7.0	4.7	4.7	5.3	5.1
SR 7200	6.7	4.3	5.3	4.3	5.7	5.0	4.0	6.0	5.1
SRX 1120	6.7	4.7	5.3	4.0	5.3	5.3	5.0	5.7	5.1
SRX 1BPAA	5.7	5.7	5.7	4.7	6.0	5.3	4.0	4.7	5.1
ABT-CRB-1	6.0	5.0	4.3	4.7	5.3	5.3	4.7	5.0	4.9
BAR CB 8US3	6.3	2.7	5.7	3.0	6.0	5.3	4.0	5.0	4.8
Imperial	6.7	3.3	5.3	3.3	5.3	5.0	3.7	6.0	4.8
Backspin	6.3	3.3	4.7	3.3	5.0	5.0	4.7	5.7	4.7
Providence	6.0	3.3	5.7	3.7	4.3	5.0	4.0	5.3	4.7
SYN 96-1	5.7	3.0	5.7	3.7	5.7	4.3	3.3	5.3	4.7
SYN 96-3	6.7	2.7	5.7	3.0	5.3	4.0	4.3	5.7	4.7
Century	5.3	3.0	5.0	3.3	5.0	5.0	3.7	4.3	4.4
SYN 96-2	6.3	2.3	4.7	3.0	5.0	4.3	4.0	5.3	4.4
Crenshaw	5.7	2.3	5.0	3.3	4.7	4.0	3.7	4.7	4.2
LSD[2]	NS[3]	1.5	NS	1.0	1.7	1.2	1.5	1.6	0.8

[1]Ratings based on a scale of 0-9 with 9 = best color, dollar spot resistance, and quality.
[2]To determine statistical differences among entries, subtract one entry's mean from another's. A statistical difference occurs when the value is larger than the corresponding LSD value.
[3]NS - no statistical difference for this rating month.

TITLE: Bentgrass Cultivar Evaluation for Golf Course Fairways

OBJECTIVE: Evaluate the performance of bentgrass cultivars for golf course fairways in Kansas

PERSONNEL: Jack Fry

SPONSOR: National Turfgrass Evaluation Program

INTRODUCTION:

There is continued interest in evaluating alternatives to perennial ryegrass for golf course fairways. Although creeping bentgrass is widely used on putting greens, there are only a handful of courses that have expanded its use to fairways in Kansas. In the Mid-Atlantic region of the United States, bentgrass use on fairways is commonplace.

MATERIALS AND METHODS:

Grasses were seeded in September, 1998 at 1.1 lb/1000 ft^2 at the Rocky Ford Turfgrass Research Center in Manhattan, Kansas. The trial was mowed at 9/16 inch and received 2 lb N from a soluble fertilizer in autumn and 1 lb N/1000 ft^2 in spring. A preemergence herbicide was applied in the spring and a broadleaf herbicide was applied in October. Turf was irrigated to prevent severe drought stress. Data were collected on turf quality using a 0 to 9 scale, where 0 = brown, dead turf; 7 = acceptable for a fairway; and 9 = optimum color, density, and uniformity. Additional information on leaf texture, color, brown patch, and dollar spot susceptibility are available in the 2000 research report, which is available at the following web address: http://www.oznet.ksu.edu/library/hort2/SRP855.PDF or through any county extension office.

RESULTS:

Turf quality was highest in April and declined through the season. In April, cultivars that rated highest statistically were Seaside II, L-93, Penneagle, PST-OVN, Penncross, Trueline, Penn G-6, Backspin, and Grand Prix. In May, only Seaside, Golfstar, and SR7100 rated lower than the highest rated cultivars. In June, best ranking cultivars were PST-OVN, Seaside II, L-93, and SRX 1BPAA. High summer temperatures took their toll on all cultivars by July and none had acceptable visual quality. Cultivars that ranked lower than the highest ranking cultivar were Century, SRX 7MOBB, Golfstar, and SR7100. Very poor quality was observed in August and September (no ratings > 4.0) and no differences occurred among entries. The plots were so badly devastated by the extreme heat in 2000 that this test may not continue in 2001.

Table 1. Turfgrass quality and other ratings of bentgrass cultivars in the 1998 National Bentgrass (Fairway) test at Manhattan, KS.

Name	April	May	June	July	Aug	Sept	Mean
Seaside II	8.7[1]	7.7	7.3	5.0	3.3	3.0	5.8
L-93	8.0	7.0	7.0	4.7	3.7	3.3	5.6
Penneagle	8.3	7.3	6.0	5.0	3.3	3.3	5.6
SRX 1BPAA	7.3	7.3	7.0	5.3	3.3	2.7	5.5
PST-OVN	8.0	7.7	8.0	5.0	2.3	1.7	5.4
Penncross	8.3	7.3	6.3	4.7	2.3	2.7	5.3
Trueline	8.0	7.3	6.0	4.3	3.0	3.0	5.3
Penn G-6	7.7	7.7	6.3	4.3	3.0	2.0	5.2
Princeville	7.3	6.3	6.0	4.3	3.7	3.7	5.2
Backspin	8.3	7.7	5.7	4.3	2.3	1.7	5.0
Radiance(PST-9HG)	7.0	6.0	5.7	4.0	3.0	3.7	4.9
Seaside	6.0	5.7	5.0	5.0	3.7	4.0	4.9
Century	7.3	6.3	5.3	3.3	3.3	3.0	4.8
Grand Prix	7.7	6.3	5.7	3.7	2.7	2.7	4.8
SR 1119	7.3	6.7	5.7	4.0	3.0	2.0	4.8
SRX 1120	7.3	6.3	6.3	4.0	2.7	2.0	4.8
ISI AT-5	7.0	6.3	5.0	3.7	2.7	3.3	4.7
PST-9PM	7.3	6.3	5.7	3.7	2.7	2.3	4.7
Imperial	7.3	7.0	5.7	3.7	2.0	2.0	4.6
Providence	7.3	7.3	5.3	3.0	2.0	2.3	4.6
SRX 7MODD	6.3	6.0	6.0	3.7	2.3	2.3	4.4
Tiger	6.7	6.7	5.7	3.7	2.0	1.7	4.4
ABT-COL-2	6.7	6.0	6.0	3.3	1.7	1.3	4.2
SRX 7MOBB	7.0	6.0	5.3	3.0	2.0	2.0	4.2
Golfstar	5.7	5.0	4.0	2.7	2.7	3.0	3.8
SR 7100	6.3	5.7	4.0	2.0	2.0	1.3	3.6
LSD Value[2]	1.3	1.7	1.3	1.6	NS[3]	NS	1.1

[1]Ratings based on a scale of 0-9 with 9 = best green-up, color, texture, and quality.
[2]To determine statistical differences among entries, subtract one entry's mean from another's. A statistical difference occurs when the value is larger than the corresponding LSD value.
[3]NS - no statistical difference for this rating month.

TITLE: Zoysiagrass Cultivar Trial

OBJECTIVE: To evaluate performance of seeded and vegetatively established cultivars in Kansas

PERSONNEL: Jack Fry

SPONSOR: National Turfgrass Evaluation Program

INTRODUCTION:

'Meyer' zoysiagrass has long been the standard cultivar for the Midwest. It has several characteristics that make it an excellent choice for this area, including good turf quality, good freezing resistance, and relatively low pesticide and fertilizer requirements. Meyer is slow to establish, however, and establishment from plugs can take two or more growing seasons. Sodding Meyer can be expensive and Meyer is also relatively drought sensitive. Identification of one or more cultivars that have qualities equal to or better than Meyer, but are more easily and quickly established at a lesser cost, would benefit Kansas turfgrass managers.

MATERIALS AND METHODS:

Grasses were established from seed or plugs in July, 1996 at the Rocky Ford Turfgrass Research Center in Manhattan. Seeded selections were ZEN 500, ZEN 400, Zenith, J-36, J-37, Chinese Common, Z-18, and Korean Common. Plots measured 5 by 5 ft and were arranged in a randomized complete block design with three replicates. Seeding rate was approximately 2 lb/1000 ft^2. Six 2-inch diameter plugs of vegetative selections were planted in each plot. Mowing was done three days weekly during summer at a height of 0.75 inch. Nitrogen was applied in June to provide 1 lb N/1000 ft^2. Irrigation was applied to prevent dormancy. Plots were rated from April to September for genetic color, leaf texture, wilting, and quality. A 0 to 9 visual rating scale, where 9 = best, was used for all parameters.

RESULTS:

Genetic color: All cultivars had similar ratings, except ZEN-500, Korean common, and Meyer, which had lower scores.

Leaf texture: Finest textured cultivars were Emerald, Cavalier, Zeon, DALZ 9601, and Palisades. Korean common had the coarsest leaf texture.

Wilting: All cultivars were similar except Meyer, which had the lowest score for wilting tolerance.

Turf Quality: Cultivars with the highest rating scores in May were Emerald, Cavalier, Zeon, DALZ 9601, Palisades, El Toro, and Jamur. In June the aforementioned cultivars again had the best quality scores, along with Crowne. Top performers in July included the same list as in June, plus Miyako, ZEN-400, Victoria, Zenith, and J-14. In August and September, top performers were Emerald, Cavalier, Zeon, DALZ 9601, Palisades, El Toro, Jamur, Crowne, J-37, and Miyako.

Winter injury: The 2000-2001 winter caused severe injury to many of the entries. All of the seeded entries were in the top group for least winter injury. Vegetative cultivars with best hardiness were HT-210 and Meyer. All other vegetative selections suffered severe winter injury.

For the past several years, including the summer of 2000, fine-textured, dark green cultivars exhibited best performance. These data were deceiving, however, as our most recent winter identified those cultivars that can be safely used in our climate. Of the vegetative selections only Meyer and HT-210 can be expected to have relatively good survivability from year to year. All of the seeded selections can be expected to have good hardiness.

Table 1. Turfgrass quality and other ratings of zoysiagrass cultivars in the 1996 National Zoysiagrass Test at Manhattan, KS.

				----------Turf quality[1]----------						Winter
Cultivar	Gencolor	Leaftex	Wilting	May	June	July	Aug	Sept	Mean	Injury[2]
Emerald	6.7	9.0	9.0	8.0	8.3	8.0	7.7	8.0	7.7	3.0
Cavalier	7.0	9.0	8.7	7.7	8.0	8.0	7.3	8.0	7.5	0.7
Zeon	7.0	9.0	9.0	7.3	8.0	8.0	7.3	8.0	7.4	1.3
DALZ 9601	7.0	9.0	9.0	7.3	8.0	8.0	6.7	7.7	7.2	1.0
Palisades	7.0	6.0	9.0	7.0	7.7	7.0	7.7	7.3	6.9	0.3
El Toro	6.0	6.3	9.0	6.7	7.7	7.0	7.0	7.3	6.8	0.0
Jamur	6.3	6.0	9.0	6.7	8.0	7.3	6.7	7.3	6.8	0.0
Crowne	6.3	6.7	9.0	6.0	8.0	7.3	6.7	7.3	6.7	0.3
*J-37	6.7	5.0	8.7	6.3	6.7	6.3	6.3	7.0	6.4	8.7
Miyako	6.7	5.3	9.0	5.7	7.0	7.0	7.0	7.0	6.7	0.7
*ZEN-400	6.0	5.7	8.7	7.0	7.0	7.0	5.7	6.3	6.3	9.0
*J-36	6.3	5.0	8.7	7.0	6.3	6.3	5.0	6.0	6.1	8.7
Victoria	6.0	6.5	7.0	5.5	7.0	7.0	5.0	6.0	6.1	3.0
*Zenith	6.0	6.3	7.3	6.3	6.3	6.7	5.3	5.7	6.1	7.3
J-14	6.0	5.7	8.3	6.0	6.0	7.0	6.3	6.7	6.0	6.7
*Chinese Common	5.7	5.3	8.7	6.0	6.7	6.3	5.3	6.0	5.7	8.7
De Anza	6.3	6.3	7.7	4.7	6.3	6.3	5.7	5.7	5.4	3.3
*Z-18	6.0	5.3	7.7	6.0	6.0	5.7	5.3	5.3	5.4	7.7
HT-210	6.0	5.7	7.7	5.0	5.3	7.5	5.7	5.0	4.9	7.7
*ZEN-500	5.3	6.0	7.3	5.0	5.7	6.0	4.0	4.3	4.8	7.7
*Korean Common	5.3	4.7	7.7	4.3	4.7	5.3	5.3	5.3	4.7	8.0
Meyer	4.0	8.0	4.3	4.0	5.7	6.3	3.7	4.7	4.7	7.0
LSD[3]	*1.5*	*1.3*	*1.9*	*1.3*	*1.1*	*1.3*	*1.9*	*1.6*	*1.8*	*2.6*

*Seeded cultivars

[1]Ratings based on a scale of 0-9 with 9 = best color and quality, and least wilting or winter injury.

[2]Winter injury rated May 10, 2001.

[3]To determine statistical differences among entries, subtract one entry's mean from another's. A statistical difference occurs when the value is larger than the corresponding LSD value.

TITLE: Buffalograss Cultivar Trial

OBJECTIVE: To evaluate seeded and vegetative buffalograss cultivars under Kansas conditions

PERSONNEL: Linda R. Parsons and Jack D. Fry

INTRODUCTION:

Buffalograss is the only native species used for turfgrass in Kansas. It requires little maintenance and is heat and drought tolerant. The introduction of many new selections, both seeded and vegetative, has aroused considerable interest in growing buffalograss. Further evaluation of these new releases is needed to determine their potential for use by Kansas consumers.

MATERIALS AND METHODS:

During the summer of 1997, we established 9 seeded and 11 vegetative buffalograss cultivars and experimental numbers in 60 study plots (8 by 8 ft) at the John C. Pair Horticultural Center in Wichita, KS. Prior to seeding and plugging the plots, we incorporated 13-13-13 into them at a rate of 1 lb NPK/1000 ft^2. We maintained fertility at 0 to 0.25 lb N/1000 ft^2 per growing month. Plots were mowed weekly during the growing season at 2.5 to 3.0 inches and returned clippings. We irrigated as necessary to prevent dormancy and controlled weeds, insects, and diseases only when they presented a threat to the trial. At appropriate times during the coarse of the study, we rated the turfgrass on a scale of 0-9, where 0=dead turf, 6=acceptable, and 9=optimum measure.

RESULTS:

The 2000 growing season for buffalograss in Wichita started and ended early – from late-April through mid-October. Turfgrass quality ratings during that period were influenced by weed infestation and degree of coverage, as well as turf density. The best overall performer for the year was vegetative type 609 (Table 1). Other good vegetative selections included UCR-95 and Stampede. Good seeded cultivars included BAM-1000, Sharp's Improved #2, and Texoka. On 26 April, we found that vegetative types Bonnie Brae, 86-120, and Legacy showed the earliest spring green-up. Bison, Cody, and Sharp's Improved #2 were among the seeded selections that showed earlier spring green-up. Consumers seem most interested in dark green, finely textured turfgrass varieties. Therefore, during the past couple of years, we have also studied these characteristics. The vegetative selections that averaged the finest for 1998 and 1999 were Midget, Prairie, and 609. Finest textured seeded types were Sharp's Improved and Tatanka. In 1998, we looked at turf color and found that vegetative types Prairie, 609, and UCR-95 and seeded types BAM-1000, Bison, and Cody were the darkest green.

Table 1. 2000 performance of buffalograss cultivars at Wichita, KS[1].

Cultivar/ Experimental No.	Seeded/ Vegetative	Spring Green-Up	Color '98	Avg. Texture '98-'99	Quality 4/26	5/30	6/27	7/31	8/29	9/26	Avg.
609*	V	3.3	7.0	7.5	5.3	5.0	6.0	5.3	5.0	5.3	5.3
UCR-95	V	1.0	7.0	7.3	3.0	4.7	5.7	6.0	4.7	5.0	4.8
Stampede*	V	3.0	5.7	6.8	3.7	4.3	6.0	4.3	4.0	5.0	4.6
91-118	V	2.3	5.3	6.2	3.3	4.7	7.0	4.7	3.7	3.3	4.4
BAM-1000	S	2.7	6.0	7.2	4.0	4.3	6.0	4.0	4.0	3.7	4.3
Sharp's Improved #2	S	3.0	6.0	7.2	3.7	4.3	6.0	4.0	3.7	4.3	4.3
Texoka*	S	3.3	6.0	7.3	3.3	4.3	6.0	4.0	4.0	4.3	4.3
Cody*	S	3.3	6.0	7.3	3.7	4.0	6.0	4.0	4.0	4.0	4.3
Sharpshooter	S	2.7	5.3	6.3	3.7	4.0	6.7	4.0	3.3	4.0	4.3
Prairie	V	2.0	7.3	7.7	4.0	3.3	4.7	4.7	4.3	4.3	4.2
Sharp's Improved	S	3.3	6.0	7.5	3.3	4.3	6.0	3.7	4.0	4.0	4.2
8907	S	3.0	5.3	6.5	4.0	4.0	6.3	4.0	3.0	3.7	4.2
Tatanka*	S	2.7	6.0	7.5	3.0	4.0	6.3	4.0	3.7	4.0	4.2
Bison*	S	3.3	6.0	7.3	3.7	4.3	5.7	3.7	3.3	4.0	4.1
Bonnie Brae*	V	5.0	5.0	6.5	5.7	3.7	5.7	3.7	3.3	2.7	4.1
86-120	V	4.0	4.3	6.5	4.3	3.7	5.7	3.7	3.0	2.7	3.8
Midget*	V	2.3	6.0	8.0	2.3	3.3	5.7	3.7	3.0	3.7	3.6
378*	V	3.3	4.7	6.7	3.7	4.0	5.0	3.3	2.3	2.3	3.4
Legacy (86-61)*	V	3.7	4.7	6.3	3.7	3.0	5.0	3.0	2.3	2.0	3.2
Mobuff	V	3.0	4.3	6.7	2.7	3.0	5.3	3.3	2.0	2.7	3.2
LSD[3]		1.0	0.8	0.5	0.9	0.8	1.3	0.7	1.3	0.8	0.6

[1] Ratings based on a scale of 0-9 with 9=earliest green-up and best texture and quality.
[2] Cultivars marked with "*" will be commercially available in 2001.
[3] To determine statistical differences among entries, subtract one entry's mean from another's. A statistical difference occurs when the value is larger than the corresponding LSD value.

TITLE: Bermudagrass Cultivar Trial

OBJECTIVE: To evaluate seeded and vegetative bermudagrass cultivars under Kansas conditions and submit data collected to the National Turfgrass Evaluation Program

PERSONNEL: Linda R. Parsons and Jack D. Fry

SPONSOR: USDA National Turfgrass Evaluation Program

INTRODUCTION:

Bermudagrass is a popular warm-season turfgrass that is wear-resistant, as well as heat and drought tolerant. Recent introductions of interest are being selected for their improved hardiness and quality. New seeded varieties, in particular, show potential for improved winter survival. Both seeded and vegetative types need further evaluation to determine their potential for use by both sod growers and consumers.

MATERIALS AND METHODS:

During the summer of 1997, we established 18 seeded and 10 vegetative bermudagrass cultivars and experimental numbers at the John C. Pair Horticultural Center in Wichita, KS. Preparation for the study included incorporating 13-13-13 NPK into 84 study plots, each 5 by 5 ft, at a rate of 1 lb/1000 ft^2. We seeded or plugged the plots in a randomized complete block design. We maintained fertility of the plots at 0.5 to 0.75 lb N/1000 ft^2 per growing month. Plots were mowed weekly during the growing season at 1.0 to 1.5 inches and returned clippings. We irrigated as necessary to prevent dormancy and controlled weeds, insects, and diseases only when they presented a threat to the trial. At appropriate times during the coarse of the study, we rated the turfgrass on a scale of 0-9, with 0=dead turf, 6=acceptable, and 9=optimum measure.

RESULTS:

Turfgrass quality was rated monthly throughout the 2000 growing season (Table 1). Ratings were influenced by degree of coverage and weed infestation, as well as turf density. The best overall performer was seeded type OKS 95-1. Another good seeded variety was Princess 77. Good vegetative selections were Midlawn, OKC 18-4, and Tifsport. On 26 April, we found that vegetative types Midlawn, OKC 19-9, and Cardinal, and seeded type OKS 95-1 were the earliest to green-up. At summer's end we looked at turf color and texture and found that seeded varieties Shanghai, OKC 18-4, Tifsport, Tifway, and OKC 19-9 were the darkest green. Vegetative types Cardinal, Mini-Verde, Midlawn and Tifgreen, and seeded type OKS 95-1 had the finest texture.

Table 1. 2000 performance of bermudagrass cultivars at Wichita, KS[1].

Cultivar/ Experimental No.	Seeded / Vegetative	Spring Green-Up	Color	Texture	Quality						
					4/26	5/30	6/27	7/31	8/29	9/26	Avg.
OKS 95-1	S	5.7	5.7	7.3	5.7	6.0	5.7	6.0	5.7	5.0	5.7
Midlawn*	V	7.7	5.0	6.7	4.7	6.0	5.7	5.7	5.0	5.3	5.4
OKC 18-4	V	5.0	7.3	5.0	4.7	6.0	6.0	5.0	4.3	4.3	5.1
Tifsport (Tift 94)*	V	3.3	6.7	6.0	4.0	5.7	5.3	6.3	4.7	4.3	5.1
Princess 77 (Princess)*	S	2.7	5.3	6.3	4.0	4.7	5.3	5.7	5.7	4.7	5.0
SW 1-11	S	1.7	5.3	6.0	4.0	4.7	5.7	4.7	5.7	4.7	4.9
Shanghai*	V	4.3	7.7	4.0	4.0	5.3	5.3	4.7	4.7	5.0	4.8
PST-R69C	S	3.3	5.7	5.7	4.3	4.7	5.3	4.7	5.0	4.0	4.7
Tifway*	V	3.7	6.7	6.0	3.7	5.7	5.3	5.7	3.7	4.0	4.7
Majestic*	S	1.7	5.3	5.3	4.0	4.3	5.0	4.7	4.7	4.3	4.5
OKC 19-9	V	6.3	6.3	5.3	5.7	4.7	4.0	3.7	4.0	4.7	4.4
Mirage*	S	2.7	5.0	5.7	4.0	4.7	5.0	4.0	4.7	4.0	4.4
Blackjack*	S	2.0	5.3	5.3	3.0	4.0	5.7	4.3	5.0	4.0	4.3
J-540	S	2.3	6.0	5.0	4.0	4.3	5.0	4.0	4.7	4.0	4.3
Southern Star (J-1224)*	S	2.0	6.0	5.3	3.7	3.7	4.7	4.7	4.7	4.0	4.2
Sydney (SW 1-7)*	S	1.7	6.0	6.0	3.7	4.0	4.7	4.0	4.7	4.3	4.2
CN 2-9	V	4.0	6.0	5.7	3.7	4.0	5.3	4.7	3.7	3.7	4.2
Tifgreen*	V	5.0	5.0	6.7	4.7	4.3	5.0	4.3	3.3	3.3	4.2
Cardinal	V	5.7	4.0	9.0	4.7	6.0	4.3	4.0	3.0	2.7	4.1
Blue-Muda*	S	1.7	5.3	5.3	3.7	4.0	4.3	3.7	5.0	4.0	4.1
Arizona Common*	S	1.7	5.3	5.3	3.3	4.0	4.3	3.7	5.0	4.0	4.1
Shangri La*	S	2.0	5.3	5.0	3.7	3.3	4.7	4.0	5.0	3.7	4.1
Jackpot*	S	1.7	5.0	5.3	3.7	3.7	4.7	3.7	4.3	4.0	4.0
Savannah*	S	2.0	5.3	5.3	3.7	4.7	4.3	4.0	4.3	3.0	4.0
Pyramid*	S	1.3	6.0	5.3	3.3	3.3	4.3	4.0	4.7	4.0	3.9
NuMex-Sahara*	S	1.0	5.3	5.0	3.0	3.3	4.3	4.0	4.3	4.3	3.9
Sundevil II*	S	2.3	5.7	5.0	3.7	3.7	4.3	3.3	4.0	3.3	3.7
Mini-Verde*	V	3.0	6.0	7.7	3.0	2.7	3.0	2.0	2.3	2.0	2.5
LSD[3]		1.3	0.8	1.1	0.9	1.3	0.8	0.9	1.2	1.1	0.7

[1] Ratings based on a scale of 0-9 with 9=earliest green-up, darkest color, finest texture, and best quality.

[2] Cultivars marked with "*" will be commercially available in 2001.

[3] To compare cultivars, subtract one entry's mean from another's. A statistical difference occurs when the value is larger than the corresponding LSD value.

TITLE: Factors Affecting Establishment of Seeded Zoysiagrass in Perennial Ryegrass

OBJECTIVE: To evaluate practical cultural approaches for converting a ryegrass fairway to zoysiagrass

PERSONNEL: Alan Zuk and Jack Fry

SPONSORS: Kansas Golf Course Superintendent's Association, Golf Course Superintendent's Association of America

INTRODUCTION:

Perennial ryegrass is used widely on golf courses throughout the transition zone of the United States. However, maintaining perennial ryegrass in the transition zone has become too expensive for many golf courses because of costs associated with watering and multiple fungicide applications.

Seeded zoysiagrass would be of great use to transition zone superintendents if ryegrass fairways and tees could be converted without closing the golf course. This would require preplant and postplant management of the competing ryegrass to allow for successful germination, development, and spread of the maturing zoysiagrass stand.

Several factors, such as competition for water, nutrients and sunlight, may impair the successful conversion of ryegrass to seeded zoysiagrass. If a cold-hardy seeded zoysiagrass cultivar can withstand this competition during establishment, golf course superintendents could convert their cool season fairways and tees with less time, effort and expense than sodding with 'Meyer'.

MATERIALS AND METHODS:

1999 Study

On 18 June 1999, 'Zenith' zoysiagrass was seeded at 1 lb/1000 ft^2 in a split plot, randomized complete block design with traffic vs. no traffic as the main plots and the following treatments as the subplots: Roundup (3 qt/acre); Primo (1.5 qt/acre); Embark (2.5 qt/acre); scalping at 0.25 inch continued until zoysia grew to a height of 0.25 inch; Primo + scalping; and untreated. Plot sizes were 4 by 8 ft, and each subplot treatment was replicated three times. Prior to seeding, the entire area was core-aerified and verticut to open up the ryegrass and encourage seed to soil contact. The seed was watered 15 minutes, two to three times per day until germination. After germination, watering frequency was reduced to one time per day for 30 minutes.

The trafficking treatment was included to simulate the effects of wear and soil compaction over the treated areas during the establishment phase. Trafficked treatments were rolled 12 times per week with a 400-lb smooth power roller that exerted 15.125 lb/in^2 static pressure.

Zoysiagrass coverage was estimated visually in September when it was beginning to go off color as dormancy approached.

2000 Study

On June 10, 2000, 'Zenith' zoysiagrass was seeded at 1 lb/1000 ft^2 in a split plot, randomized complete block design as described above. Irrigation treatment was the whole plot, and seedbed treatments were the subplots. Plot sizes were 4 by 7 ft, and each subplot treatment was replicated three times. Irrigation was applied to prevent ryegrass stress (ryegrass irrigation), or to encourage ryegrass decline (zoysiagrass irrigation). The ryegrass irrigation main plots received 0.5 inch water on Monday, Wednesday, and Friday. The zoysiagrass irrigation main plots were watered when leaf curl was visible with 0.5 inch water. Watering treatments did not begin until we noticed tiller formation on the zoysiagrass seedlings, which occurred 66 days after seeding.

Seedbed treatments included Roundup, scalping, and a control, as described above. No growth regulator treatments were included.

Turf quality was rated weekly during the growing season, based on a 0-9 scale. Plots were rated from the perspective of what a golfer may see if the fairway was open during the establishment phase. Percent coverage was determined in October by using a 4 by 7 ft, counting grid placed directly over each plot. Coverage was estimated by counting the number of grid intersections where a zoysiagrass plant appeared.

RESULTS:

1999 Study in 1999

Quality: Six weeks after planting (early August), the nontrafficked control treatment had the highest quality. The trafficked Roundup treatment yielded the lowest quality rating.

Coverage: The treatments with the highest zoysiagrass coverage by the end of the first season were nontrafficked Roundup and trafficked Roundup. Of the treatments where zoysiagrass was seeded into an existing ryegrass canopy, nontrafficked Primo and scalped showed the highest coverage.

1999 Study in 2000

Quality: The treatments with the highest average quality rating after two seasons were nontrafficked ryegrass treated with Roundup or Primo. Ryegrass trafficked and treated with Roundup the previous spring had the lowest quality rating.

Coverage: Ryegrass treated with Roundup in 1999 and not subjected to traffic, had nearly complete zoysiagrass coverage by October 2000. Nontrafficked ryegrass scalped after seeding in 1999 exhibited 59% coverage by October 2000. Non treated ryegrass exhibited essentially no zoysiagrass coverage in 2000, regardless of trafficking treatment.

2000 Study in 2000

Quality: Six weeks after planting (early August), the control/water to favor ryegrass treatment showed the highest average quality ratings. The scalped/water to favor ryegrass treatment yielded the lowest rating.

Coverage: Irrigation had no effect on zoysiagrass coverage regardless of seedbed treatment. The ryegrass scalping treatment resulted in 7 to 9% zoysiagrass coverage by September.

Table 1. Turf quality and coverage of 'Zenith' zoysiagrass in 1999 after seeding into an existing perennial ryegrass canopy in June, 1999.

	Quality[1]								Coverage (%)	
	June		July		August		September		October	
Treatment	Traffic	No Traffic	Traffic	No Traffic	Traffic	No Traffic	Traffic	No Traffic	Traffic	No Traffic
Roundup	0 d[2]	0 c	0 e	0 e	1.1 c	3.8 b	1.7 c	6.1 ab	23 a	75 a
Primo	7.2 a	6.7 a	6.8 a	7.3 a	7.1 a	7.1 a	7.0 a	7.2 ab	1 c	4 d
Embark	6.0 b	6.3 a	5.6 b	6.5 b	6.4 a	7.0 a	6.5 a	7.7 ab	5 b	2 d
Scalped	2.7 c	3.3 b	2.4 d	3.3 d	3.1 bc	4.1 b	4.1 b	5.7 b	7 b	10 bc
Primo & Scalped	2.8 c	3.3 b	2.9 c	4.5 c	3.6 b	3.8 b	4.5 b	5.7 b	5 bc	12 b
Control	7.3 a	6.8 a	6.7 a	6.9 a	6.4 a	7.3 a	6.1 ab	7.8 a	1 c	5 cd
LSD (p = 0.05)	0.79	0.79	0.48	0.48	2.2	2.2	2.0	2.0	5	5

[1]Quality rated on a scale of 0 - 9 with 9 = best.
[2]Means within individual columns not followed by the same letter are significantly different.

Table 2. Turf quality and coverage of 'Zenith' zoysiagrass in 2000 after seeding into an existing perennial ryegrass canopy in June, 1999.

	Quality[1]								Coverage (%)	
	June		July		August		September		October	
Treatment	Traffic	No Traffic	Traffic	No Traffic	Traffic	No Traffic	Traffic	No Traffic	Traffic	No Traffic
Roundup	1.6 c[2]	4.8 c	1.2 c	5.0 a	2.2 b	6.7 a	2.1 b	6.8 a	44 a	99 a
Primo	7.8 a	7.8 ab	6.8 a	6.3 a	5.0 ab	6.5 a	4.8 ab	6.3 a	0 b	11 d
Embark	7.2 ab	7.6 ab	6.3 ab	6.3 a	4.8 ab	5.9 a	4.3 ab	5.5 a	4 b	10 d
Scalped	6.2 b	6.7 b	5.1 b	5.9 a	4.8 ab	5.6 a	4.6 ab	5.8 a	6 b	59 b
Primo & Scalped	6.9 ab	7.3 ab	6.3 ab	5.9 a	5.8 a	5.8 a	5.1 ab	5.6 a	4 b	42 c
Control	8.1 a	8.0 a	6.9 a	6.1 a	5.9 a	6.0 a	5.7 a	4.8 a	0 b	9 d
LSD (p = 0.05)	1.2	1.2	1.4	1.4	2.8	2.8	3.0	3.0	8	8

[1]Quality rated on a scale of 0 - 9 with 9 = best.
[2]Means within individual columns not followed by the same letter are significantly different.

Table 3. Turf quality and coverage of 'Zenith' zoysiagrass in 2000 after seeding into an existing perennial ryegrass canopy in June, 2000.

	Quality[1]								Coverage (%)	
	June		July		August		September		October	
Treatment	Water/rye	Water/zoy	Water/rye	Water/zoy	Water/rye	Water/zoy	Water/rye	Water/zoy	Water/rye	Water/zoy
Control	8.3 a[2]	8.8 a	6.7 a	6.6 a	4.8 a	4.6 a	4.1 b	2.9 ab	1 b	0 c
Roundup	1.0 c	1.0 c	1.2 b	1.2 b	3.0 b	2.7 b	5.4 a	3.9 a	84 a	84 a
Scalped	3.0 b	3.0 b	2.6 b	2.7 b	2.6 b	2.7 b	3.5 b	1.9 b	9 b	7 b
LSD (p = 0.05)	0.5	0.7	1.4	1.7	1	1.2	1	1.3	22	2

[1]Quality rated on a scale of 0 - 9 with 9 = best.
[2]Means within individual columns not followed by the same letter are significantly different.

TITLE: Converting Transition Zone Fairways from Perennial Ryegrass to Kentucky Bluegrass

OBJECTIVE: Evaluate strategies for effectiveness in converting established perennial ryegrass fairway turf to Kentucky bluegrass

PERSONNEL: Robb Kraft and Steve Keeley

INTRODUCTION:

Perennial ryegrass is used for golf course fairways and tees throughout cool regions of the United States. However, maintaining perennial ryegrass in the transition zone has become too costly for many golf courses. Multiple fungicide applications through the summer months are usually required to prevent outbreaks of brown patch and pythium blight. In recent years, fear of gray leaf spot epidemics has led superintendents to make preventive late-summer and early-fall fungicide applications. It is not unusual for courses to spend more than $20,000 annually on fungicide applications to ryegrass fairways and tees.

Research at K-State over the past few years has shown that some new Kentucky bluegrass cultivars may provide a viable alternative to perennial ryegrass. Data collected from the Kentucky bluegrass cultivar trial, sponsored by the National Turfgrass Evaluation Program, has shown that there is great diversity among cultivars in performance at close mowing heights. As a result, we have identified a few top performing varieties well suited for use under fairway conditions in our climate, including 'America', 'Apollo', 'Brilliant', 'Showcase', and 'Unique'.

Conversion to Kentucky bluegrass would be most easily accomplished by closing the golf course temporarily to allow grow-in on ryegrass fairways previously treated with Roundup. However, the potential revenue loss and golfer dissatisfaction resulting from a closure dictates that superintendents consider establishing Kentucky bluegrass into existing ryegrass stands. The focus of this project was to study the logistics for accomplishing this conversion.

METHODS:

Study I

Primo application (1.5 qt/acre), Roundup application (3 qt/acre), scalping (once, at 0.25 inch), and core-aeration were evaluated, alone and in combination, for their effects on Kentucky bluegrass establishment in an existing perennial ryegrass stand. All treatments were applied prior to seeding. Treatments were as follows:

1) Primo
2) Scalping
3) Core-aeration
4) Primo + Scalping
5) Primo + Core-aeration
6) Scalping + Core-aeration
7) Primo + Scalping + Core-aeration
8) Roundup
9) Untreated (control)

The study was established in mid-September 1999. Plots measured 4 by 8 ft and were arranged in a randomized complete block design with three replications. Prior to seeding, the entire area was verticut to encourage seed to soil contact. Kentucky bluegrass (cv. Unique) was seeded at 2 lb PLS/1000 ft^2. The seedbed was kept moist until Kentucky bluegrass seedlings were well-established. Normal mowing was continued to simulate a fairway in play.

In 2000, the study area was mowed three times weekly at 9/16 inch. Irrigation was applied as needed to prevent dormancy. No fungicides were applied. Percent Kentucky bluegrass was evaluated in the spring and fall, using a grid method that uses plant species counts at grid intersections to determine coverage.

Study II

This experiment was established in mid-September 2000, as a strip-split-plot design. Whole plots were pre-seeding chemical treatment (None or Embark Lite at 2.5 qt/acre). Subplots were Kentucky bluegrass (cv. Unique) seeding rate, and timing (2 or 4 lb PLS/1000 ft^2, and fall-only or fall+spring). Check plots were treated with Roundup (3 qt/acre) to kill all existing vegetation and then seeded at either 2 or 4 lb PLS/1000 ft^2. Prior to seeding, the entire study area was core-aerated and vertical mowed to enhance seed to soil contact.

After seeding, a scalping treatment was imposed in strips across the whole plots. The treatment consisted of scalping twice weekly at 0.25 inch until Kentucky bluegrass seedlings grew above 0.25 inch.

The seedbed was kept moist until Kentucky bluegrass seedlings were well-established. The study was maintained like a typical fairway. Percent Kentucky bluegrass was evaluated in March 2001, before the spring seeding treatments were applied, and will be evaluated again in the fall of 2001. Measurements were made with a grid method that uses plant species counts at grid intersections. Visual quality was also evaluated following seeding and will continue to be evaluated through the growing season.

RESULTS:

Study I

Pre-plant Roundup was the only treatment that resulted in significant Kentucky bluegrass coverage one year after establishment. Roundup-treated plots consisted of greater than 98% Kentucky bluegrass. No other treatment or treatment combination resulted in greater than 3.6% Kentucky bluegrass. Statistical analysis showed that only the Roundup treatment was significantly different from the untreated check. When Roundup is not used, a more aggressive approach may be needed.

Study II

Embark Lite prior to seeding produced the highest percentage of Kentucky bluegrass (15.2%) six months after seeding. Next best treatments were the high seeding rate (4 lb/1000 ft^2) and post-seeding scalping. When post-seeding scalping was not used, no treatment combination resulted in more than 3% Kentucky bluegrass (Table 1). When the high seeding rate was not used, no treatment combination resulted in more than 5.2% Kentucky bluegrass.

For comparison purposes, check plots that had been treated with Roundup prior to seeding averaged 77% Kentucky bluegrass cover when seeded at the low rate (2 lb/1000 ft^2), and 86% at the high rate.

Contrasts revealed that post-seeding scalping and a high seeding rate were the most important factors in enhancing Kentucky bluegrass establishment into an existing perennial ryegrass turf. The scalping treatment did result in a significant reduction in visual quality compared with non-scalped plots. However, this reduction would be temporary.

We will continue to evaluate the composition of the stand following a second seeding treatment in the spring of 2001.

Table 1. Percent Kentucky bluegrass in the spring following a fall seeding into an existing perennial ryegrass fairway turf.

		% Kentucky Bluegrass	
Seeding Rate (lbs PLS/1000 ft^2)	PGR Pre-treatment	Scalped†	Not Scalped
2	none	3.5	1.0
4	none	8.5	2.9
2	Embark Lite	5.2	1.5
4	Embark Lite	15.2	2.9
	LSD(0.05):	8.2	NS

Contrasts:	Significance
Scalped vs. Not Scalped	(((
2 lb seeding rate vs. 4 lb seeding rate	(((
Embark Lite vs. No PGR	(

† Following seeding, the plots were scalped twice weekly at 1/4 inch, until Kentucky bluegrass seedlings were greater than 1/4 inch tall.
(Significant at p=0.05
(((Significant at p=0.001

TITLE: Creeping Bentgrass Disease Incidence After Application of a Plant Defense Activator and Biostimulants

PERSONNEL: Joon Lee, Jack Fry, and Ned Tisserat

SPONSORS: Kansas Turfgrass Foundation, Green Releaf, Plant Health Care, Roots, PBI Gordon, Sustane, Grigg Bros., Harmony Products

INTRODUCTION:

Fungicides are used routinely, often on a preventive schedule, to suppress dollar spot and brown patch on creeping bentgrass greens. As environmental stewards, golf course superintendents are interested in identifying ways to reduce fungicide use. It has been suggested that some biostimulants have the potential to reduce disease incidence on creeping bentgrass greens. Our objective was to evaluate a plant defense activator and several biostimulants for their effects on dollar spot and brown patch.

MATERIALS AND METHODS:

The study was done on a blend of 'Crenshaw' and 'Cato' creeping bentgrass at the Rocky Ford Turfgrass Research Center, Manhattan, KS, on a sand-based green. Turf was mowed six days weekly at 5/32 inch. Irrigation was applied to deliver approximately 0.2 inch daily. A 20-0-10 Scott's fertilizer was applied to the entire study area, except plots treated with Harmony organic fertilizer, at 1 lb N/1000 ft^2 in April, May, September, and October; 0.5 lbs N/1000 ft^2 was applied in June, July, and August.

Study design was a split-plot. Whole plots were treated, which was application of a plant defense activator (acibenzolar-S-methyl (Syngenta Actigard ™)) at 1 oz/acre in 2 gallons/1000 ft^2, and untreated. The plant activator induces systemic acquired resistance in plants, thereby increasing the protection against diseases. Whole plots measured 14 by 21 ft. Sub-plots were the biostimulant treatments and measured 3 by 7 ft. Biostimulants were applied according to label directions, and included:

1. Harmony organic fertilizer (7-2-5 with 4% Fe) derived from biosolids, urea, methylene urea, ammonium sulfate, diammonium phosphate, sulfate of potash, iron oxide, ferrous sulfate, copper sulfate, manganese sulfate, seaweed extracts, and humic acid. Rate = same as Scotts 20-0-10 outlined above.

2. Urea (46-0-0): Rate = 0.1 lb N/1000 ft^2 every 2 weeks.

3. Roots 1>2>3 premix with bacillus complex: soil enhancing microbes with 1.4% K_2O, 2.0%, P_2O_5, 2.2% chelated iron. Rate = Premix at 6 oz of product/1000 ft^2 Bacillus complex added to the tank mix at 1.5 oz of product/1000 ft^2 every 2 weeks.

4. Roots 1>2>3 premix with Standup: applied at 6 oz of product/1000 ft^2. Standup added to the tank mix to apply 6 oz product/1000 ft^2 every 2 weeks.

5. Aminoplex: N-3%, fermentation products-45%, natural plant and organic extracts-21% and inert material-31%. Rate = 3 oz/1000 ft^2 every 2 weeks.

6. Colonize T&O: applied at a rate of 0.01 lb/1000 ft^2 every 2 weeks.

7. Compete Plus : a dry, water dispersible soil inoculant that contains numerous strains of beneficial rhizosphere bacteria and fungi, including selected species of *Bacillus*, *Streptomyces*, and *Pseudomonas* bacteria and *Trichoderma* fungi. Rate = 0.04 lb/1000 ft^2 every 2 weeks.

8. Flexx (3-0-20): humic and fulvic acids derived from solubilized leonardite, cold water sea kelp extract, *Ascophylum nodosum*, amino acids, 18 vitamins, and soluble Yucca plant extract. Rate = 0.16 lb/1000 ft^2 every 2 weeks.

9. Turf Vigor (9-3-6): applied at a rate of 18 oz/1000 ft^2 every 2 weeks. It is composed of Kelp, 9-3-6 NPK, 6 specific bacillus strains with unique phyto hormone production capabilities, and micronutrient package, including 0.1% Fe.

10. 710-132 -Microbial Fungicide. Rate = 5 oz/1000 ft^2 every 2 weeks. It is composed of Kelp, small NPK, 1 baccilli strain, and micronutrient package, including 0.1% Fe.

11. Focus Liquid: 4.8% Kelp extract, 35.4% humic/fulvic acid, 1.4% chelated iron, and 58.4% inert. Rate = 8 oz/1000 ft^2 in Mar-Apr, May-June (5/12), July-Aug (7/7), Sept.-Oct (9/15).

12. Focus 15G: 7% N (urea), 5.3% humic/fulvic acid, 0.7% kelp extract, 0.17% organo-modified siloxane surfactant, and 0.04% iron derived from EDTA. Applied at 4 lb/1000 ft^2 in early spring (5/12), mid-summer (7/7), and early fall (10/13).

13. Launch: 74.3% manure extract, 1.2% kelp (*Ascophyllum nodosum*) extract, 9% humic/fulvic acid, 0.35% chelated iron and 15.15% inerts. Applied every 4 weeks at 32 fl. oz/1000 ft^2

14. Bolster: 2.0% Sulfur, 5.0% Iron, plant food sources derived from ferrous sulfate, 2.0% solubilized seaweed, and 4.0% humic acids from leonardite. Applied at 3.0 oz/1000 ft^2 every 2 weeks.

Data were collected weekly on turf quality, dollar spot number, and brown patch. Turf quality was rated visually on a 0 to 9 scale where 0 = dead turf; 7 = acceptable quality for a putting green; and 9 = optimum color, density, and uniformity. Dollar spot number was counted using a 27-cm diameter template randomly tossed two times per plot. Values were then converted to number of spots per square meter. Percentage of each plot infested with brown patch was rated visually using a 0 to 100% scale. Dollar spot and brown patch data were analyzed using Area Under the Disease Progress Curve (AUDPC), which allows comparison of treatments using a whole-season data summary.

RESULTS:

There was no interaction between the plant activator and biostimulants. Therefore, main effect means are presented.

Dollar Spot: The plant activator significantly reduced dollar spot compared to untreated turf (Fig. 1). Untreated turf had >1000 infection centers per square meter by mid-August. None of the biostimulants reduced dollar spot compared to the urea treatment (Table 1). Biostimulants that were statistically similar in dollar spot level to urea were Roots 1>2>3 with bacillus complex, Turf Vigor, and 710-132 Microbial Fungicide. Other biostimulants had higher AUDPC values for dollar spot than urea.

Brown Patch: Turf treated with plant activator had higher brown patch levels than untreated turf (Fig. 1). Biostimulants had no effect on brown patch (data not shown).

Turf Quality: None of the biostimulants provided acceptable quality on more than 11% of rating dates because of high dollar spot pressure (Table 2).

Table 1. Dollar spot in a Crenshaw-Cato creeping bentgrass blend as influenced by biostimulants at Manhattan, KS in 2000.

Treatment**	Spray interval (days)	Dollar spot AUDPC*
Harmony (organic fertilizer)	28	9448 de***
Urea	14	9354 e
Roots 1>2>3 premix with bacillus complex	14	10802 abcde
Roots 1>2>3 premix with standup	14	12293 a
Aminoplex	14	11976 ab
Colonize T&O	14	11603 abc
Compete Plus	14	12329 a
Flexx	14	11902 ab
Turf Vigor	14	10191 bcde
710-132 Microbial Fungicide	14	9819 cde
Focus Liquid	48	11445 abcd
Focus 15G	48	11477 abcd
Launch	28	12058 ab
Bolster	14	11619 abc

Table 2. Brown patch in a Crenshaw-Cato creeping bentgrass blend as influenced by biostimulants at Manhattan, KS in 2000.

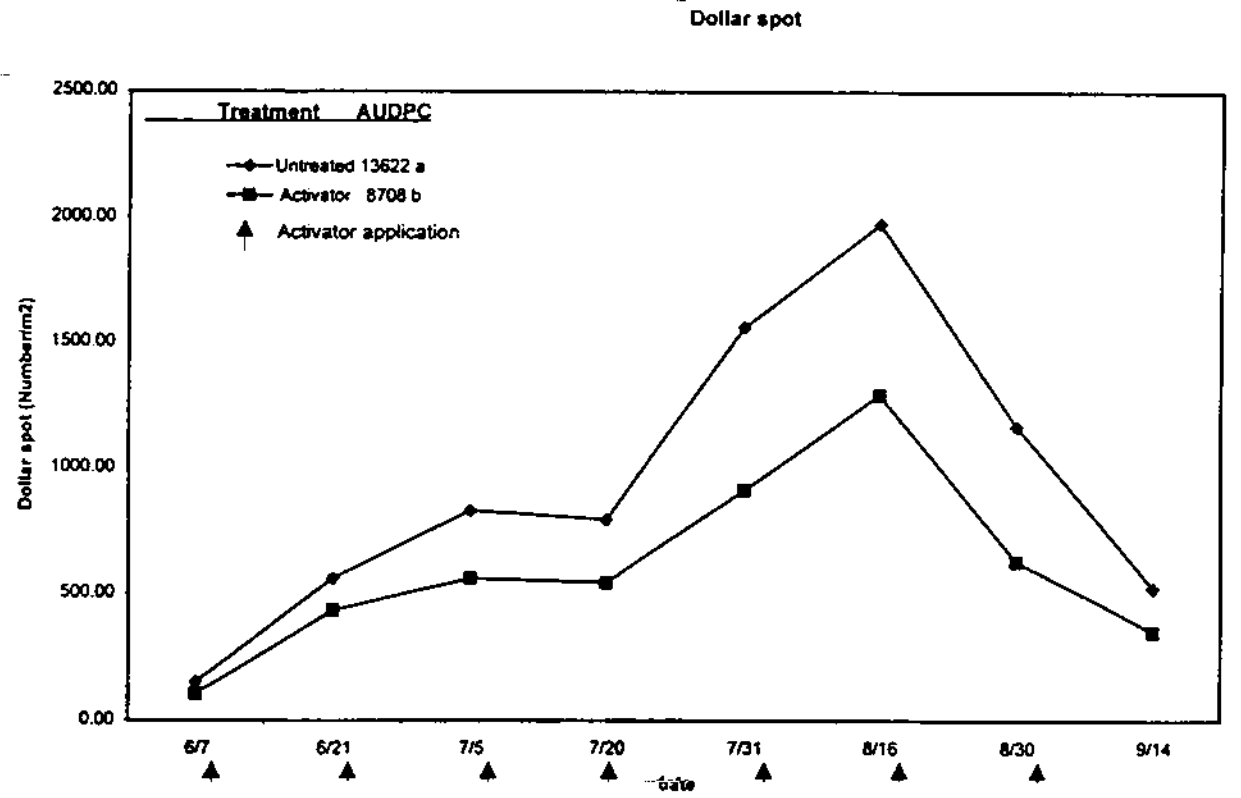
Treatment**	Spray interval (days)	Brown patch AUDPC*
Harmony (organic fertilizer)	28	133 ab
Urea (inorganic fertilizer)	14	83 ab
Roots 1>2>3 premix with bacillus complex	14	111 ab
Roots 1>2>3 premix with standup	14	86 ab
Aminoplex	14	129 a
Colonize T&O	14	94 ab
Compete Plus	14	120 ab
Flexx	14	66 ab
Turf Vigor	14	82 ab
710-132 Microbial Fungicide	14	81 ab
Focus Liquid	48	112 ab
Focus 15G	48	70 ab
Launch	28	97 b
Bolster	14	47 b

*AUDPC = area under the disease progression curve from, using days as the horizontal axis.
**All treatments were applied according to label instructions. Harmony organic fertilizer was used for routine greens fertilization. Urea was applied at 0.1 lbs N/1000 ft^2, in addition to routine fertilization described in methods.
***Means followed by the same letter are not significantly different (P=0.05)

Table 3. Quality of Crenshaw-Cato creeping bentgrass cultivar as influenced by biostimulants at Manhattan, KS in 2000.

Treatment	Rating dates with acceptable quality (%)*		
	Activator	No Activator	Total
Harmony (organic fertilizer)	2	0	1
Urea (inorganic fertilizer)	2	11	6
Roots 1>2>3 premix with bacillus complex	2	0	1
Roots 1>2>3 premix with standup	0	0	0
Aminoplex	2	0	1
Colonize T&O	2	0	1
Compete Plus	2	0	1
Flexx	2	0	1
Turf Vigor	2	0	1
710-132 Microbial Fungicide	0	0	0
Focus Liquid	2	2	2
Focus 15G	2	0	1
Launch	0	2	1
Bolster	6	0	3

*Plots were rated on 19 dates from 10 May to 26 September, 2000. Ratings represent percentage of weekly visual ratings when turf received a score of >7 on a 0 (worst) to 9 (best) scale.



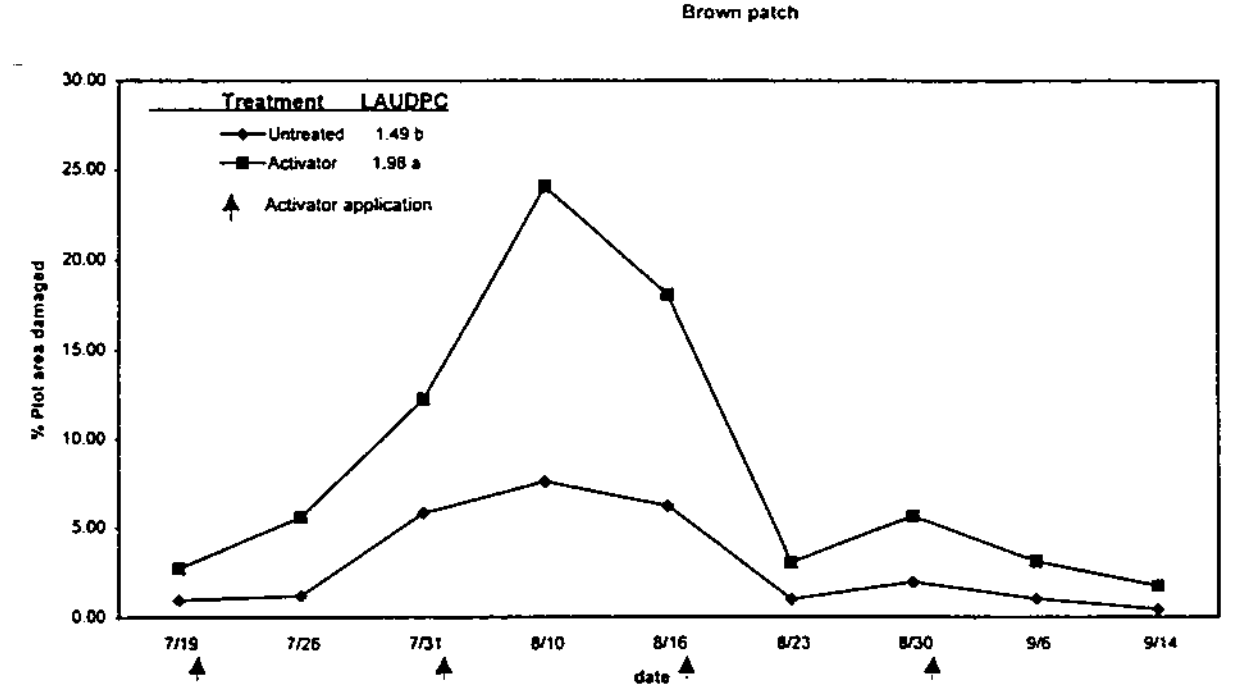


Figure 1. Influence of a plant disease activator on dollar spot and brown patch in Crenshaw-Cato creeping bentgrass. Area under the disease progress curve (AUDPC) means were significantly different ($P<0.05$) for both diseases.

TITLE: Dollar Spot and Brown Patch Incidence in Four Creeping Bentgrass Cultivars after Application of a Plant Defense Activator and Organic Fertilizers

OBJECTIVE: Evaluate disease incidence in creeping bentgrass in response to application of a defense activator and several organic fertilizers

PERSONNEL: Joon Lee, Jack Fry, and Ned Tisserat

SPONSORS: Kansas Turfgrass Foundation, Nature Safe, Roots, Sustane

INTRODUCTION:

Fungicides are used routinely, often on a preventive schedule, to suppress dollar spot and brown patch on creeping bentgrass greens. As environmental stewards, golf course superintendents are interested in identifying ways to reduce fungicide use. Research has indicated that organic fertilizers or topdressing with organic materials may suppress some diseases. Our objective was to evaluate bentgrass cultivar disease occurrence in response to application of a defense activator and several organic fertilizers.

MATERIALS AND METHODS:

The study was done at the Rocky Ford Turfgrass Research Center on a sand-based USGA green. Turf was mowed six days weekly at 5/32 inch. Irrigation was applied to deliver approximately 0.2 inch daily. Plot design was a split-strip plot. Whole plots were the bentgrass cultivars (Crenshaw, L-93, Penncross, and Providence), these plots were 24 by 7.2 ft. Subplots were the plant activator (treated or untreated) and were 24 by 3.6 ft.. Strip plots were fertilizer treatments (see Tables 1 and 2), these plots were 3.3 by 7.2 ft.

Plant activator (acibenzolar-S-methyl (Syngenta Actigard ™)) was applied at 1 oz/acre in 2 gallons of water/1000 ft^2 every 14 days. This plant activator induces systemic acquired resistance in plants, thereby increasing protection against diseases. Fertilizers were applied at 1 lb N/1000 ft^2 on 28 April, 25 May, and 29 September. Fertilizers were also applied on 22 June, 20 July, and 17 August at a rate of 0.5 lb N/1000 ft^2.

Data were collected weekly on turf quality, dollar spot number, and brown patch. Turf quality was rated visually on a 0 to 9 scale where 0 = dead turf; 7 = acceptable quality for a putting green; and 9 = optimum color, density, and uniformity. Dollar spot was counted using 27-cm diameter template randomly tossed two times per plot. Values were then converted to number of spots per square meter. Brown patch infestation was rated visually using a 0 to 100% scale. Dollar spot and brown patch data were analyzed using Area Under the Disease Progress Curve (AUDPC), which allows comparison of treatments using a whole-season data summary.

RESULTS:

Dollar spot: Data analysis indicated a disease activator x cultivar interaction and a cultivar x fertilizer interaction. Crenshaw had nearly three to four times the number of spots counted as noted on the other cultivars. The plant disease activator suppressed dollar spot in all cultivars except L-93 (Fig. 1). Greatest suppression occurred during August when dollar spot numbers were highest.

Dollar spot response to fertilizer applications also varied across cultivars. In Crenshaw, turf treated with Nature Safe products had higher dollar spot numbers than turf treated with urea. Turf treated with Roots had less dollar spot than urea-treated turf (Table 1). No fertilizer effect was observed for dollar spot in L-93. In Penncross, turf treated with Sustane had higher dollar spot numbers than that treated with urea. In Providence, Nature Safe (8-3-5) treated turf had higher dollar spot numbers than urea-treated turf.

Brown Patch: No organic fertilizer x cultivar interaction was noted. The plant disease activator had no effect on brown patch levels (data not presented). None of the fertilizer treatments reduced brown patch when compared to the urea treatment (Table 2). In Crenshaw, Milorganite, Nature Safe (8-3-5), and Sustane (10-1-2) all had a higher AUDPC value for brown patch than the urea treatment. In L-93, Sustane (5-2-4) had a higher brown patch level than urea-treated turf. No differences were observed among fertilizer treatments in Penncross. In Providence, turf treated with Milorganite or Roots Turf Food had higher brown patch levels than turf treated with urea.

Turf Quality: L-93 had the greatest percentage of rating dates with acceptable quality, but ratings were less than acceptable on at least 70% of rating dates regardless of fertilzer treatment (Table 3). All other cultivars exhibited unacceptable quality on at least 82% of rating dates regardless of fertilizer treatment.

Table 1. Dollar spot in four creeping bentgrass cultivars as influenced by nitrogen source at Manhattan, KS in 2000.

		AUDPC*			
Nitrogen source	Analysis	Crenshaw	L-93	Penncross	Providence
Milorganize	6-2-0	10093 c**	692 a	1832 ab	1117 abc
Nature Safe	8-3-5	12507 a	1308 a	1719 ab	2737 a
Nature Safe	10-2-8	11415 b	1207 a	1868 ab	1191 abc
Roots Turf Food	15-3-8	10117 c	1173 a	1818 ab	1585 c
Sustaine	10-1-2	8918 d	1119 a	2446 a	2027 abc
Sustane with Iron	5-2-4	10481 c	1366 a	2325 ab	2344 ab
Urea	46-0-0	10072 c	1238 a	1668 b	1758 bc

*AUDPC = area under the disease progression curve, using days as the horizontal axis.
**Means followed by the same letter are not significantly different ($P<0.05$)

Table 2. Brown patch in four creeping bentgrass cultivars as influenced by nitrogen source at Manhattan, KS in 2000.

		AUDPC*			
Nitrogen source	Analysis	Crenshaw	L-93	Penncross	Providence
Milorganite	6-2-0	62 a	29 b	42 a	94 a
Nature Safe	8-3-5	51 a	52 b	42 a	34 b
Nature Safe	10-2-8	33 ab	39 b	33 a	35 b
Roots Turf Food	15-3-8	32 ab	42 b	18 a	67 a
Sustane	10-1-2	59 a	31 b	26 a	33 b
Sustane with Iron	5-2-4	38 ab	90 a	44 a	34 b
Urea	46-0-0	17 b	42 b	20 a	22 b

*AUDPC = area under the disease progression curve, using days as the horizontal axis.
**Means followed by the same letter are not significantly different (P<0.05).

Table 3. Quality of four creeping bentgrass cultivars at Manhattan, KS in 2000.

		Rating dates with acceptable quality (%)*			
Nitrogen source	Analysis	Crenshaw	L-93	Penncross	Providence
Milorganite	6-2-0	0	8	2	1
Nature Safe	8-3-5	0	16	3	4
Nature Safe	10-2-8	0	18	5	6
Roots Turf Food	15-3-8	0	30	13	11
Sustane	10-1-2	5	16	1	5
Sustane with iron	5-2-4	0	19	4	4
Urea	46-0-0	0	31	18	18

*Plots were rated on 19 dates from 10 May to 26 September, 2000. Ratings represent percentage of weekly visual ratings when turf received a score of >=7 on a 0 (worst) to 9 (best scale).

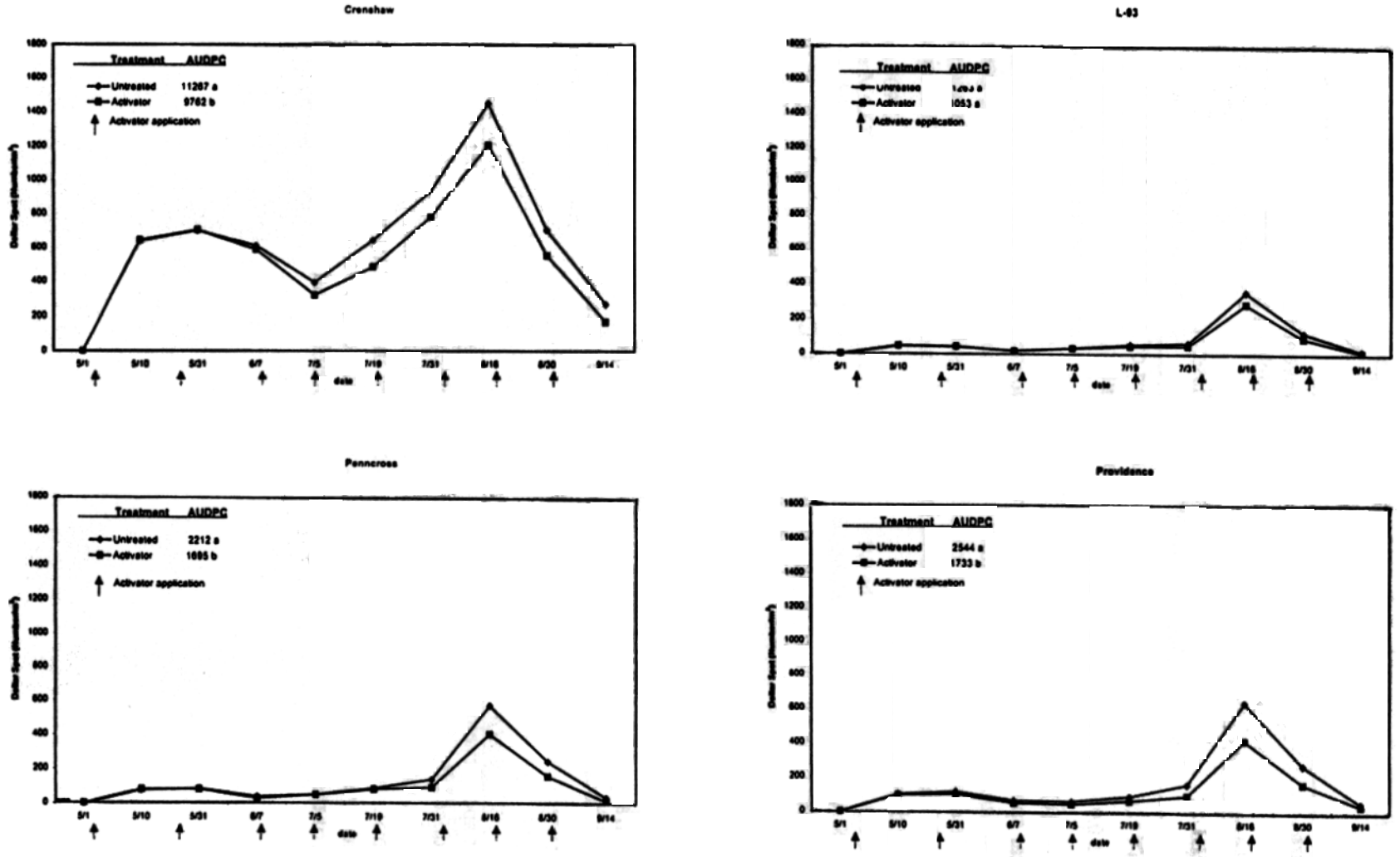


Figure 1. Influence of a plant defense activator on dollar spot numbers in four creeping bentgrass cultivars. Area under the disease progress curve (AUDPC) means were significantly different ($P<0.05$) for all cultivars except L-93.

TITLE: Preventive Fungicide Applications for Control of Brown Patch and Dollar Spot of Creeping Bentgrass

OBJECTIVE: To evaluate the effectiveness of preventive fungicide applications for the control of dollar spot and brown patch on bentgrass

PERSONNEL: Derek Settle, Jack Fry, and Ned Tisserat

SPONSORS: Kansas Turfgrass Foundation, Heart of America Golf Course Superintendents Association, Aventis , Syngenta, BASF, Rohm & Haas

INTRODUCTION:

Dollar spot caused by the fungus *Sclerotinia homoeocarpa*, and brown patch caused by *Rhizoctonia solani*, are the two most common diseases on creeping bentgrass putting greens in Kansas. These diseases are usually controlled by regularly scheduled preventive fungicide applications. In this study, we evaluated various fungicide combinations for their effectiveness in suppressing these diseases.

MATERIALS AND METHODS:

Fungicides were evaluated on an established stand of 'Cobra' creeping bentgrass on a sand-based putting green at the Rocky Ford Turf Research Center, Manhattan, KS. The turf was mowed to a height of 0.16 inch, irrigated as needed, and fertilized with 4 lb N/1000 ft^2 annually. Applications were made at 2- or 4-week intervals beginning 7 May and continued through Aug. Fungicides were applied with a CO_2-powered backpack sprayer with 8003 TeeJet nozzles at 20 psi in water equivalent to 2.7 gal/1000 ft^2. Plots were not irrigated after applications. Plots were 5 by 6 ft and arranged in a randomized complete-block design with three replications. Plots were rated for the number of dollar spot infection centers and the percentage plot area damaged by brown patch.

RESULTS:

Dollar spot developed in mid-May and continued throughout the summer. All fungicide treatments reduced the area under the disease progress curve (AUDPC) for dollar spot compared to the untreated control. However, Fore Rainshield did not provide aesthetically acceptable levels of control. A single brown patch epidemic occurred in early August and was controlled by all fungicide treatments. Plots treated with Daconil Ultrex exhibited a dark green to brown discoloration of the leaves from mid-August through September and resulted in unacceptable turf quality.

Table 1. Dollar spot and brown patch incidence as affected by preventive fungicide application Manhattan, KS, 2000.

	Spray interval (days)	Dollar spot (number infection centers/plot)					Brown patch (% plot area blighted)
		22 May	12 Jun	7 Aug	21 Aug	AUDPC*	4 Aug
No fungicide	-	96.8 a	111.0 a	262.5 a	337.5 a	1871 a	15.0 a
Chipco 26GT 2SC 4 fl oz	14	3.3 d	0.3 d	1.5 c	0.0 d	9 d	0.0 b
Daconil Ultrex 82.5DG 3.2 oz	14	29.5 bc	17.3 cd	53.8 b	7.0 cd	180 cd	0.0 b
Daconil Ultrex 82.5DG 3.2 oz + Heritage 50DG 0.2 oz	14	17.5 cd	6.0 cd	15.8 c	3.0 d	58 d	0.0 b
Daconil Ultrex 82.5DG 3.2 oz + Heritage 50DG 0.4 oz	14 28	22.8 bcd	7.5 cd	47.8 b	25.7 cd	178 cd	0.0 b
Compass 50WG 0.15 oz + Banner MAXX 1.2MEC 1.0 fl oz	14	9.9 cd	0.5 d	0.0 c	0.0 d	9 d	0.0 b
Compass 50WG 0.15 oz + Banner MAXX 1.2MEC 1.0 fl oz	21	17.5 cd	7.0 cd	3.5 c	0.0 d	42 d	0.0 b
BAS 505 50WG 0.2 oz	14	12.0 cd	0.0 d	0.0 c	0.0 d	7 d	0.0 b
Eagle 40WP 0.6 oz	14	24.5 bcd	5.8 cd	0.0 c	0.0 d	31 d	0.0 b
Eagle 40WP 1.2 oz	28	18.5 bcd	8.5 cd	3.0 c	0.0 d	50 d	0.0 b
RH-0611 62.2W 10 oz	14	42.8 b	20.0 cd	0.0 c	0.0 c	92 d	0.0 b
Fore Rainshield 80W 8 oz	14	14.0 cd	24.3 c	56.0 b	39.5 c	351 bc	0.0 b
Fore Rainshield 80 W 6 oz	14	21.0 bcd	52.0 b	63.0 b	77.5 b	580 b	0.0 b

*Area under disease progress curves (AUPDC) from 22 May through 31 Sep. Means not followed by the same letter within the same column are significantly different (P=0.05) by Fisher's LSD.

TITLE: Granular Fungicide Applications for the Control of Brown Patch on Tall Fescue

OBJECTIVE: To evaluate the effectiveness of granular preventive fungicide applications for the control brown patch on tall fescue

PERSONNEL: Derek Settle, Jack Fry and Ned Tisserat

SPONSORS: Kansas Turfgrass Foundation, Scotts Corp., Syngenta, Bayer,

INTRODUCTION:

Brown patch caused by *Rhizoctonia solani* is the most common disease of tall fescue in Kansas. This disease can be suppressed by preventive applications of certain fungicides at 4- to 5-week intervals. Current products are dry flowable or wettable powder formulations that must be mixed with water and applied by a sprayer. In this study, we compared the effectiveness of several granular formulations to Heritage, which is the currently recommended product.

MATERIALS AND METHODS:

Fungicides were evaluated on an established stand of tall fescue at the Rocky Ford Turf Research Center, Manhattan, KS. Soil was a Chase silt loam. Turf was mowed weekly to a height of 3.5 in., irrigated as needed and fertilized annually with 6 lb N/1000 ft^2. Granular fungicides were applied with a hand-held shaker. Plots were irrigated with 0.4 in. water within 24 h after application. Granular fungicides were compared to standard foliar treatments of Heritage 50DG applied with a CO_2-powered backpack sprayer with 8003 TeeJet nozzles at 20 psi in water equivalent to 1.9 gal/1000 ft^2. All fungicide applications were made at monthly intervals on 6 June, 6 July, and 3 August. Plots were 7 by 10 ft and arranged in a randomized complete block design with four replications. Plots were rated weekly for the percentage plot area blighted (foliar necrosis).

RESULTS:

Conditions during the summer were extremely hot, and brown patch severity was moderate to severe. Three monthly applications of Heritage 50DG at both rates provided almost complete suppression of brown patch through the summer. The granular product S 8323 also provided control equal to the foliar applications of Heritage. None of the other granular products resulted in acceptable levels of control. Pythium blight, caused by *Pythium aphanidermatum*, was observed in some of the fungicide-treated plots in August, but it resulted in minimal damage (<1% plot area blighted).

Table 1. Comparison of granular fungicide with standard foliar treatment for prevention of brown patch, Manhattan, KS, 2000.

Treatment and rate/1000 ft^2	% plot area blighted*				AUDPC**
	15 Jul	31 Jul	7 Aug	14 Aug	
Control	47.9 a	45.0 ab	42.5 ab	50.0 ab	381 ab
Heritage 50 DG 0.2 oz	0.0 b	0.0 c	0.0 c	2.5 d	3 c
Heritage 50 DG 0.4 oz	0.0 b	0.0 c	0.0 c	0.0 d	1 c
S 8323 0.25G 2.5 lb	8.7 b	1.3 c	2.5 c	5.0 d	58 c
S 8323 0.25G 5.0 lb	1.3 b	0.3 c	0.0 c	0.0 d	10 c
S 4693 2.3G 2.7 lb	30.0 a	50.0 a	57.5 a	52.5 a	398 a
S 7511 0.39G 4.0 lb	38.8 a	31.2 b	33.8 b	32.5 bc	289 ab
S 7511 0.39G 8.0 lb	30.0 a	35.0 ab	32.8 b	35.0 abc	293 ab
Bayleton 0.5G 6.0 lb	37.5 a	32.5 b	32.5 b	30.0 c	276 b
Safe-T Green 0.7G 7.0 lb	41.3 a	38.8 ab	45.0 ab	40.0 abc	330 ab

*Mean percentage plot area damaged by brown patch. Means not followed by the same letter in the same column are significantly different (P = 0.05) by Fisher's LSD.

**Area under disease progress curve based on 13 dates from 21 Jun through 31 Aug.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service, Manhattan 66506

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