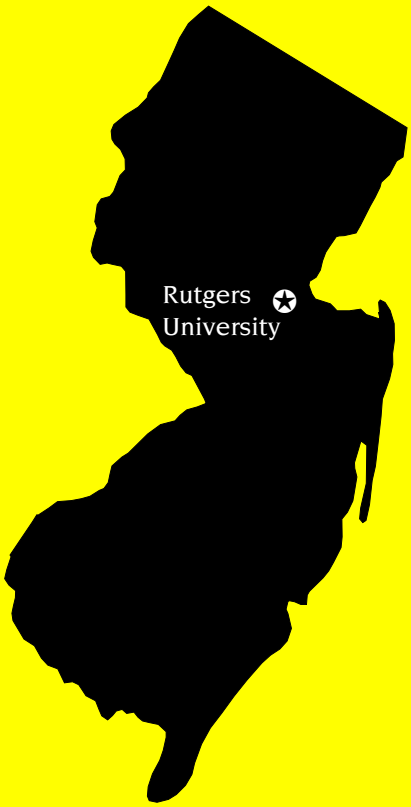
2001
RUTGERS
Turfgrass Proceedings



THE NEW JERSEY TURFGRASS ASSOCIATION

In Cooperation With

RUTGERS COOPERATIVE EXTENSION
NEW JERSEY AGRICULTURAL EXPERIMENT STATION
RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY
NEW BRUNSWICK

2001 RUTGERS TURFGRASS PROCEEDINGS

of the

New Jersey Turfgrass Expo
December 11-13, 2001
Trump Taj Mahal
Atlantic City, New Jersey

The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, Cook College, Rutgers, The State University of New Jersey in cooperation with the New Jersey Turfgrass Association. The purpose of this document is to provide a forum for the dissemination of information and the exchange of ideas and knowledge. The proceedings provide turfgrass managers, research scientists, extension specialists, and industry personnel with opportunities to communicate with co-workers. Through this forum, these professionals also reach a more general audience, which includes the public.

This publication includes lecture notes of papers presented at the 2001 New Jersey Turfgrass Expo. Publication of these lectures provides a readily available source of information covering a wide range of topics and includes technical and popular presentations of importance to the turfgrass industry.

This proceedings also includes research papers that contain original research findings and reviews of selected subjects in turfgrass science. These papers are presented primarily to facilitate the timely dissemination of original turfgrass research for use by the turfgrass industry.

Special thanks are given to those who have submitted papers for this proceedings, to the New Jersey Turfgrass Association for financial assistance, and to those individuals who have provided support to the Rutgers Turfgrass Research Program at Cook College, Rutgers, The State University of New Jersey.

Dr. Ann Brooks Gould, Editor
Dr. Bruce B. Clarke, Coordinator

PERFORMANCE OF TALL FESCUE CULTIVARS AND SELECTIONS IN NEW JERSEY TURF TRIALS

Eric Watkins, William A. Meyer, James A. Murphy, Stacy A. Bonos, Melissa M. Mohr, Ronald F. Bara, Dirk A. Smith, and William K. Dickson[1]

Tall fescue (*Festuca arundinacea*) is a cool-season grass that is widely used as both a forage and turfgrass in many areas of the United States. Significant improvements in turf quality, disease resistance, and heat and drought tolerance have caused tall fescue to become a popular turfgrass species. The ability to perform well under low soil moisture conditions has made tall fescue an attractive option for turf managers in many situations. Other cool-season turfgrasses lack the ability to perform as well as tall fescue under conditions of high temperature and drought. Although tall fescue is known to have good drought tolerance, it will not survive drought conditions unless adequate soil moisture conditions exist prior to the stress, allowing the plant to produce a deep and extensive root system that can extract water from the lower portions of the soil profile.

Tall fescue was first introduced into the United States in the nineteenth century as a forage grass. The first tall fescue cultivars to be used as turfgrass (Kentucky-31 and Alta) were introduced in the early 1940s. These cultivars, along with the forage cultivar Fawn, have poor turfgrass quality, coarse leaf texture, light-green color, rapid vertical growth, and low shoot density. Kentucky-31 seed is still sold in large quantities, despite the great improvements that have been made in the most recently developed tall fescue cultivars, because it is very inexpensive to produce.

Plant breeders have focused their efforts on producing tall fescue cultivars that exhibit darker green color, lower growth habit, higher shoot density, finer leaf texture, and increased resistance to disease. Many of the improved tall fescue cultivars are comparable to other cool-season turfgrass species in terms of turf quality at mowing heights of 1.5 inches and higher. Recent tall fescue releases can now be used effectively for a number of medium-high maintenance situations including athletic fields, parks, and home lawns. In addition, tall fescue is quite effective in low maintenance situations such as roadsides and industrial sites.

Currently, a great amount of research is being done on the beneficial role of endophytes in tall fescue. Endophytic fungi can live in tall fescue plants and have been shown to enhance drought tolerance and insect resistance. The development of cultivars that contain beneficial endophytes may lead to many more uses for tall fescue as a turfgrass. Plant collection trips are being made around the world in an effort to obtain new sources of endophytes and turfgrass germplasm. By diversifying the pool of available endophytes, plant breeders may be able to find endophytes that will enhance resistance to insects and diseases previously unaffected by endophytes.

PROCEDURES

Four tall fescue tests were established in New Jersey between 1997 and 2000. A single test was established each year at Adelphia (Tables 1 to 4). All tests were established in August or September by hand sowing 0.88 oz of seed per 3 X 5 ft plot (3.7 lb/1000 ft^2). A 6-inch border was left unseeded around each plot to reduce contamination between the plots. Each entry was replicated three times in a randomized complete block design. The tests were managed under different nitrogen and mowing regimes (Table 5), and all tests were mowed with a reel mower with clippings returned. The mowing of the plots was frequent enough to prevent excessive clipping accumulation. Soil pH was kept between 6.0 and 6.5 with agricultural limestone. Broadleaf weeds were controlled with spring or fall applications of 2,4-D + Dicamba, and Bensulide was used as a preemergent

[1]Graduate Assistant, Research Professor, Associate Extension Specialist in Turfgrass Management, Assistant Professor, Soils and Plants Technician, Principal Laboratory Technician, Principal Laboratory Technician, and Turfgrass Research Farm Supervisor, respectively, New Jersey Agricultural Experiment Station, Cook College, Rutgers, The State University of New Jersey, New Brunswick, NJ 08901-8520.

control of annual grassy weeds. A late summer application of Dimension was made for *Poa annua* control.

The tests were maintained at low to medium fertility levels and 1.5-inch mowing heights. During the summer, fertilizer applications were timed to encourage disease and insect problems.

All tests were evaluated for turf quality throughout the growing season. Turf quality ratings take into consideration color, density, leaf texture, growth habit, uniformity, and disease or insect damage. When possible, the plots were also rated for individual characteristics such as resistance to diseases (especially brown patch), establishment, seedling emergence, drought stress, and spring green-up. Rating was done visually using a 1 to 9 scale, where 9 represented the best turf quality or most desirable turf characteristic.

The 2000 test at Adelphia (Table 4) was inoculated with *Rhizoctonia solani* (the cause of the disease brown patch) in July. The 1999 test (Table 3) was also inoculated the previous summer. The purpose of these inoculations was to create intense, uniform disease pressure throughout the tests.

RESULTS AND DISCUSSION

Results of the tall fescue tests can be found in Tables 1 through 4. Tests in Tables 1 to 3 are ranked by the overall (multiple-year) turf quality averages. The test in Table 4 is ranked by the 2001 turf quality average. Rankings based strictly on turf quality do not necessarily reflect the performance of cultivars for individual characteristics such as color, disease resistance, establishment, etc. A cultivar may have excellent color and superior turf density resulting in an attractive turf in the spring and early summer; however, this same cultivar may be quite unattractive in the late summer due to damage caused by brown patch disease. Turf managers should pay close attention to all available data and not rely strictly on the overall turf quality average when comparing cultivars.

Turf Quality

Since the first turf-type tall fescues were developed, great improvements have been made in overall turf quality. The early forage cultivars, such as Kentucky-31, consistently rank near the bottom of the tests in regard to turf quality. Tall fescue breeding is currently improving turf quality at a brisk pace. A given cultivar may rank very high in one test, while it ranks quite low in a test seeded just two or three years later; therefore, turfgrass managers should continually research all available data.

Disease Resistance

The major disease of tall fescue is brown patch. As can be seen in Table 4, brown patch resistance in commercially available cultivars is inadequate. There are currently no turf-type tall fescue cultivars with complete resistance to brown patch, and if the proper conditions exist, all available cultivars will sustain damage from the disease. The inoculation of the 2000 test was quite successful (Table 4). Significant differences existed between cultivars, with every plot in the test showing some disease.

The intense disease pressure that occurred in the 2000 test can improve the selection of resistant germplasm and may aid in the development of tall fescue cultivars with exceptional brown patch resistance. Dense turf produces a microenvironment more favorable to brown patch. At Rutgers, the focus of tall fescue breeding has shifted from selecting extremely dense types to selecting germplasm that exhibits a slightly more open canopy. This type of tall fescue cultivar is described as being 'semi-dwarf.' Our research and observations have shown that semi-dwarf tall fescues will often out-perform 'dwarf' tall fescues over an extended period of time. Although these open-type selections may not have the optimum density for some turf functions, the anticipated reduction in brown patch severity may greatly enhance summer turf quality.

In New Jersey, most improved tall fescue cultivars are able to recover fully from brown patch soon after the disease subsides; therefore, treating for the disease may not be needed in most situations.

Color

One of the most noticeable aesthetic qualities of turfgrass is color. Breeding efforts over the past few decades have focused on the development of tall fescue cultivars that exhibit a darker green color. The dark green color of newer cultivars is reflected in the overall quality ratings in each of the tables. Much of the recent improvement that has been made in newer cultivars such as Bingo, SR 8250, and Finesse can be attributed to a change in color from medium green (i.e. Rebel Jr. and Jaguar 3) to dark green. Depending on the situation, fall color retention may also be an important trait in tall fescue cultivar selection.

SUMMARY

As plant breeders continue to develop cultivars with improved turf quality, tall fescue is certain to be used on a much broader basis. Improvements in density, leaf texture, and color have made tall fescue a viable option in many turfgrass situations. These improvements have also made it possible for tall fescue to be used effectively in mixtures with other turfgrass species, especially Kentucky bluegrass. Tall fescue performs better than most other cool-season turfgrasses under high temperature and low moisture conditions. Endophyte-infected tall fescue cultivars are useful in certain stress situations, and will continue to be studied. The major weakness of tall fescue is susceptibility to brown patch, and the focus of breeding efforts should be to develop tall fescue cultivars with increased resistance to this disease.

ACKNOWLEDGMENTS

New Jersey Agricultural Experiment Station Publication No. E-12264-1-02. Project No. 12264, supported by the New Jersey Agricultural Experiment Station, State and Hatch Act funds, the Rutgers Center for Turfgrass Science, and other grants, and gifts. Additional support was received from the United States Golf Association and the New Jersey Turfgrass Association.

Table 1. Performance of tall fescue cultivars and selections in a turf trial seeded in September 1997 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 1998-2001 Avg.	1998 Avg.	1999 Avg.	2000 Avg.	2001 Avg.
1	Mustang 3	6.7	6.8	6.7	6.9	6.6
2	DLSD comp	6.5	6.3	7.1	6.1	6.7
3	TFC 7001	6.2	6.5	6.3	6.1	5.7
4	Bingo	6.0	5.9	5.9	5.8	6.4
5	SR 8250	6.0	6.3	5.9	5.6	6.2
6	Finesse	5.8	5.8	5.9	5.6	5.9
7	Coyote	5.6	5.8	5.2	5.8	5.4
8	Syn 5PH	5.5	5.3	5.2	5.9	5.5
9	DDL	5.5	6.1	5.3	5.4	5.1
10	Syn 5DH	5.3	5.2	5.4	5.4	5.4
11	Syn 57E	5.3	5.0	5.0	5.6	5.7
12	WX6-2000	5.3	5.2	5.6	5.7	4.8
13	Plantation	5.2	5.3	4.9	5.2	5.5
14	Twilight II	5.1	5.7	5.0	5.3	4.6
15	Millennium	5.1	5.2	4.8	5.2	5.2
16	Syn 5NRR	5.1	5.0	4.9	5.3	5.1
17	Picasso	5.1	5.4	4.9	5.3	4.7
18	5LZ	5.0	5.8	4.6	5.1	4.6
19	Shenandoah II	5.0	4.9	5.3	5.2	4.7
20	Brandy	5.0	5.4	4.7	4.9	5.1
21	Syn R5EH-97	4.9	4.9	5.0	5.2	4.5
22	Masterpiece	4.9	4.5	5.2	4.8	5.1
23	LA 38	4.9	4.8	4.8	5.3	4.6
24	Syn 5RMY	4.9	4.3	4.8	5.1	5.3
25	5DU	4.9	5.3	4.4	5.1	4.6
26	Matador	4.9	5.9	4.1	4.9	4.5
27	Jaguar 3	4.8	4.5	5.2	4.9	4.8
28	EA 40	4.8	5.1	4.7	5.0	4.5
29	Bonsai 2000	4.8	4.9	4.8	4.8	4.9
30	Laramie	4.8	5.1	4.2	5.2	4.7
31	Syn 5FH	4.8	4.3	4.6	5.2	5.1
32	Sunpro	4.8	5.3	4.5	4.7	4.6
33	R5AE	4.7	4.5	4.4	5.1	5.0
34	Syn R534-97	4.7	4.4	4.7	4.6	5.1
35	LA 46	4.7	4.7	4.5	5.3	4.3

Table 1 (continued).

	Cultivar or Selection	1998-2001 Avg.	1998 Avg.	1999 Avg.	2000 Avg.	2001 Avg.
		----------Turf Quality[1]----------				
36	Alamo	4.7	4.7	4.6	5.2	4.3
37	Endeavor	4.7	4.3	5.0	4.9	4.5
38	523-97	4.7	4.5	4.5	5.1	4.6
39	WX5-365-19	4.7	4.6	4.6	5.1	4.5
40	5HU	4.7	4.8	4.5	5.0	4.4
41	523M	4.7	4.2	4.5	5.1	4.8
42	MA 71	4.7	5.0	4.7	4.7	4.3
43	Rembrandt	4.7	4.2	5.0	4.8	4.6
44	Tar Heel	4.6	4.0	4.7	4.9	5.0
45	Bandana	4.6	4.2	4.1	5.2	5.0
46	MA 74	4.6	4.2	4.6	5.0	4.6
47	Apache II	4.6	4.9	4.4	4.8	4.2
48	5M5	4.6	4.4	4.5	4.6	4.7
49	Syn R5GR-97	4.6	4.5	4.6	4.4	4.8
50	Lion	4.6	4.0	4.5	5.2	4.6
51	Equinox	4.6	4.3	4.7	5.0	4.3
52	CIS-TF-303	4.6	5.4	4.5	4.4	4.0
53	Pixie E+	4.6	4.8	4.6	4.5	4.3
54	5 E5	4.6	4.4	4.3	4.7	4.8
55	Arid II	4.5	4.8	4.4	4.7	4.3
56	Tomahawk E+	4.5	4.1	4.5	4.6	4.9
57	Wolfpack	4.5	4.1	5.0	4.7	4.3
58	Coronado Gold	4.5	4.6	4.3	4.8	4.4
59	Syn 5TOR	4.5	4.0	4.7	4.8	4.6
60	Exp-LWE	4.5	4.3	4.9	4.6	4.2
61	Arabia	4.5	4.9	4.3	4.6	4.2
62	Bravo	4.5	4.1	4.6	4.5	4.6
63	5LMD	4.4	5.0	4.1	4.4	4.2
64	Houndog 5	4.4	4.3	4.3	4.7	4.4
65	R5AU	4.4	3.9	4.0	4.9	4.9
66	Anthem II	4.4	4.4	4.3	4.4	4.4
67	Gazelle	4.3	4.6	3.9	4.5	4.4
68	Onyx	4.3	4.7	3.9	4.5	4.2
69	Syn R5MM-97	4.3	4.1	4.3	4.7	4.1
70	Syn 5DU	4.3	4.4	3.9	4.7	4.1

Table 1 (continued).

	Cultivar or Selection	Turf Quality[1] 1998-2001 Avg.	1998 Avg.	1999 Avg.	2000 Avg.	2001 Avg.
71	CIS-TF-301	4.3	4.7	4.1	4.5	3.7
72	Syn 5R94Y	4.3	3.7	4.6	4.1	4.6
73	CIS-TF-302	4.2	4.5	4.3	4.4	3.7
74	Syn R5EL-97	4.2	4.1	4.3	4.2	4.4
75	Lancer	4.2	4.2	4.3	4.1	4.0
76	5HOE-97	4.2	4.0	4.2	4.7	3.8
77	Duster	4.1	4.5	4.1	3.9	4.1
78	Syn R5GEN-97	4.1	3.5	4.3	4.3	4.3
79	Stetson	4.1	3.5	4.1	4.3	4.3
80	Mini-Mustang	3.9	3.6	3.9	4.1	3.9
81	Debutante	3.8	3.4	3.3	4.2	4.5
82	EA 67	3.8	3.6	4.0	4.0	3.6
83	Safari	3.8	3.1	4.0	4.3	3.9
84	Tomahawk	3.8	3.5	3.6	4.2	3.7
85	Bonsai	3.7	3.4	3.7	4.0	3.6
86	Silverado	3.6	2.9	3.4	3.9	4.2
87	WX3 275	3.5	3.1	3.6	3.9	3.5
88	Crewcut	3.5	3.3	3.6	3.5	3.5
89	Coronado E+	3.5	2.8	3.5	4.0	3.5
90	Advanti	3.4	3.1	3.3	3.7	3.5
91	Crossfire II	3.4	3.2	3.6	3.5	3.2
92	Grande	3.3	2.8	3.6	3.5	3.5
93	Shenandoah	3.2	2.9	3.2	3.3	3.3
94	Crossfire	3.1	2.8	3.2	3.7	2.8
95	Amigo	2.9	2.3	3.4	2.9	3.0
96	Monarch	2.8	1.5	3.0	3.7	3.2
97	Eldorado	2.8	2.0	2.7	3.3	3.2
98	Olympic II	2.7	1.9	2.5	3.3	3.2
99	Kentucky-31	1.2	1.4	1.4	1.0	1.0
	LSD at 5% =	0.6	0.7	0.7	0.9	0.9

[1]9 = best turf quality

Table 2. Performance of tall fescue cultivars and selections in a turf trial seeded in September 1998 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 1999-2001 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Brown Patch[2] July 2001
1	DLSD	6.1	5.6	6.1	6.6	7.5
2	MS6 comp	6.1	5.9	6.5	5.9	6.0
3	Biltmore	6.1	5.8	6.2	6.2	6.5
4	MC1 comp	6.0	5.6	6.6	5.6	8.0
5	8001	5.9	5.8	6.3	5.8	7.5
6	Bingo	5.7	5.5	5.8	5.8	4.0
7	Focus	5.6	5.5	5.7	5.6	6.5
8	601 comp	5.6	5.7	5.4	5.6	7.0
9	Rembrandt	5.4	5.3	5.3	5.5	5.5
10	LRF-98-440	5.3	5.4	5.3	5.3	4.5
11	Finesse	5.3	5.2	5.3	5.3	5.5
12	SR 8250	5.2	5.1	5.5	5.1	6.0
13	Pride	5.2	5.1	5.4	5.1	5.0
14	Masterpiece	5.2	5.3	5.2	5.1	5.5
15	LRF-98-436	5.1	5.0	5.0	5.5	5.5
16	Plantation	5.1	5.1	5.1	5.1	6.0
17	LRF-98-442	5.1	5.2	5.2	4.9	5.0
18	98GA12	5.1	5.1	4.6	5.6	5.0
19	MS5 comp	5.0	5.4	4.8	4.9	4.5
20	Picasso	5.0	5.2	5.0	4.9	6.0
21	Rebel Sentry	5.0	5.5	4.8	4.7	6.0
22	LRF-98-251	5.0	5.0	4.9	5.1	6.0
23	LRF-98-441	4.9	4.6	5.0	5.3	6.5
24	MS4 comp	4.9	5.3	4.9	4.6	4.5
25	R5GR-98	4.9	5.1	4.5	5.2	5.0
26	98GA11	4.8	4.7	4.9	4.7	5.0
27	EA 96	4.7	4.3	4.5	5.3	4.5
28	Millennium	4.7	4.8	4.5	4.8	5.5
29	R5MM-98	4.7	4.8	4.8	4.4	6.5
30	EA 40	4.7	4.3	4.7	4.9	5.5
31	98GA7	4.6	4.6	4.5	4.7	4.0
32	98GA3	4.6	4.6	4.3	4.9	5.0
33	Brandy	4.6	5.0	4.1	4.6	4.5
34	MA 87	4.6	4.8	4.4	4.4	5.0
35	R5EH-98	4.5	4.8	4.3	4.4	4.5

Table 2 (continued).

	Cultivar or Selection	Turf Quality[1] 1999-2001 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Brown Patch[2] July 2001
36	Tarheel	4.5	4.4	4.5	4.5	6.0
37	Wolfpack	4.5	4.5	4.4	4.7	7.0
38	R5PCP-98	4.5	4.2	4.4	4.8	5.5
39	MA 95	4.4	4.4	4.2	4.7	5.5
40	MA 138	4.4	4.6	4.4	4.2	5.0
41	Rebel 3D	4.4	4.8	4.3	4.2	5.5
42	LA 46	4.4	3.7	4.3	5.1	5.5
43	Coronado Gold	4.4	4.2	4.4	4.5	5.5
44	MA 71	4.3	4.4	4.2	4.4	4.0
45	Laramie	4.3	5.0	4.0	4.1	4.5
46	Cochise	4.3	4.4	4.3	4.3	6.0
47	98GA10	4.3	4.5	3.8	4.6	5.5
48	MA 108	4.3	4.0	3.8	5.1	5.0
49	MA 104	4.3	3.8	4.5	4.5	4.0
50	AG-T981	4.2	4.4	4.0	4.3	2.5
51	MA 90	4.2	4.2	4.0	4.5	3.5
52	MA 74	4.2	3.8	4.4	4.3	4.0
53	Cochise II	4.2	4.7	3.8	4.0	4.0
54	MA 91	4.2	3.9	4.2	4.3	5.0
55	Rebel 2000	4.1	4.5	3.8	4.0	4.5
56	LA 107	4.1	3.8	4.1	4.4	3.5
57	Ninja	4.1	4.2	4.0	4.0	5.0
58	LA 45	4.1	3.8	4.2	4.1	5.5
59	Pixie	4.0	4.6	3.8	3.7	3.0
60	MA 98	4.0	4.1	3.9	4.0	3.5
61	AG-T982	3.9	4.2	3.7	3.9	4.0
62	LA 113	3.9	3.9	3.7	4.2	3.5
63	Rebel Jr.	3.9	4.3	3.9	3.5	3.5
64	Cortez	3.6	3.9	3.2	3.7	3.5
65	Arid	2.7	3.2	2.3	2.7	5.0
66	98GA2	2.7	2.8	2.5	2.9	4.5
67	98GA8	2.5	2.4	2.2	2.9	4.5
68	98GA4	2.5	2.4	2.3	2.7	4.5
69	Reveille[3]	2.2	1.8	2.0	2.7	3.5
70	98GA6	1.6	1.5	1.5	1.8	4.0

Table 2 (continued).

	Cultivar or Selection	Turf Quality[1] 1999-2001 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Brown Patch[2] July 2001
71	98GA5	1.6	1.5	1.5	1.6	4.5
72	98GA1	1.5	1.8	1.5	1.3	5.0
73	Kentucky-31	1.4	1.8	1.2	1.2	4.5
74	98GA9	1.3	1.4	1.3	1.1	3.5
	LSD at 5% =	0.5	0.5	0.8	0.8	2.3

[1]9 = best turf quality
[2]9 = least brown patch
[3]Texas bluegrass x Kentucky bluegrass hybrid

Table 3. Performance of tall fescue cultivars and selections in a turf trial seeded in August 1999 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 2000-2001 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Brown Patch[2] Aug. 2001
1	Signia	6.1	6.3	5.9	7.0
2	ATF 594	5.9	6.1	5.7	3.7
3	EPB comp	5.9	5.9	5.9	7.3
4	BE 3 comp	5.9	5.9	5.8	6.3
5	Pick TF 5-99	5.8	5.5	6.1	6.0
6	Rebel Exeda	5.8	5.7	5.9	7.3
7	TF 41	5.8	5.7	5.9	5.7
8	DWP	5.8	5.5	6.0	5.3
9	BE 1 comp	5.8	5.7	5.8	5.0
10	Bingo	5.8	5.9	5.6	4.7
11	ATF 629	5.7	5.7	5.7	6.0
12	BE 4 comp	5.7	5.9	5.5	7.0
13	Forte	5.7	5.7	5.6	4.3
14	TFC 7001	5.7	5.5	5.8	6.3
15	ATF 708	5.6	5.7	5.5	5.7
16	Focus	5.6	5.5	5.7	6.0
17	P58 comp	5.6	5.4	5.8	5.7
18	WAF	5.6	5.6	5.6	7.3
19	Pick RT-95	5.6	5.3	5.8	5.3
20	94 RUT TF-2	5.4	5.3	5.6	7.0
21	8001 comp	5.4	5.6	5.2	4.3
22	Picasso	5.3	5.3	5.4	5.3
23	ATF 593	5.3	5.4	5.3	5.3
24	E67 comp	5.3	5.5	5.1	6.0
25	Arid 3	5.3	5.3	5.2	5.7
26	Arabia	5.2	5.4	5.0	3.7
27	MC 1 CX	5.1	5.0	5.2	5.7
28	Masterpiece	5.1	5.0	5.3	6.3
29	Biltmore	5.1	4.7	5.5	4.7
30	ATF 703	5.1	5.1	5.1	5.0
31	DDL	5.1	5.0	5.2	5.7
32	GS Bulk M-99	5.1	5.2	5.0	4.0
33	Plantation	5.1	5.0	5.1	5.0
34	Rembrandt	5.1	4.7	5.4	6.7
35	Barrington	5.0	5.2	4.9	5.7

Table 3 (continued).

	Cultivar or Selection	Turf Quality[1] 2000-2001 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Brown Patch[2] Aug. 2001
36	Sunpro	5.0	4.9	5.0	5.7
37	Pick FAXF-95	5.0	4.9	5.0	5.3
38	Pick H-97	5.0	4.9	5.0	4.3
39	Pick TF 4-99	4.9	4.6	5.3	6.3
40	Laramie	4.9	5.0	4.8	4.3
41	Greystone	4.9	4.8	5.0	5.3
42	Tracer	4.9	5.0	4.8	5.7
43	Barlexas	4.9	5.2	4.6	5.3
44	LWE	4.9	4.7	5.1	5.3
45	FA 24-91-99	4.9	4.5	5.3	5.0
46	OPP2	4.9	4.8	4.9	5.0
47	TF 40	4.9	4.8	4.9	6.3
48	Barerra	4.8	5.3	4.4	5.0
49	T991	4.8	4.6	5.1	4.0
50	ATF 704	4.8	4.8	4.7	6.7
51	6LV	4.8	4.7	4.9	5.0
52	LA 107R	4.8	4.5	5.1	6.7
53	RTP	4.7	4.9	4.6	4.0
54	MA 125	4.7	4.7	4.8	4.3
55	Arizona	4.7	5.1	4.3	5.3
56	MA 127	4.7	4.4	5.0	6.0
57	SMS	4.7	4.6	4.8	4.7
58	SYN R5LT-99	4.7	4.6	4.7	5.3
59	94 RUT TF-1	4.7	4.6	4.8	4.7
60	ATF 706	4.7	4.6	4.7	5.3
61	6D	4.7	4.5	4.8	4.7
62	TF 5-97	4.7	4.8	4.5	4.7
63	TF6	4.6	4.6	4.6	3.7
64	Lancer	4.6	4.7	4.5	4.7
65	Bravo	4.6	4.8	4.4	6.0
66	Prospect	4.6	4.5	4.6	4.7
67	Millennium	4.5	4.3	4.8	5.0
68	WATF	4.5	4.2	4.7	5.3
69	Brandy	4.5	4.7	4.2	4.7
70	SYN R5EH-99	4.5	4.5	4.4	5.3

Table 3 (continued).

	Cultivar or Selection	Turf Quality[1] 2000-2001 Avg.	Turf Quality[1] 2000 Avg.	Turf Quality[1] 2001 Avg.	Brown Patch[2] Aug. 2001
71	MA 138	4.4	4.7	4.1	3.7
72	MA 131	4.4	4.2	4.7	4.7
73	FA 487	4.4	4.4	4.5	4.3
74	LA 128	4.4	4.3	4.5	5.7
75	MA 108	4.4	4.0	4.8	3.0
76	Houndog 5	4.4	4.5	4.3	5.3
77	Coronado	4.4	4.7	4.0	3.7
78	Pixie	4.4	4.7	4.0	6.0
79	ATF 707	4.4	4.5	4.2	6.0
80	Arid II	4.3	4.3	4.3	5.7
81	MA 123	4.3	4.3	4.3	2.7
82	MA 135	4.2	4.0	4.5	3.7
83	MA 98	4.2	4.2	4.2	5.7
84	Stetson	4.2	4.3	4.0	6.3
85	TF E-97	4.2	4.3	4.0	3.3
86	Watchdog	4.1	4.2	4.1	1.7
87	Lion	4.1	4.3	3.9	3.7
88	Onyx	4.1	4.1	4.1	3.3
89	Wolfpack	4.0	3.9	4.1	5.3
90	Frontera	3.9	3.7	4.1	3.3
91	Shortstop II	3.9	3.9	3.9	3.7
92	GS Bulk E-99	3.9	4.0	3.8	6.0
93	MA 132	3.9	3.8	4.0	3.7
94	Crossfire II	3.8	4.2	3.3	6.0
95	LA 126	3.7	3.6	3.8	4.7
96	Vegas	3.5	3.8	3.2	5.7
97	Talisman	2.8	2.1	3.5	4.7
98	Phoenix	2.4	2.6	2.3	4.7
99	Austin	1.5	1.5	1.4	4.7
100	Kentucky-31	1.2	1.2	1.1	4.0
	LSD at 5% =	0.8	0.9	0.8	2.3

[1]9 = best turf quality
[2]9 = least brown patch

Table 4. Performance of tall fescue cultivars and selections in a turf trial seeded in August 2000 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 2001 Avg.	Seedling Height[2] Sept. 2000	Establishment[3] Sept. 2000	Leaf Spot[4] Nov. 2000	Brown Patch[5] 2001 Avg.
1	DOL comp	6.8	8.3	7.0	6.3	7.2
2	SBM comp	6.5	7.3	7.3	5.7	6.3
3	RB3 comp	6.4	7.3	6.3	6.0	5.7
4	OD3 comp	6.2	6.3	6.3	5.7	7.3
5	10,001 comp	6.2	6.7	6.7	5.7	6.7
6	OD4 comp	6.1	7.7	6.3	5.0	7.2
7	P58	6.1	6.7	7.3	7.3	6.5
8	TF-33	6.1	7.3	6.3	5.7	5.7
9	TF-34	6.1	7.3	6.7	6.3	4.5
10	2nd Millennium	6.1	7.0	6.0	5.3	7.2
11	Syn 578	6.1	5.3	6.3	5.3	7.0
12	Forte	6.1	6.7	6.3	6.0	6.8
13	TF-35	6.1	7.7	6.0	6.0	6.8
14	Justice	6.0	7.0	6.3	4.0	7.5
15	EA 171	6.0	7.7	5.7	4.3	5.3
16	OD1 comp	6.0	6.7	6.7	5.3	6.7
17	OD2 comp	5.9	6.0	6.0	4.7	7.3
18	00 GFA	5.9	5.7	6.0	5.3	6.5
19	Syn 5K1	5.9	6.3	6.0	6.0	6.3
20	SR 8600	5.9	5.0	6.7	6.3	5.7
21	Bingo	5.9	6.7	6.7	4.7	5.0
22	Biltmore	5.8	6.7	5.3	5.3	5.7
23	Syn 5T2	5.8	6.3	6.0	4.7	5.7
24	Syn 5BAB	5.7	6.3	6.3	5.3	6.8
25	00-BFA	5.7	6.0	7.0	4.7	5.2
26	Matador	5.6	8.0	5.7	6.3	4.7
27	Syn 5KU	5.6	7.7	6.3	5.3	6.2
28	BE 4	5.6	8.0	6.3	4.7	5.7
29	Mustang III	5.6	6.0	6.3	5.0	5.7
30	Rendition	5.6	6.7	6.7	5.7	5.8
31	00-H FA	5.6	6.3	6.0	5.0	5.8
32	Syn 5DWF	5.6	7.7	6.7	6.0	5.7
33	E-97	5.6	8.3	6.7	4.0	5.0
34	FA6-91	5.5	6.7	5.7	5.0	5.8
35	Syn-R54M-00	5.5	8.3	6.3	5.3	3.3

Table 4 (continued).

	Cultivar or Selection	Turf Quality[1] 2001 Avg.	Seedling Height[2] Sept. 2000	Establishment[3] Sept. 2000	Leaf Spot[4] Nov. 2000	Brown Patch[5] 2001 Avg.
36	Syn 5NAS	5.5	6.7	6.3	5.7	5.3
37	SRX 8DDMPP	5.4	6.7	5.7	4.7	6.3
38	MA 176	5.4	7.3	5.7	3.7	6.2
39	Syn 5BEH	5.4	6.3	5.7	5.3	6.0
40	Syn 5BZ	5.4	6.0	5.3	5.0	6.0
41	Southern Comfort	5.4	6.7	6.0	5.0	5.0
42	DLSD	5.4	6.0	6.0	6.0	5.0
43	Syn 5MP	5.4	7.0	6.7	5.7	4.7
44	57E	5.4	6.3	5.7	6.3	4.8
45	TF H-97	5.4	7.0	6.3	5.3	4.2
46	00-J FA	5.4	7.3	6.7	6.3	4.8
47	Picasso	5.4	7.0	6.0	5.3	3.8
48	EA 180	5.3	7.7	6.0	3.3	5.5
49	TF-34	5.3	8.0	6.3	5.0	4.8
50	Syn 5H2	5.3	5.7	5.7	4.7	6.2
51	SRX 8 FFT	5.3	6.7	6.0	4.7	5.5
52	00-CFA	5.3	5.3	5.7	3.7	5.2
53	5BE	5.3	6.3	6.7	4.7	5.5
54	00-A FA	5.3	6.3	6.7	4.7	3.8
55	SRX 8601 E	5.2	5.7	6.0	5.3	6.3
56	Syn 5A3	5.2	6.7	5.7	5.3	5.7
57	Rembrandt	5.2	6.0	6.0	4.7	5.2
58	SRX 8BPDDE	5.2	6.0	6.3	4.7	4.7
59	5301	5.2	.	.	.	6.5
60	Santa Fe	5.2	7.0	5.7	2.0	5.0
61	Crewcut II	5.2	6.0	5.7	5.3	3.7
62	BE1	5.1	6.3	5.7	5.0	6.7
63	Plantation	5.1	5.7	6.7	4.7	5.0
64	MA 157	5.1	7.3	5.7	4.0	4.8
65	TF J-97	5.1	7.0	6.0	4.7	4.5
66	EA 172	5.1	6.3	5.7	3.0	4.2
67	Laramie	5.1	6.0	6.0	5.3	3.7
68	Sun Pro	5.1	6.3	5.3	5.3	5.0
69	MA 160	5.1	7.7	5.0	4.0	4.3
70	Syn-R5JM-00	5.1	7.7	6.3	5.0	2.8

Table 4 (continued).

	Cultivar or Selection	Turf Quality[1] 2001 Avg.	Seedling Height[2] Sept. 2000	Establishment[3] Sept. 2000	Leaf Spot[4] Nov. 2000	Brown Patch[5] 2001 Avg.
71	CAE comp	5.1	5.7	5.7	4.7	6.5
72	Syn TUO	5.1	6.7	6.7	4.0	5.2
73	Bravo	5.1	4.3	6.3	5.0	4.2
74	EA 155	5.1	6.7	5.7	4.0	4.2
75	MC1	5.0	6.0	5.7	5.0	7.0
76	Syn 5S2	5.0	5.7	5.7	5.7	5.5
77	TF-41	5.0	7.3	6.7	5.0	5.7
78	Syn 5CH	4.9	6.0	5.7	5.0	6.0
79	Pick FA B93	4.9	6.7	5.3	5.0	5.5
80	Syn BRO	4.9	5.3	6.3	4.3	5.3
81	SRX 8DDEOO	4.9	6.3	5.7	4.3	4.2
82	8 S M2	4.9	6.0	5.7	3.3	5.2
83	MA 127 Forbes	4.9	6.7	5.7	2.7	5.2
84	P89 * SpL	4.9	5.3	6.3	5.0	5.2
85	SRX 8 BPDDNE	4.9	5.3	6.3	2.7	5.0
86	ORE-00TF	4.9	4.7	6.0	4.3	4.3
87	Millennium	4.8	5.7	6.3	4.0	5.3
88	EA 163	4.8	6.7	5.3	3.3	4.7
89	Pure Gold	4.8	7.0	6.7	4.3	3.5
90	Syn 5G9	4.8	6.3	5.3	6.0	5.7
91	00-I FA	4.8	6.7	6.0	4.0	4.8
92	00-D FA	4.8	5.0	5.7	4.0	6.3
93	MA 177	4.8	7.7	5.3	3.3	4.7
94	SRX 8EDFF	4.7	4.7	5.3	4.7	4.5
95	Shortstop II	4.7	7.0	5.3	5.3	4.2
96	TF-40	4.7	5.7	6.0	3.3	4.2
97	SRX 8CDEW	4.7	7.0	6.7	3.3	5.0
98	SRX 8MO961	4.7	5.7	6.3	5.0	4.5
99	Prospect	4.6	5.7	6.0	4.3	6.5
100	MA 165	4.6	7.0	5.0	4.0	3.5
101	Apache II	4.6	5.7	6.0	5.0	5.0
102	Coronado Gold	4.6	4.7	6.0	4.7	4.8
103	RT-95	4.6	5.3	6.0	3.3	4.5
104	SR 8500	4.6	5.7	6.0	5.0	5.2
105	GS bulk M2	4.6	6.3	6.3	4.7	3.7

Table 4 (continued).

	Cultivar or Selection	Turf Quality[1] 2001 Avg.	Seedling Height[2] Sept. 2000	Establishment[3] Sept. 2000	Leaf Spot[4] Nov. 2000	Brown Patch[5] 2001 Avg.
106	MA 178	4.6	6.3	5.3	3.0	3.3
107	MA 138 JSC	4.5	6.0	6.3	3.7	5.0
108	8OP22	4.5	7.3	5.7	3.0	4.3
109	8RF2	4.5	6.3	6.0	3.0	4.8
110	GS bulk E1	4.5	4.7	6.0	4.0	4.5
111	Coronado	4.5	6.3	6.3	4.7	2.8
112	00-E FA	4.5	5.3	5.3	3.0	5.2
113	Houndog 5	4.5	4.0	5.7	4.0	4.3
114	Olympic Gold	4.5	4.7	6.0	4.7	4.2
115	MA 158	4.4	8.0	4.7	2.7	5.7
116	Rebel Jr.	4.4	3.7	5.7	3.3	4.7
117	Tarheel	4.4	5.0	5.7	3.7	3.5
118	5UD	4.4	6.3	5.7	4.7	4.7
119	Lancer	4.3	5.0	5.3	4.3	4.3
120	Tomahawk E+	4.3	4.0	6.0	4.7	3.8
121	MA 98 Mtn. View	4.3	6.3	6.0	2.0	4.0
122	TF-43	4.2	5.7	5.3	3.0	5.2
123	P89 * SpE	4.2	6.3	6.0	4.3	3.7
124	TF-42	4.2	5.3	5.3	2.3	5.8
125	Talisman	4.2	6.3	6.0	4.7	4.5
126	Syn 5HUO	4.1	5.7	6.7	3.3	5.7
127	Tomahawk	4.1	3.3	5.7	2.7	4.7
128	Crossfire II	4.1	5.7	5.7	4.3	4.5
129	T991-00	4.0	6.7	5.3	4.3	3.5
130	Regiment	4.0	2.7	5.0	4.0	5.2
131	SRX 8 MO94	4.0	4.3	6.3	3.3	4.8
132	Grande	3.9	3.3	6.3	3.0	5.8
133	Crewcut	3.9	5.0	5.7	4.7	4.2
134	D5 ATF 00-6	3.9	.	.	.	6.7
135	SRX LJHH	3.8	5.0	5.7	3.7	5.3
136	Bonanza II	3.8	3.7	5.3	2.7	3.7
137	SR 8210	3.8	4.3	6.0	3.3	3.7
138	Wolfpack	3.7	4.7	4.7	3.7	5.7
139	Mustang II	3.7	2.7	5.3	2.7	5.3
140	Hilltop TF	3.6	2.3	5.0	2.3	4.0

Table 4 (continued).

	Cultivar or Selection	Turf Quality[1] 2001 Avg.	Seedling Height[2] Sept. 2000	Establishment[3] Sept. 2000	Leaf Spot[4] Nov. 2000	Brown Patch[5] 2001 Avg.
141	Eldorado	3.6	2.7	4.3	3.7	5.5
142	Confederate	3.6	5.0	4.3	4.0	5.0
143	GT 2K	3.0	4.3	5.0	1.3	4.5
144	Kentucky 31	1.3	1.0	4.0	1.7	5.2
145	Torpedo	1.0	1.0	3.3	1.0	5.7
	LSD at 5% =	0.7	1.2	1.1	1.2	2.1

[1]9 = best turf quality
[2]9 = shortest seedling height
[3]9 = best establishment
[4]9 = least leaf spot
[5]9 = least brown patch (average of two ratings taken 8-13-01 and 8-17-01)

Table 5. Yearly nitrogen (N) applied and mowing height (Ht) on tall fescue tests established at Adelphia, NJ.

	1998		1999		2000		2001	
	N[1]	Ht[2]	N	Ht	N	Ht	N	Ht
Table 1 (1997 Adelphia)	2.8	1.5	2.1	1.5	1.4	1.5	1.4	1.5
Table 2 (1998 Adelphia)			2.8	1.5	2.8	1.5	2.1	1.5
Table 3 (1999 Adelphia)					2.6	1.5	2.2	1.5
Table 4 (2000 Adelphia)							2.8	1.5

[1]Annual N applied (lb/1000 ft^2)
[2]Mowing height in inches