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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 University 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. Articles appearing in these proceedings are divided into two sections.

The first section (white pages) includes lecture notes of papers presented at the 1997 New Jersey Turfgrass Expo. Publication of the New Jersey Turfgrass Expo Notes provides a readily available source of information covering a wide range of topics. The Expo Notes include technical and popular presentations of importance to the turfgrass industry.

The second section (green pages) includes technical research papers containing original research findings and reviews covering selected subjects in turfgrass science. The primary objective of these papers is to facilitate the timely dissemination of original turfgrass research for use by the turfgrass industry.

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

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

James A. Murphy, William A. Meyer, C. Reed Funk, Dirk A. Smith, William K. Dickson, Ronald F. Bara, and Margaret E. Secks[1]

The fine fescues include a number of species that possess rather fine, bristle-like leaves. These species will persist under limited soil moisture, low nitrogen fertility, and moderate to high cutting heights. Fine fescues can form a dense, soft-looking turf cover that is quite attractive. The species used for turf include bunch types [Chewings fescue (*Festuca rubra* L. subsp. *commutata* Gaud.), hard fescue (*F. longifolia* Thuill.), sheeps fescue (*F. ovina* L.), *F. pseudovina*, and blue fescue (*F. glauca* Lam.)] and rhizomatous types [slender creeping red fescue (*F. rubra* L. subsp. *trichophylla* Gaud.) and strong creeping red fescue (*F. rubra* L. subsp. *rubra* Gaud.)].

Both the strong and slender creeping red fescues have a spreading growth habit and produce a more open turf. The slender creeping red fescues have fewer, shorter rhizomes than the strong creeping red fescues. In addition, the strong creeping red fescues are better adapted to hot, humid summers and are often mixed with other grasses such as Kentucky bluegrass. Chewings fescues form a denser turf than the strong creeping red fescues and tend to be more disease resistant and persistent under lower maintenance. The hard fescues are similar in appearance to sheeps fescues, but have wider, tougher, less bluish leaves, and are more tolerant of higher fertility and moist soil conditions. Improved varieties of hard fescue have good turf-type characteristics similar in density and texture to the Chewings fescues, but with lower nutrient requirements and a slower growth rate.

Sheeps and blue fescues possess stiff, bluish-green leaves, require little maintenance, and will decline under intensive cultural management. Sheeps and blue fescues are often used in wildflower mixes for soil stabilization as well as for aesthetic purposes. Their bunch-type growth habit and bluish-green color can enhance the ornamental features of a meadow-like landscape.

Fine fescues are important turfgrasses for low management sites, particularly considering society's interest in reducing nutrient and pesticide usage. Of the cool-season grasses commonly used for turf, fine fescues are more persistent on infertile, dry soils and often predominate where there is competition from trees and shrubs for nutrients and moisture. Fine fescues are recommended for sites where soil stabilization or reclamation are important considerations. Once established, fine fescues can survive for many years without fertilization, supplemental irrigation, or chemical inputs. Golf course superintendents often manage roughs of fine fescue with limited mowing to produce a meadow-like appearance accented with seed heads.

High nitrogen fertilization and close mowing can reduce fine fescue populations in a turf of mixed species by decreasing heat tolerance and

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

increasing plant succulence, thereby decreasing resistance to insect pests and diseases. For good persistence, an established fine fescue turf should be fertilized with no more than 2 lb nitrogen per 1000 ft^2 per year and mowed at a height of 2.5 inches or higher.

Fine fescues that contain the symbiotic *Neotyphodium* (= *Acremonium*) endophyte can exhibit enhanced stress tolerance and resistance to insects and diseases, important features for lower maintenance turf. Neotyphodium is a fungus that resides primarily within the crown and leaf sheath tissues. It is believed that the endophyte was once a pathogenic fungus that evolved over many years to form a symbiotic relationship with some turfgrass species. The endophyte/plant symbiosis produces compounds that improve resistance to some biotic and abiotic stresses. In some endophyte-infected grasses, stromata (fungal reproductive structures) of the endophyte can inhibit development of the inflorescence and production of seed. Severe levels of this malady, called choke, can limit the commercial value of a cultivar or selection.

Breeding efforts continue to enhance the turf-type qualities of fine fescues and improve resistance to diseases, insects, and environmental stresses. In addition, efforts have been made to find and utilize endophytes that are naturally associated with these grasses. The program at Rutgers involves extensive field evaluation of new material developed in its breeding program as well as the evaluation of cultivars or selections developed by other breeders. Rutgers participates in the National Turfgrass Evaluation Program (NTEP), which is housed by the United States Department of Agriculture and Agricultural Research Service and is sponsored by the National Turfgrass Foundation.

PROCEDURES

Fine fescue turf trials were conducted at two sites in New Jersey. One test was established at the Turfgrass Research Facility in North Brunswick, NJ (Table 1) and four others at the Rutgers Plant Science Research Farm in Adelphia, NJ (Tables 2 to 5). The tests at Adelphia were situated in open areas with good air circulation. The North Brunswick site was bordered on one side by a mature wood, which restricted air circulation.

All tests used 3 X 5 ft plots seeded at a rate of 3.7 lb/1000 ft^2. Plots were replicated at least three times in a randomized complete block design. Tests were fertilized at different nitrogen rates, mowed at different heights, and subjected to varying levels of moisture stress depending on the objective of the test during the evaluation period (Table 6). After establishment, tests were only irrigated to avoid severe drought stress and dormancy. The plots were mowed at intervals frequent enough to avoid excessive accumulation of clippings, and clippings were not collected. Weed control consisted of a yearly spring application of a preemergence herbicide for crabgrass and other annual grasses, and a broadleaf weed control herbicide applied in either the spring or fall. Insecticides or fungicides were not routinely applied to any tests.

All tests were evaluated by visually rating each plot throughout the year. Tests were regularly rated for quality on a scale of 1 to 9, where 9 represented the most desirable turf. Turf quality is a subjective rating that is based on density, texture, uniformity, color, growth habit, freedom from disease or insect damage, and overall appearance. To help reduce personal bias, turf quality ratings were made by various people throughout the growing season and were averaged. Tests were also evaluated for other characteristics as conditions warranted. These attributes were rated using the same scale as turf quality, where 9 represents the most desirable characteristic (e.g., early spring green-up and freedom from disease).

RESULTS AND DISCUSSION

In all tables, data were grouped by species and ranked by the multiple year average. This facilitates the comparison of different cultivars and selections within a species. Generally, the hard fescues tended to perform best, and the

Chewings fescues performed better than the strong and slender creeping red fescues.

Overall, the strong creeping red fescues and slender creeping red fescues greened up earliest in the spring (Tables 1 and 2) and established more rapidly (Table 5). The creeping red fescues tended to be the least aggressive and produced less thatch than the hard or Chewings fescues. Thus, the creeping red fescues are more compatible in mixtures with Kentucky bluegrass and perennial ryegrass, a popular combination for general utility and lawn turfs. Desirable characteristics including darker green color, lower growth habit, and better leaf spot resistance continue to improve through breeding efforts.

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Table 1. Performance of fine fescue cultivars and selections in a turf trial seeded in September 1993 at North Brunswick, NJ. (Includes 1993 National Fineleaf Fescue Test.)

	Cultivar or Selection	Turf Quality[1] 1994-1997 Avg.	1994 Avg.	1995 Avg.	1996 Avg.	1997 Avg.	Spring Green-up[2] April 1997
	CHEWINGS FESCUES						
1	Shadow II	6.5	6.5	7.4	5.4	6.7	6.0
2	NJF-93	6.3	6.5	6.9	5.7	6.1	3.7
3	Treazure E+	5.9	5.8	5.9	5.7	6.0	4.7
4	Magic	5.8	6.0	6.4	5.2	5.7	3.7
5	MB 61-93	5.8	5.9	6.7	5.4	5.3	4.0
6	Ford92 D	5.8	6.3	6.2	5.3	5.5	3.7
7	Brittany	5.8	5.6	6.6	5.5	5.5	4.0
8	Victory II	5.8	5.6	6.5	5.2	5.8	4.3
9	MB 63-93	5.8	5.4	6.9	5.2	5.6	6.3
10	MB 64-93	5.7	5.7	6.4	5.1	5.6	4.7
11	Tiffany	5.7	5.7	6.9	4.7	5.4	6.0
12	Treazure	5.5	5.0	6.2	5.2	5.5	4.7
13	Bridgeport	5.6	5.2	6.6	5.1	5.3	4.7
14	Ford92 C	5.6	6.1	5.7	4.7	5.7	3.7
15	SR 5100	5.5	5.7	6.3	5.0	5.1	3.3
16	DCH 93 comp	5.5	6.0	5.9	4.7	5.3	3.0
17	Ford92 E-	5.5	5.5	6.0	4.8	5.6	4.3
18	Wx3-FF54	5.3	4.8	6.2	4.8	5.5	3.7
19	MB 65-93	5.2	4.9	6.5	4.1	5.3	5.7
20	TMI-3CE	5.2	5.0	5.8	4.9	5.0	5.0
21	PRO 92/20	5.0	4.5	6.3	4.0	5.3	3.3
22	Jamestown II '92	4.9	4.6	5.0	4.5	5.4	3.7
23	Shadow E+	4.9	4.5	6.1	4.3	4.6	4.7
24	Victory E+	4.8	4.6	6.1	3.9	4.4	4.3
25	Jamestown II '93	4.7	4.4	5.2	4.1	5.2	4.7
26	Jamestown II	4.6	4.3	5.2	3.5	5.2	3.7
27	Darwin	4.5	5.1	5.6	3.3	4.0	3.3
28	Banner II	4.5	4.1	5.7	3.8	4.3	4.7
29	Jamestown II '90	4.5	4.2	4.6	4.0	5.0	3.3
30	ISI-FC-62	4.4	4.1	5.1	4.2	4.3	4.7

(Continued)

Table 1 (continued).

	Cultivar or Selection	Turf Quality[1] 1994-1997 Avg.	1994 Avg.	1995 Avg.	1996 Avg.	1997 Avg.	Spring Green-up[2] April 1997
	CHEWINGS FESCUES (continued)						
31	MB 66-93	4.3	3.9	5.5	3.7	4.1	6.7
32	Jamestown II '91	4.3	3.9	4.5	3.7	5.0	4.0
33	Medina	4.2	3.9	5.0	3.8	4.1	5.0
34	Molinda	4.1	4.1	5.2	3.4	3.8	7.0
35	Jamestown	4.0	3.7	4.6	3.2	4.3	6.4
36	Cascade	2.8	2.4	3.7	2.4	2.8	7.0
	HARD FESCUES						
1	Discovery	6.5	6.0	6.8	6.4	6.8	2.3
2	SR 3100	6.1	5.2	6.7	6.2	6.2	2.3
3	Ecostar	5.9	5.6	6.2	5.0	6.6	2.0
4	MB 82-93	5.7	5.4	6.8	5.0	5.5	6.0
5	MB 81-93	5.6	5.4	6.1	5.0	6.0	4.3
6	Aurora	5.5	5.0	5.9	5.1	5.8	2.7
7	Nordic	5.4	5.3	5.8	4.7	5.6	2.3
8	Reliant II	5.3	5.2	5.9	4.4	5.6	2.7
9	PRO 92/24	5.1	5.3	5.7	4.2	5.2	2.3
10	Brigade	5.0	5.3	5.6	4.1	5.1	3.3
11	MB 83-93	5.0	5.3	5.5	4.1	5.0	2.7
12	Spartan	4.9	4.9	5.5	4.2	5.1	2.3
13	Scaldis	4.6	4.8	5.2	3.7	4.5	2.3
14	Pamela	4.1	4.0	4.6	3.6	4.2	3.7
	SHEEPS AND BLUE FESCUES						
1	Quatro (FO 143)	4.8	5.5	4.9	4.3	4.3	6.3
2	Azure	4.7	5.2	5.1	4.5	3.8	2.0
3	Bighorn	4.1	4.1	4.1	4.4	3.6	2.3
4	Mx-86	3.1	3.9	3.3	2.7	2.5	3.3
5	67135	2.0	1.6	2.1	2.0	2.4	4.7

(Continued)

Table 1 (continued).

	Cultivar or Selection	Turf Quality[1] 1994-1997 Avg.	1994 Avg.	1995 Avg.	1996 Avg.	1997 Avg.	Spring Green-up[2] April 1997
	SLENDER CREEPING RED FESCUES						
1	Seabreeze	4.2	3.9	4.9	3.9	4.1	5.0
2	Dawson	3.3	2.9	3.4	3.5	3.5	4.3
	STRONG CREEPING RED FESCUES						
1	PST-4VB E+	6.3	6.2	6.9	6.8	5.1	3.3
2	PST-4ST	5.8	5.5	7.0	5.6	4.9	2.7
3	Shademaster II	5.7	5.6	7.1	5.9	4.1	3.3
4	Flyer II	5.7	5.2	6.8	6.0	4.6	3.7
5	PST-4DT	5.5	5.1	6.3	5.7	4.8	5.3
6	Jasper II	5.1	5.1	6.1	5.0	4.0	5.0
7	Wx3-FFG6	4.6	5.1	5.7	3.9	3.9	5.0
8	Aruba	4.4	3.6	5.6	4.3	4.0	6.3
9	Flyer	4.2	3.8	5.6	4.1	3.3	5.3
10	BAR Frr 4ZBD	3.9	4.0	4.5	3.4	3.6	3.3
11	Rondo	3.7	3.1	4.4	3.7	3.6	3.3
12	CAS FR13	3.7	3.6	4.1	3.1	3.9	5.7
13	WVPB-STCR-101	3.1	4.1	3.6	2.5	2.4	4.0
14	BAR UR 204	3.1	2.6	4.2	2.7	2.7	5.3
15	Common Cr	2.8	2.4	2.9	2.6	3.2	3.7
	LSD at 5% =	0.6	0.6	0.9	0.8	1.0	1.4

[1]9 = best turf quality
[2]9 = brightest green color

Table 2. Performance of fine fescue cultivars and selections in a turf trial seeded in September 1993 at Adelphia, NJ. (Includes 1993 National Fineleaf Fescue Test.)

	Cultivar or Selection	Turf Quality[1] 1994-1997 Avg.	Turf Quality[1] 1994 Avg.	Turf Quality[1] 1995 Avg.	Turf Quality[1] 1996 Avg.	Turf Quality[1] 1997 Avg.	Spring Green-up[2] April 1997
	CHEWINGS FESCUES						
1	Shadow II	6.0	5.9	5.8	6.5	5.9	6.7
2	NJF-93	5.5	6.0	5.2	5.8	5.0	6.0
3	Ford92 D	5.5	6.1	4.9	5.9	5.3	5.7
4	Treazure E+	5.5	5.3	5.4	5.5	5.7	6.3
5	Magic	5.5	6.4	4.8	5.5	5.1	5.7
6	4FE	5.4	5.3	5.3	5.7	5.2	6.3
7	Ford92 E-	5.3	5.9	4.5	5.6	5.1	5.7
8	Ford92 C	5.3	6.2	4.7	5.4	4.8	6.3
9	Victory II	5.3	5.9	5.2	5.1	4.8	5.3
10	MB 61-93	5.2	5.8	5.3	5.5	4.3	5.7
11	MB 64-93	5.2	5.7	4.7	5.2	5.1	6.0
12	SR 5100	5.1	5.5	5.0	5.5	4.5	6.3
13	CAS FC-14	5.1	5.6	5.1	4.8	4.8	6.3
14	Brittany	5.1	5.5	4.7	5.5	4.5	5.7
15	CAS FC-24	5.0	5.4	4.8	5.0	5.0	6.7
16	Tiffany	5.0	5.2	4.9	5.3	4.7	6.7
17	Bridgeport	5.0	5.0	4.5	5.5	5.1	6.3
18	DCH93 comp	5.0	6.1	4.5	4.7	4.6	4.3
19	CAS FC-28	4.9	5.5	4.5	4.6	5.0	6.7
20	CAS FC-12	4.9	5.5	4.8	4.6	4.6	6.7
21	4LD	4.9	4.9	4.9	5.0	4.7	5.7
22	Jamestown II '90	4.9	4.3	5.0	5.3	4.7	6.0
23	TMI-3CE	4.7	4.9	4.5	4.7	4.7	6.3
24	Southport	4.6	5.2	4.2	4.5	4.6	6.3
25	Jamestown II '93	4.6	4.4	4.4	5.0	4.7	5.0
26	CAS FC-26	4.6	5.3	4.1	4.6	4.4	6.3
27	Jamestown II '92	4.5	4.5	4.3	4.5	4.5	5.3
28	MB 63-93	4.5	5.2	3.9	4.3	4.5	7.0
29	Wx3-FF54	4.5	5.1	4.7	4.0	4.1	5.7
30	ISI-FC-62	4.4	4.6	4.0	4.9	4.2	7.0

(Continued)

Table 2 (continued).

	Cultivar or Selection	Turf Quality[1] 1994-1997 Avg.	1994 Avg.	1995 Avg.	1996 Avg.	1997 Avg.	Spring Green-up[2] April 1997
	CHEWINGS FESCUES (continued)						
31	Banner II	4.4	4.2	3.9	5.0	4.7	6.3
32	Shadow E+	4.4	4.5	4.2	4.6	4.3	6.0
33	Jamestown II '91	4.4	4.2	4.3	4.2	4.7	6.7
34	Victory E+	4.4	4.9	4.0	4.6	3.9	5.7
35	Jamestown II	4.3	4.1	4.1	4.4	4.8	4.7
36	Darwin	4.3	4.6	4.2	3.9	4.4	5.0
37	PRO 92/20	4.3	4.3	3.9	4.5	4.3	6.0
38	Jamestown	4.0	4.0	3.7	4.2	4.2	6.0
39	MB 65-93	4.0	5.4	4.1	3.0	3.4	6.7
40	CAS FC-27	4.0	3.8	3.6	3.7	4.7	5.7
41	Medina	3.7	3.5	3.7	3.4	4.0	7.0
42	Molinda	3.4	3.2	3.4	3.3	3.6	6.3
43	MB 66-93	3.2	4.0	2.8	2.5	3.3	7.0
44	Cascade	3.0	2.8	2.3	3.2	3.5	6.0
	HARD FESCUES						
1	Discovery	6.4	6.6	6.2	6.3	6.3	2.7
2	CAS FL-20	6.2	6.7	5.8	5.8	6.3	2.3
3	SR 3100	5.9	6.3	6.1	5.5	5.7	3.4
4	MB 81-93	5.7	6.1	5.9	5.5	5.3	4.3
5	Reliant II	5.7	5.8	5.8	5.1	5.9	2.3
6	Warwick	5.6	5.4	5.1	5.7	6.1	2.0
7	PRO 92/24	5.6	5.6	5.6	5.1	5.9	2.3
8	4RU	5.4	5.7	5.1	5.2	5.5	3.0
9	MB 83-93	5.3	6.1	5.3	4.6	5.1	2.7
10	Reliant	5.2	5.4	4.5	5.1	5.9	2.3
11	Ecostar	5.1	5.6	5.3	4.3	5.2	2.7
12	Nordic	5.1	5.3	5.0	4.8	5.2	3.3
13	Brigade	5.0	5.3	5.3	4.6	4.9	3.3
14	Spartan	5.0	5.1	4.9	4.6	5.5	3.0
15	Scaldis	5.0	5.3	5.0	4.4	5.3	3.0

(Continued)

Table 2 (continued).

	Cultivar or Selection	Turf Quality[1] 1994-1997 Avg.	1994 Avg.	1995 Avg.	1996 Avg.	1997 Avg.	Spring Green-up[2] April 1997
	HARD FESCUES (continued)						
16	MB 82-93	4.9	5.3	4.8	5.1	4.3	5.0
17	Aurora	4.8	4.9	5.2	4.2	5.0	3.7
18	Attila	4.6	4.9	3.9	3.8	5.7	3.7
19	Pamela	4.0	4.3	3.9	3.7	4.2	4.7
	SHEEPS AND BLUE FESCUES						
1	4EB	4.6	4.8	4.3	5.3	4.1	3.7
2	Quatro (FO 143)	4.6	5.4	3.8	4.0	5.1	5.3
3	Bighorn	4.2	4.4	4.0	4.8	3.7	4.7
4	4BE	4.2	4.7	3.9	4.6	3.8	3.7
5	CAS FO-23	3.9	4.0	3.5	4.0	4.1	5.3
6	67135	3.5	2.1	3.3	4.1	4.3	5.3
	SLENDER CREEPING RED FESCUES						
1	Seabreeze	4.9	4.4	5.1	4.7	5.5	5.3
2	Dawson	3.9	3.1	3.8	3.8	4.9	5.3
	STRONG CREEPING RED FESCUES						
1	PST-4VB E+	5.8	5.5	5.9	6.3	5.3	6.3
2	4DR-93	5.6	5.5	5.6	5.7	5.6	6.7
3	PST-4ST	5.6	5.0	5.2	6.1	5.9	6.3
4	Jasper E+	5.5	5.3	5.4	5.8	5.4	7.7
5	4DT-93	5.3	5.0	5.0	5.3	5.7	7.7
6	PST-4DT	5.2	5.0	4.9	5.3	5.8	7.0
7	43F-93	5.2	4.9	5.5	4.7	5.5	6.7
8	4PB	5.2	5.3	4.8	5.5	5.1	6.7
9	Shademaster II	5.1	5.5	5.0	4.9	5.1	6.7
10	Flyer II	5.1	4.7	5.3	5.6	4.9	6.0

(Continued)

Table 2 (continued).

	Cultivar or Selection	Turf Quality[1] 1994-1997 Avg.	1994 Avg.	1995 Avg.	1996 Avg.	1997 Avg.	Spring Green-up[2] April 1997
	STRONG CREEPING RED FESCUES (continued)						
11	4VB E-	5.1	5.6	5.1	4.4	5.2	6.7
12	Syn 4VE	5.0	5.5	4.6	4.8	5.1	6.3
13	4R3-93	5.0	4.3	4.9	5.7	5.0	6.0
14	Wx3-FFG6	5.0	5.3	4.9	5.5	4.2	6.3
15	Flyer	4.5	4.1	4.1	4.9	4.9	6.7
16	Shademaster	4.5	4.3	3.6	4.9	5.1	6.0
17	CAS FR-29	4.4	4.4	4.3	4.0	4.9	7.3
18	CAS FR13	4.4	3.7	4.6	5.0	4.1	6.0
19	CAS FR-15	4.2	4.2	3.8	3.9	4.8	7.0
20	CAS F+25	4.0	3.7	3.9	3.4	5.1	7.3
21	Rondo	4.0	3.2	3.8	3.7	5.3	5.7
22	BAR Frr 4ZBD	4.0	3.5	3.9	4.1	4.5	5.7
23	Common Cr	3.8	2.8	3.7	3.9	4.8	5.0
24	Aruba	3.8	3.5	3.3	3.8	4.6	6.3
25	Salem	3.8	3.6	3.7	3.4	4.3	7.3
26	WVPB-STCR-101	3.7	4.0	3.2	4.0	3.7	6.0
27	BAR UR 204	3.6	2.9	2.9	4.3	4.2	6.3
28	Pennlawn	3.1	2.2	2.5	3.2	4.3	7.0
	LSD at 5% =	0.6	0.7	1.0	1.0	1.0	1.6

[1]9 = best turf quality
[2]9 = brightest green color

Table 3. Performance of fine fescue cultivars and selections in a turf trial seeded in September 1994 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 1995-1997 Avg.	Turf Quality[1] 1995 Avg.	Turf Quality[1] 1996 Avg.	Turf Quality[1] 1997 Avg.	Leaf Spot[2] April 1997	Red Thread[2] June 1997
	CHEWINGS FESCUES						
1	Frc 4-92-94	5.5	6.3	5.7	4.5	6.3	6.7
2	Frc C-93-94	5.4	5.8	5.8	4.5	6.7	8.0
3	Frc 1-92-94	5.1	4.9	5.3	5.1	6.7	7.0
4	MB-64	5.1	5.4	5.1	4.8	6.7	4.7
5	Frc A-93-94	5.1	5.8	5.0	4.4	6.3	7.0
6	Frc B-92-94	5.0	5.5	5.0	4.4	7.0	7.0
7	MB-61	4.9	5.4	5.4	4.0	6.7	5.7
8	Frc 2-92-94	4.9	5.5	4.8	4.5	5.7	7.3
9	Frc 5-92-94	4.9	5.0	5.2	4.5	6.7	4.3
10	MB-63	4.8	5.3	5.0	4.2	6.3	4.7
11	Frc 3-92-94	4.8	5.5	4.8	4.0	5.5	7.5
12	Jamestown II '91	4.6	4.3	5.0	4.5	7.0	4.0
13	MB-65	4.5	4.9	4.8	3.9	6.7	6.0
14	MB-66	4.4	4.2	4.1	4.9	7.0	5.7
15	Jamestown II '94	4.3	4.3	4.3	4.4	7.3	5.7
16	MB-62	4.2	4.5	4.1	3.9	7.7	5.0
17	Banner II	3.9	4.3	4.0	3.5	6.7	4.0
18	Cascade	2.6	2.5	2.9	2.5	6.7	7.3
19	Banner	2.6	1.8	3.2	2.9	6.7	5.3
	FESTUCA PSEUDOVINA						
1	Verdome	3.4	4.6	2.8	2.7	6.3	7.0
	HARD FESCUES						
1	SR 3100	5.9	5.6	5.8	6.3	5.3	8.0
2	Discovery	5.5	5.4	5.4	5.7	5.7	7.0
3	FF2-94	5.4	5.5	6.0	4.8	6.0	9.0
4	94 FL Poly x orange	5.4	5.4	5.3	5.4	5.7	9.0
5	ML-21	5.3	5.3	5.5	5.0	5.7	7.3

(Continued)

Table 3 (continued).

	Cultivar or Selection	Turf Quality[1] 1995-1997 Avg.	Turf Quality[1] 1995 Avg.	Turf Quality[1] 1996 Avg.	Turf Quality[1] 1997 Avg.	Leaf Spot[2] April 1997	Red Thread[2] June 1997
	HARD FESCUES (continued)						
6	Rescue	5.3	5.5	5.3	5.0	5.0	7.0
7	MB-81	5.2	5.4	5.3	4.9	5.3	8.0
8	Reliant '92	5.1	5.1	5.1	5.2	5.0	8.0
9	94 FL Poly x gray	5.1	5.2	5.1	5.1	5.0	7.7
10	94 FL Poly x blue	5.1	5.0	4.9	5.5	5.7	6.0
11	94 FL Poly x yellow	5.1	5.5	4.9	4.9	5.0	8.0
12	MB-83	5.1	5.2	5.3	4.8	4.7	7.7
13	Reliant '94	5.0	5.0	4.9	5.2	4.7	8.0
14	Spartan	5.0	4.8	5.1	5.2	5.0	7.7
15	Reliant '93	5.0	4.9	5.0	5.1	4.3	7.0
16	94 FL Poly x purple	5.0	5.0	5.1	4.9	5.0	6.3
17	MB-82	4.8	5.0	4.9	4.5	5.7	5.7
18	FF5-94	4.7	4.6	4.8	4.6	5.0	9.0
19	Eureka	4.2	4.1	4.2	4.3	6.0	8.3
	SHEEPS AND BLUE FESCUES						
1	FF1-94	5.0	6.0	5.0	4.0	5.0	9.0
2	FO 2-91-93	4.3	5.0	4.1	3.8	6.0	7.7
3	FO 1-92-94	4.2	5.0	3.9	3.6	5.7	7.7
4	FF4-94	4.1	5.1	3.7	3.6	4.0	9.0
5	PST Syn 4MB	4.0	4.6	3.8	3.5	6.0	8.3
6	FO 1-91-93	3.8	4.3	3.8	3.4	6.0	9.0
7	Azay	3.8	3.1	4.3	4.1	6.3	7.3
8	FO MO 43	3.7	4.3	3.6	3.3	6.7	7.3
9	PST Syn 4BC	3.7	4.3	3.4	3.4	5.5	8.0
10	Mx-86	3.2	3.6	2.9	3.2	6.3	7.7
11	FO A-93-94	3.2	4.5	2.6	2.5	6.3	7.0
12	FO B-93-94	3.2	4.6	2.5	2.4	7.0	9.0
13	Bighorn	3.0	2.8	3.3	3.0	5.7	6.3

(Continued)

Table 3 (continued).

	Cultivar or Selection	Turf Quality[1] 1995-1997 Avg.	Turf Quality[1] 1995 Avg.	Turf Quality[1] 1996 Avg.	Turf Quality[1] 1997 Avg.	Leaf Spot[2] April 1997	Red Thread[2] June 1997
	STRONG CREEPING RED FESCUES						
1	H-Frr Bulk	5.4	5.3	5.8	5.0	7.0	9.0
2	H-Frr E+	5.3	5.0	5.8	5.0	7.0	8.3
3	Fenway E-	5.0	4.8	5.4	4.9	6.7	8.0
4	Fenway E+	4.8	4.2	5.2	4.9	7.0	7.7
5	Cindy	4.3	4.4	4.4	4.0	6.0	8.0
6	MB-71	3.3	3.4	3.1	3.3	6.3	8.3
7	Pennlawn	2.6	2.2	2.7	2.8	6.0	7.3
	LSD at 5% =	0.6	0.6	0.7	0.9	1.5	3.2

[1]9 = best turf quality
[2]9 = least disease

Table 4. Performance of fine fescue cultivars and selections in a turf trial seeded in September 1995 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 1996-1997 Avg.	Turf Quality[1] 1996 Avg.	Turf Quality[1] 1997 Avg.
	CHEWINGS FESCUES			
1	Ambassador	5.2	5.9	4.5
2	WS-CF94-Rx	5.0	5.7	4.3
3	Brittany	4.6	5.3	3.9
4	FC 14	4.5	4.7	4.3
5	Southport	4.4	4.9	4.0
6	Jamestown II	3.9	4.0	3.9
7	Shetland	3.4	3.6	3.2
8	ML 45	3.3	3.1	3.5
	HARD FESCUES			
1	Oxford	6.1	6.5	5.7
2	LTP 4821	6.1	6.2	6.0
3	W5-HF94-Rx	5.8	6.1	5.5
4	Aurora E+	5.3	5.4	5.3
5	Serra E+	5.3	5.4	5.3
6	Med 13	5.3	5.2	5.3
7	Ecostar	5.2	5.2	5.1
8	Reliant	5.0	4.8	5.1
9	Spartan	4.9	4.7	5.1
10	Warwick	4.9	4.7	5.0
11	LCHF	4.6	4.6	4.6
12	Med 13 E+	4.3	4.4	4.1
	SHEEPS FESCUES			
1	LBS-95	4.1	4.2	4.1
2	LGS-95	3.8	4.0	3.6
3	LO44	3.6	4.0	3.2
4	Bighorn	3.5	3.5	3.4
5	Mx-86 Sheeps Fescue	3.4	3.5	3.2

(Continued)

Table 4 (continued).

	Cultivar or Selection	1996-1997 Avg.	1996 Avg.	1997 Avg.
		----------Turf Quality[1]----------		
	STRONG CREEPING RED FESCUES			
1	Pathfinder	4.7	4.8	4.6
2	LTP 4731	4.6	4.9	4.3
3	Audubon	4.3	4.7	3.9
4	R Str Cr-95 E+	4.3	4.6	3.9
5	FR 27	4.2	4.6	3.8
6	PL E+	4.1	4.5	3.7
7	FR 13	3.9	4.4	3.4
8	Salem	3.8	4.3	3.3
9	Wx5-396	3.6	3.9	3.3
	LSD at 5% =	0.4	0.5	0.5

[1]9 = best turf quality

Table 5. Performance of fine fescue cultivars and selections in a turf trial seeded in September 1996 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 1997 Avg.	Establishment[2] October 1996	Leaf Spot[3] May 1997
	CHEWINGS FESCUES			
1	Brittany	5.3	7.0	3.3
2	96-CF94-1	5.3	6.0	4.3
3	NJF-93	5.0	5.7	3.7
4	MB-81	4.8	5.7	3.3
5	Shadow II	4.6	5.3	4.0
6	MB 64-93	4.5	5.3	4.3
7	Tiffany	4.5	6.0	3.0
8	FC 51	4.4	5.7	3.7
9	Victory E+	4.1	5.7	3.7
10	Jamestown II	3.7	5.3	3.7
11	FC 12	3.6	2.7	3.3
12	SR 5100	3.5	4.3	3.0
13	Banner II	3.5	5.3	2.7
14	Southport	3.4	3.7	3.0
15	Shadow	2.3	1.7	2.3
	HARD FESCUES			
1	96-HF 94-1	5.9	6.0	3.7
2	Ecostar	5.7	6.0	3.3
3	EL 20	5.6	4.3	3.3
4	Discovery	5.5	3.7	3.3
5	Nordic	5.3	5.7	4.0
6	SR 3100	5.2	4.3	3.0
7	Heron	5.0	3.0	3.3
8	Spartan	4.8	4.3	3.3
9	Brigade	4.8	2.3	3.0
10	Serra	4.8	6.7	3.7
11	Aurora E+	4.8	3.7	3.0
12	Reliant	4.6	5.7	3.0
13	Reliant II	4.3	2.7	2.7
14	Warick	3.3	2.3	2.0

(Continued)

Table 5 (continued).

	Cultivar or Selection	Turf Quality[1] 1997 Avg.	Establishment[2] October 1996	Leaf Spot[3] May 1997
	SHEEPS FESCUES			
1	Bighorn	4.1	3.0	3.3
2	MX-86	3.8	4.0	3.3
3	LO 44	2.5	1.7	2.0
	SLENDER CREEPING RED FESCUES			
1	Seabreeze	4.4	6.0	3.3
2	Dawson	4.1	5.3	3.3
	STRONG CREEPING RED FESCUES			
1	PST 4ST	5.2	6.0	3.3
2	OFI-JH	5.1	5.7	5.0
3	Flyer II	4.9	6.7	3.0
4	PST 4VB E+	4.8	5.3	3.7
5	Pathfinder	4.7	7.0	2.7
6	Shademaster II	4.4	6.3	3.3
7	RSTR-CR	4.2	6.3	2.3
8	WX5 386	4.2	5.0	2.7
9	Shademark	4.1	5.3	2.7
10	Melody	3.9	7.0	2.7
11	Flyer	3.9	5.7	2.0
12	Common Cr	3.8	7.0	2.3
13	PST 4DT	3.7	4.3	2.7
14	ISI-Frr-7	3.7	6.0	2.3
	LSD at 5% =	0.9	1.2	1.2

[1]9 = best turf quality
[2]9 = best establishment
[3]9 = least disease

Table 6. Yearly nitrogen (N) applied and mowing height (Ht) on fine fescue tests established at North Brunswick and Adelphia, NJ.

	1994		1995		1996		1997	
	N[1]	Ht[2]	N	Ht	N	Ht	N	Ht
Table 1 (1993 North Brunswick)	5.7	1.5	2.0	1.5	2.7	1.5	0.8	1.5
Table 2 (1993 Adelphia)	3.8	1.5	3.6	2.0	3.4	2.0	1.9	2.0
Table 3 (1994 Adelphia)	1.0	3.0	0.0	3.0	0.0	3.0	0.0	3.0
Table 4 (1995 Adelphia)			4.6	2.0	1.4	2.0	1.7	1.5
Table 5 (1996 Adelphia)							1.4	1.5

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