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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 includes lecture notes of papers presented at the 1999 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 includes research papers containing original research findings and reviews covering selected subjects in turfgrass science. The primary objective of this section 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
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PERFORMANCE OF PERENNIAL RYEGRASS CULTIVARS AND SELECTIONS IN NEW JERSEY TURF TRIALS

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Perennial ryegrass (*Lolium perenne* L.) is a popular cool-season grass best adapted to areas with mild winters and cool, moist summers. Perennial ryegrass is most recognized for its ability to vigorously establish an attractive, persistent turf stand within a few months of seeding. The development of improved perennial ryegrass varieties continues at the New Jersey Agricultural Experiment Station and many other research facilities around the world. The incorporation of new germplasm from old turfs around the world has permitted turf breeders to expand the genetic base of perennial ryegrass used in cultivar development. Present cultivars and selections of perennial ryegrass have darker green color, better mowing quality, lower growth habit, and more uniform appearance. The presence of an endophyte (*Neotyphodium lolii*) in many ryegrasses has enhanced insect resistance and stress tolerance.

The tables presented in this paper provide current data on trials established at the Plant Science Research Center at Adelphia, New Jersey, and the Turfgrass Research Facility at Horticultural Farm II, North Brunswick, New Jersey.

PROCEDURES

Five perennial ryegrass tests were established between 1996 and 1998. Four of the tests were established at Adelphia: one in August 1996 (Table 1), two in August 1997 (Tables 2 and 3), and one test in August 1998 (Table 4). One additional test was seeded at North Brunswick in September 1998 (Table 5).

The four Adelphia tests were hand sown with 0.88 oz of seed into 3 X 5 ft plots (3.7 lb seed/1000 ft^2). The North Brunswick test was hand sown with 2.1 oz into 3.5 X 5.5 ft plots (6.8 lb seed/1000 ft^2). A 6 inch unseeded border surrounded each plot. All tests were arranged in a randomized complete block design with three replications. Management procedures included irrigation as needed to avoid severe drought stress, a fall application of the postemergence herbicides 2,4-D and dicamba for broadleaf weed control, and a spring application of DCPA or bensulide for preemergence control of summer annuals.

Bensulide was applied to the North Brunswick test for preemergence crabgrass control in April 1999, and Dylox was applied for grub control in early September 1999. The annual rate of nitrogen (N) and mowing height for each test are presented in Table 6. Single applications of fertilizer did not exceed 1.0 lb N/1000 ft^2. The amount and timing of N applied to turf varied to encourage disease and other stresses. Tests were mowed regularly with reel mowers to maintain a 1.5 inch height of cut. Rotary mowers were occasionally used to remove stems. Based on soil test results, tests were limed as needed to maintain a pH of 6.0 to 6.5.

All tests were rated throughout the growing season for visual turf quality (i.e., overall appearance, turf color, uniformity, density, mowing quality, reduced rate of vertical growth, leaf texture, spring green-up, and insect and disease damage). The 1996 Adelphia test was specifically

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rated for wear tolerance (Table 1). The cultivars presented in the 1997 Adelphia test (Table 2) were additionally rated for percent of dollar spot in each plot. The data in Table 3 includes ratings of seedling establishment in 1997, steminess, summer leaf spot and crown rust in 1998, and a percent dollar spot rating in 1999. The table includes data from 1997 and 1998 that was previously unpublished. The 1998 test at Adelphia (Table 4) was evaluated for seedling establishment and pink snow mold. The 1998 test in North Brunswick (Table 5) was specifically rated for seedling establishment. All ratings were based on a 1 to 9 scale, with 9 representing the best turf characteristic. Plots were evaluated by a number of turfgrass specialists to reduce the impact of personal bias for particular characteristics. All data were summarized and subjected to an analysis of variance. Means were separated using the least significant difference (LSD) multiple comparisons test.

RESULTS AND DISCUSSION

Results for all tests are presented in Tables 1 through 5. Entries in these tables are ranked according to their overall (multi-year) quality average. A high quality average is generally indicative of a darker green color, greater density, finer leaf texture, lower growth habit, cleaner mowing cut, better wear tolerance and less damage due to insects and disease.

Turf Quality

The overall quality of turf-type perennial ryegrasses has greatly improved since the release of NK-100 in the mid 1960s, Manhattan in 1967, and Pennfine in 1970. Newer perennial ryegrasses have darker green color, more uniform appearance, increased density, lower growth habit, cleaner mowing, and better tolerance to diseases and insects. The overall quality averages in Tables 1 through 5 indicate that newer varieties such as Jet, Exacta, and Paragon, along with promising experimentals such as CIS PR-78, 4801 Comp, 8326 Comp, and 6501 Comp, are much better turf-types than older varieties such as Manhattan, Linn, and Pennfine.

Disease

Turf plots were evaluated when diseases were most active. Dollar spot ratings (Tables 2 and 3) show that a small number of cultivars appear to have quite good resistance to the disease. Cultivars such as Panther, Wind Dancer, Laredo, and Exacta had the lowest percentages of dollar spot, and disease severity in turf plots of 2LC Bulk, an experimental, were extremely low.

A crown rust rating in Table 3 indicates that most cultivars had fair to moderate resistance to the disease. Good resistance was shown by varieties such as Sonata, Exacta, and experimentals such as LP1, LP 9, SRX DMSO, and MP 42. Pink snow mold ratings in Table 4 suggest that newer experimentals such as 4801 Comp, LP 86, LDD Comp, and MP 58 as well as varieties such as Palmer III, Exacta, Promise, and APM had good snow mold resistance.

The summer leaf spot data presented in Table 3 indicates that there is little difference in tolerance to this disease among the entries evaluated. Palmer III showed the best resistance compared to varities such as Magic and SR 4300.

Establishment

Perennial ryegrass is popular in many parts of the world because of its ability to rapidly establish an attractive turf stand within a month or two of seeding. Seedling vigor can be affected by factors such as genetics, seed quality, the environment, after ripening dormancy, and management procedures. Most entries in Tables 3 and 5 were well established one month after seeding. Exacta, Jet, and Churchill were among the best establishing cultivars.

Wear Tolerance

The 1996 Adelphia test was subjected to artificial wear during the 1999 growing season (Table 1). Half of each plot was worn 34 times throughout the growing season using a Rutgers Novel Traffic Simulator developed at Rutgers University (Meyer et al., 1997). Many differences were evident in the wear tolerance level of various cultivars. Varieties such Palmer III and Churchill had good wear tolerance, Gator II, Paragon, and Secretariat had moderate wear tolerance, and older varieties such as Linn and Pennfine had poor wear tolerance.

Steminess

Entries presented in Table 3 were evaluated for amount of reproductive tillers, or steminess. While more stems are a good characteristic for seed production purposes, steminess can take away from the attractive, uniform appearance of the turf plot. The variety Panther and experimentals LP 1 and LP 22 possessed the least amount of reproductive tillers.

SUMMARY

Although significant improvements have been made on perennial ryegrasses, genetically stable resistance to gray leaf spot, crown rust, dollar spot, pink patch, red thread, and brown patch are needed. Furthermore, increased heat tolerance and cold hardiness and the ability to survive under ice sheets for extended periods are also necessary characteristics to develop a more desirable, persistent, turf-type perennial ryegrass.

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REFERENCE

Meyer, W. A., Murphy, J. A., and Smith, D. A., 1997. Response of cool-season turfgrasses to a novel traffic simulator. Page 125 *in* Agronomy Abstracts, American Society of Agronomy, Madison, Wisconsin.

Table 1. Performance of perennial ryegrass cultivars and selections in a turf trial established in August 1996 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 1997-1999 Avg.	Turf Quality[1] 1997 Avg.	Turf Quality[1] 1998 Avg.	Turf Quality[1] 1999 Avg.	Worn Quality[2] July 1999 Avg.
1	Paragon	6.2	6.5	6.1	5.9	5.7
2	Churchill	6.0	6.3	5.9	5.8	6.0
3	Bar Lp 695-1	5.8	6.3	5.6	5.4	5.7
4	Exacta	5.6	5.9	5.6	5.3	5.9
5	Bar Lp 94-1	5.6	6.2	5.2	5.3	5.7
6	Palmer III	5.5	5.8	5.0	5.6	6.3
7	Gator II	5.3	5.5	5.3	5.3	5.7
8	Manhattan 3	4.9	4.7	4.8	5.1	4.7
9	Bar Lp 695-2	4.9	4.8	4.6	5.2	5.0
10	Secretariat	4.8	5.0	4.4	5.0	5.7
11	Calypso II	4.8	5.4	4.3	4.7	5.0
12	CISI PR-37	4.8	5.1	4.8	4.5	5.3
13	Catalina	4.7	5.1	4.2	4.8	5.0
14	Palmer II	4.7	4.5	4.5	5.0	4.7
15	Brightstar	4.5	4.4	4.7	4.3	4.3
16	Advantage	4.4	4.5	4.2	4.6	4.7
17	CISI PR-38	4.4	4.2	4.2	4.7	5.7
18	Prizm	4.3	4.2	4.4	4.3	5.3
19	Citation III	4.3	4.6	4.0	4.1	4.0
20	Saturn II	4.2	4.4	4.2	3.9	4.3
21	APM	4.1	4.2	4.1	4.1	5.7
22	Elf	4.1	4.2	3.8	4.3	4.7
23	Seville	4.0	3.9	4.1	4.1	5.7
24	Windstar	4.0	4.1	3.9	4.1	5.7
25	Advent	4.0	3.8	4.0	4.1	5.0
26	SR-4200	4.0	3.9	3.9	4.1	5.0
27	Quickstart	3.9	4.0	3.7	4.0	4.0
28	Equal	3.9	4.2	3.6	3.9	4.7
29	Prelude II	3.9	4.0	3.7	3.9	5.0
30	Mark V	3.8	4.2	3.4	4.0	4.0

(Continued)

Table 1 (continued).

	Cultivar or Selection	Turf Quality[1] 1997-1999 Avg.	Turf Quality[1] 1997 Avg.	Turf Quality[1] 1998 Avg.	Turf Quality[1] 1999 Avg.	Worn Quality[2] July 1999 Avg.
31	Dandy	3.6	3.7	3.3	3.8	5.3
32	Express	3.6	3.5	3.5	3.7	4.3
33	Manhattan II	3.6	3.5	3.5	3.6	5.0
34	Blazer II	3.5	3.3	3.4	3.8	4.7
35	Fiesta II	3.1	3.2	2.9	3.1	4.3
36	Pennfine	2.4	2.4	2.3	2.6	4.3
37	Linn	1.1	1.1	1.1	1.2	1.3
	LSD at 5% =	0.4	0.7	0.6	0.6	1.2

[1]9 = best turf quality
[2]9 = best turf quality of the portion of the plot treated 15 times with a wear machine

Table 2. Performance of perennial ryegrass cultivars and selections in a turf trial established in August 1997 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 1998-1999 Avg.	Turf Quality[1] 1998 Avg.	Turf Quality[1] 1999 Avg.	Dollar Spot (%) Aug. 1999
1	Jet	6.3	6.5	6.0	11.7
2	SJSPR	6.2	6.7	5.6	24.3
3	Sev II A	6.0	6.4	5.6	20.0
4	Sev II C	6.0	6.1	5.9	21.7
5	Paragon	6.0	6.3	5.6	21.7
6	2L96 Bulk	5.9	6.1	5.8	13.3
7	Sev II B	5.9	6.1	5.6	16.7
8	Brightstar II	5.7	6.1	5.4	20.0
9	EDR	5.7	6.0	5.5	20.0
10	2LA-97	5.7	6.1	5.3	10.0
11	A96 E+	5.7	6.0	5.4	25.0
12	A96 Rusty E+	5.6	5.9	5.4	11.7
13	A96 E-	5.5	6.1	4.9	12.7
14	MB 48	5.2	5.4	5.1	19.3
15	Affirmed	5.2	5.4	5.0	20.0
16	Wind Dancer	5.1	5.0	5.2	7.7
17	Syn 2LTS	4.9	4.8	5.1	8.3
18	Elfkin	4.9	5.2	4.7	16.7
19	2PS-97	4.7	4.7	4.6	15.0
20	2LC Bulk	4.6	4.6	4.7	4.3
21	Syn 2NA-97	4.5	4.7	4.4	30.0
22	Catalina	4.5	4.8	4.2	38.3
23	Roadrunner	4.4	4.6	4.2	23.3
24	Laredo	4.4	4.4	4.4	8.0
25	Monterey	4.4	4.4	4.4	25.0
26	2TN Bulk	4.4	4.3	4.4	12.7
27	2PS	4.4	4.3	4.4	21.7
28	Manhattan 3	4.3	4.1	4.5	20.0
29	2KS	4.3	4.6	4.1	18.3
30	Penguin	4.3	4.0	4.6	36.7

(Continued)

Table 2 (continued).

	Cultivar or Selection	Turf Quality[1] 1998-1999 Avg.	Turf Quality[1] 1998 Avg.	Turf Quality[1] 1999 Avg.	Dollar Spot (%) Aug. 1999
31	Omega 3	4.3	4.3	4.2	33.3
32	Legacy II	4.3	4.1	4.4	16.7
33	2SX Bulk	4.2	4.0	4.5	15.0
34	Chaparral	4.2	4.0	4.4	12.7
35	Esquire	4.2	4.0	4.5	21.7
36	Syn 2HCE	4.2	4.1	4.3	21.0
37	Caddieshack	4.2	4.2	4.2	15.7
38	Brightstar	4.2	4.3	4.1	40.0
39	A+ 96	4.2	4.4	3.9	41.7
40	Charger II	4.1	4.3	4.0	20.0
41	Top Gun	4.1	4.0	4.2	18.3
42	Saturn II	4.1	4.3	3.8	38.3
43	Target	4.0	3.8	4.2	35.0
44	Windstar	4.0	4.0	3.9	30.0
45	WX2-92	4.0	3.8	4.2	32.0
46	Goal Keeper	3.9	3.9	3.8	51.7
47	Seville	3.8	3.5	4.1	30.0
48	Cathedral II	3.8	3.5	4.2	20.0
49	APM	3.8	3.7	3.9	40.0
50	Assure	3.8	3.6	3.9	68.3
51	Citation III	3.8	3.7	3.8	31.7
52	Cutter	3.7	3.6	3.7	48.3
53	Advent	3.6	3.6	3.6	28.3
54	Windstar	3.6	3.6	3.6	48.3
55	Stardance	3.6	3.6	3.5	18.3
56	Morning Star	3.6	3.5	3.6	28.3
57	Omni	3.5	3.6	3.4	45.0
58	Affinity	3.5	3.6	3.4	48.3
59	Evening Shade	3.5	3.4	3.6	43.3
60	Fiesta II	3.5	3.4	3.5	38.3

(Continued)

Table 2 (continued).

	Cultivar or Selection	Turf Quality[1] 1998-1999 Avg.	Turf Quality[1] 1998 Avg.	Turf Quality[1] 1999 Avg.	Dollar Spot (%) Aug. 1999
61	Dandy	3.4	3.4	3.4	48.3
62	Blackhawk	3.4	3.6	3.2	45.0
63	Shining Star	3.4	3.3	3.4	41.7
64	Line Drive	3.3	3.3	3.2	41.7
65	Cathedral	3.2	3.6	2.8	50.0
66	Express	3.1	3.0	3.2	36.7
67	Accent	3.0	3.1	2.9	68.3
68	Caliente	2.8	2.5	3.0	33.3
69	Mulligan	2.7	2.7	2.8	53.3
70	Pennfine	2.6	2.3	2.9	28.3
71	Nui	1.0	1.1	1.0	20.0
	LSD at 5% =	0.2	0.6	0.8	24.5

[1]9 = best turf quality

Table 3. Performance of perennial ryegrass cultivars and selections in a turf trial established in August 1997 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 1998-1999 Avg.	Turf Quality[1] 1998 Avg.	Turf Quality[1] 1999 Avg.	Seedling Establishment[2] Sept. 1997	Steminess[3] June 1998	Summer Leaf Spot[4] Aug. 1998	Crown Rust[4] Oct. 1998	Dollar Spot (%) Aug. 1999
1	BBC	6.2	6.5	5.9	6.3	5.3	5.0	5.7	19.0
2	Exacta	6.2	6.0	6.4	7.0	5.3	5.3	6.0	8.0
3	Elfkin	6.0	6.1	5.9	5.7	4.0	5.0	5.3	9.7
4	Affirmed	5.5	5.5	5.6	6.7	5.7	5.7	5.7	25.0
5	Prelude III	5.5	5.2	5.8	7.7	4.7	5.3	4.3	16.7
6	Palmer III	5.4	5.3	5.5	6.7	5.0	6.0	5.0	14.0
7	Panther	5.1	4.8	5.4	7.3	6.0	5.3	5.3	6.0
8	Repel III	5.0	4.8	5.1	7.3	4.0	4.3	4.0	18.3
9	Mardi Gras	4.9	4.7	5.0	7.3	5.7	5.0	5.3	12.7
10	MP 41	4.8	5.2	4.5	5.7	5.0	3.7	5.7	30.0
11	Sonata	4.8	4.9	4.8	6.7	5.3	5.3	7.0	17.7
12	Saturn II	4.6	4.4	4.7	7.0	4.3	5.0	5.3	13.3
13	EP 40	4.6	4.5	4.6	5.7	4.0	4.3	3.7	21.7
14	MP 42	4.5	4.9	4.1	5.3	5.0	5.3	6.0	43.3
15	Elf	4.4	4.1	4.7	7.0	5.0	4.7	3.3	15.0
16	Omega 3	4.3	4.0	4.6	7.7	5.3	4.3	5.7	15.0
17	LP 9	4.3	4.5	4.0	6.7	5.0	4.3	6.3	28.3
18	Affinity	4.2	4.1	4.3	7.3	4.7	4.7	5.0	15.7
19	LP 22	4.2	4.5	3.9	6.3	6.3	5.3	5.3	50.0
20	SRX DMSO	4.2	3.9	4.5	6.7	4.3	5.0	6.0	16.7

(Continued)

Table 3 (continued).

	Cultivar or Selection	Turf Quality[1] 1998-1999 Avg.	Turf Quality[1] 1998 Avg.	Turf Quality[1] 1999 Avg.	Seedling Establishment[2] Sept. 1997	Steminess[3] June 1998	Summer Leaf Spot[4] Aug. 1998	Crown Rust[4] Oct. 1998	Dollar Spot (%) Aug. 1999
21	EP 37	4.1	4.2	4.1	5.7	4.0	3.7	4.7	19.0
22	Prizm	4.1	4.0	4.2	7.7	5.0	5.0	3.7	25.0
23	LP 1	4.1	4.3	3.9	6.7	6.0	3.7	6.3	30.0
24	SR 4200	4.0	3.8	4.1	7.3	5.0	5.0	4.0	40.0
25	SR 4000	4.0	3.9	4.0	6.7	4.0	5.0	3.7	28.3
26	SR 4100	3.9	3.8	4.1	7.7	5.3	6.0	4.0	21.7
27	EP 53	3.9	4.0	3.8	5.3	5.0	3.3	3.3	40.0
28	Bullet	3.9	3.7	4.0	6.7	3.7	4.7	4.7	10.7
29	SR 4400	3.8	3.5	4.2	7.3	5.0	4.3	5.0	25.0
30	SR 4010	3.8	3.7	3.8	7.0	4.7	3.7	5.0	40.0
31	Dandy	3.7	3.4	4.1	7.0	4.3	4.0	3.3	17.3
32	SR 4330	3.6	3.5	3.7	6.7	5.3	4.0	5.0	30.0
33	Envy	3.6	3.5	3.6	7.0	4.3	4.0	5.7	14.0
34	SR 4300	3.6	3.5	3.6	7.3	5.0	3.7	5.7	35.0
35	Magic	3.6	2.5	4.6	6.0	3.3	3.7	4.0	13.3
	LSD at 5% =	0.5	0.6	0.6	0.9	1.1	1.3	1.2	18.8

[1]9 = best turf quality
[2]9 = best seedling establishment
[3]9 = least amount of reproductive tillers
[4]9 = least disease

Table 4. Performance of perennial ryegrass cultivars and selections in a turf trial established in August 1998 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 1999 Avg.	Seedling Establishment[2] Oct. 1999	Pink Snow Mold[3] Feb. 1999
1	CIS PR-78	6.9	7.3	4.3
2	Pizzazz	6.8	7.7	5.0
3	4801 Comp	6.5	7.0	7.3
4	8326 Comp	6.3	8.0	4.0
5	6501 Comp	6.2	8.0	6.3
6	CIS PR-72	6.0	7.7	6.7
7	ME Comp	6.0	7.7	5.3
8	LDD Comp	6.0	8.0	7.0
9	FPT Comp	5.9	7.3	5.3
10	CIS PR-80	5.7	7.0	5.7
11	Exacta	5.6	7.7	6.7
12	EDR	5.6	7.3	5.7
13	Churchill	5.6	6.0	6.0
14	6011 Comp	5.6	8.0	6.3
15	Wilmington	5.5	7.7	6.3
16	Affirmed	5.4	7.0	6.0
17	Promise	5.4	7.3	6.7
18	LRF-98-437-PR	5.4	6.3	4.7
19	LRF-98-439-PR	5.3	7.3	4.3
20	MP 88	5.2	5.7	7.3
21	MP 57	5.1	6.0	6.3
22	CIS PR-79	5.1	7.3	2.7
23	MP 58	5.1	5.3	6.0
24	EP 53	5.1	6.0	5.0
25	Brightstar II	5.1	7.3	4.0
26	Palmer III	5.0	7.7	7.3
27	LP 84	5.0	6.0	3.7
28	MP 58	4.9	7.0	7.0
29	MP 42	4.9	5.7	6.3
30	Paragon	4.9	7.0	4.7

(Continued)

Table 4 (continued).

	Cultivar or Selection	Turf Quality[1] 1999 Avg.	Seedling Establishment[2] Oct. 1999	Pink Snow Mold[3] Feb. 1999
31	EP 70	4.7	6.3	6.0
32	Pleasure XL	4.7	8.0	6.3
33	LP 56	4.7	7.0	4.3
34	Elfkin	4.7	8.0	5.3
35	LP 86	4.6	5.0	7.3
36	MP 41	4.5	5.0	5.3
37	LRF-98-438-PR	4.5	6.3	4.0
38	AG-P981	4.4	7.3	4.3
39	CIS PR-81	4.4	7.3	4.3
40	Allsport	4.4	6.3	4.3
41	Caddieshack	4.3	7.7	5.7
42	LP 62	4.3	5.7	4.3
43	CIS PR-77	4.3	8.0	6.0
44	EP 39	4.2	5.7	5.0
45	LP 85	4.1	4.7	6.0
46	CIS PR-76	4.0	8.0	3.0
47	EP 59	4.0	5.0	6.0
48	CIS PR-70	4.0	7.0	2.7
49	Top Gun	3.9	7.7	5.0
50	Gator II	3.9	7.7	4.7
51	SC 96-1	3.8	7.3	5.3
52	APM	3.5	7.3	7.0
53	SC 97-1	3.5	7.0	5.0
54	Envy	3.5	6.3	4.3
55	Accent	3.5	6.3	5.3
56	Delaware Dwarf	3.3	7.0	5.3
57	Nobility	3.3	7.0	5.0
58	Advent	3.2	8.0	5.0
59	Bullet	3.0	7.3	4.7
60	Pleasure	2.8	7.3	4.3
61	Nui	1.1	5.0	1.0

(Continued)

Table 4 (continued).

Cultivar or Selection	Turf Quality[1] 1999 Avg.	Seedling Establishment[2] Oct. 1999	Pink Snow Mold[3] Feb. 1999
LSD at 5% =	0.7	1.3	2.5

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

Table 5. Performance of perennial ryegrass cultivars and selections in a turf trial established in September 1998 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 1999 Avg.	Seedling Establishment[2] Oct. 1999
1	Jet	8.0	7.3
2	Exacta	8.0	6.9
3	Churchill	7.7	7.3
4	EDR	7.3	7.3
5	Paragon	7.3	6.8
6	Palmer III	7.3	5.9
7	Affirmed	7.0	6.1
	LSD at 5% =	0.6	0.6

[1]9 = best turf quality
[2]9 = best seedling establishment

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

	1997		1998		1999	
	N[1]	Ht[2]	N	Ht	N	Ht
Table 1 (1996 Adelphia)	4.3	1.5	4.1	1.5	2.8	1.5
Table 2 (1997 Adelphia)			4.6	1.5	3.5	1.5
Table 3 (1997 Adelphia)			4.6	1.5	3.5	1.5
Table 4 (1998 Adelphia)					2.8	1.5
Table 5 (1998 North Brunswick)					2.4	1.5

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