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This publication includes lecture notes of papers presented at the 2000 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.

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PERFORMANCE OF BENTGRASS CULTIVARS AND SELECTIONS IN NEW JERSEY TURF TRIALS

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Bentgrass species used for specialized, high maintenance, close-cut turf include creeping bentgrass (*Agrostis palustris*, also known as *A. stolonifera*), colonial bentgrass (*A. tenuis* or *A. capillaris*), highland or dryland bentgrass (*A. castellana*), and velvet bentgrass (*A. canina*). Creeping bentgrasses have a dense, prostrate growth habit and are able to persist under low heights of cut, making this the most popular grass for putting greens. Through vigorous stolon growth, creeping bentgrasses form a fine-textured, dense, low growing turf, and are well adapted for golf course use in both the cool temperate and warm, humid environments of the United States. With the recent release of improved creeping bentgrasses, turf managers now have a choice of new varieties that may outperform the older varieties.

Colonial bentgrass, also referred to as browntop, has traditionally been used as a lawn grass in areas of northern Europe and New Zealand that have cool and humid or mild summers. Compared to creeping bentgrasses, colonial bentgrasses are fine-textured grasses that have a more upright and less aggressively spreading growth habit. In addition, the colonial bentgrasses typically have a brighter green color and better color retention during cool weather, and they are also more resistant to dollar spot, but more susceptible to brown patch. Colonial bentgrasses perform best in New Jersey when mowed between 3/8 and 3/4 of an inch, and thus are better adapted for fairway or tee use.

Velvet bentgrass has been called the 'aristocrat' of turfgrasses. It forms the finest-textured and most dense turf of the bentgrasses and can nearly resemble green velvet when managed properly. It spreads mainly through profuse production of erect tillers with short, limited stolons. This grass can tolerate very close mowing, heat, cold, and shade, and is one of the most drought resistant of the bentgrasses used for turf (Skogley, 1973). Velvet bentgrass can form excessive thatch, especially at higher fertility rates and higher cutting heights. It is also susceptible to red thread and copper spot diseases. Velvet bentgrass has not been used extensively for high maintenance turf, therefore its management requirements are not well known.

Other bentgrasses currently under evaluation for turf include dryland bentgrass and Idaho bentgrass (*A. idahoensis* Nash.). Dryland bentgrasses are similar in adaptation and appearance to colonial bentgrasses, but are more blue-green in color and have rhizomes. Idaho bentgrass is native to the western United States and is adapted to wet meadows or bogs in mountainous regions. This grass establishes well in turfgrass plots, but has a dull green color and an upright growth habit that is less attractive than creeping, colonial, or velvet bentgrasses. In New Jersey turf trials this species has exhibited good resistance to dollar spot disease.

The New Jersey Agricultural Experiment Station participates in the National Turfgrass Evaluation Program (NTEP), which evaluates many

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species of turfgrasses, including bentgrasses, throughout the United States. The Rutgers turfgrass breeding program conducts extensive field evaluations of collections and new material developed in the improvement program, and it also evaluates cultivars of selections developed in other breeding programs.

PROCEDURES

Bentgrass evaluation trials were established in September 1997 (Tables 1 and 2), September 1998 (Tables 3 and 4), November 1998 (Tables 5 and 6), and September 1999 (Tables 7, 8, and 9) at North Brunswick, New Jersey. Two trials planted in 1998 included all entries of the 1998 National Bentgrass Test coordinated by NTEP (Tables 5 and 6). The trials seeded in 1997, 1998, and 1999 included named cultivars, but the majority of entries were experimental selections. The 1997 and 1999 greens tests (Tables 1, 7, and 8) simulated putting green conditions on a modified Nixon loam. The 1998 NTEP and progeny greens trials were established on a sand-based root zone constructed to USGA guidelines (United States Golf Association, 1993) (Tables 3 and 5). The four other tests (Tables 2, 4, 6, and 9) simulated fairway conditions on a Nixon loam.

All sites were well drained and, except for the fairway trial seeded in September 1997 (Table 2), were open and exposed to both sunlight and air circulation. The September 1997 trial was blocked from south or southwest sun by a barn and a line of pine and oak trees. Plot size was 3 X 5 ft for all trials, except the 1998 NTEP trial plots (greens and fairway/tee), which were 4 X 8 ft (Tables 5 and 6). A 6-inch unseeded border surrounded each plot to minimize seed contamination from adjacent plots. Plots were hand-seeded at a rate of approximately 0.5 lb/1000 ft^2. All tests used a randomized complete block design with three replications.

The annual rate of nitrogen applied and mowing height for each test are presented in Table 10. The putting green tests were mowed five to six times per week during periods of active growth with a triplex or walk-behind reel mower equipped to collect clippings. The fairway tests were mowed and clippings were removed three times per week with a triplex reel mower during periods of active growth. Soil pH was maintained in the range of 6.0 to 6.5 with agricultural limestone. All tests were irrigated to avoid drought stress.

The 1997 greens and fairway trials were sprayed with Primer™ wetting agent (4 oz/1000ft^2) on 1 May and 2 June, 2000. Each received a single application of pre-emergent herbicide (Betasan 4E at 2.5 gal/A) in the spring and a single application of Bayleton 50W (1 oz/1000 ft^2) for disease control in summer.

Plots in the 1998 NTEP trials (greens and fairways/tees) were split; the rear 3/8ths of the plots were not sprayed preventively for disease control. The forward 5/8ths of the plots received a preventive disease control program in 2000. The spray schedules for the 1998 greens and fairway trials are outlined in Table 11. Applications denoted as 'entire' were applied to the whole NTEP trial as well as the corresponding progeny trial.

The 1999 greens and fairway trials received a single application each of a pre-emergent herbicide (Betasan 4E at 2.5 gal/A) in the spring, an insecticide (Merit 75WP at 0.145 oz/1000 ft^2) in summer, and a fungicide (Bayleton 50W at 1 oz/1000 ft^2) in fall. The greens trials were topdressed with a sand/peat mixture on 25 April, 2000.

Plots were evaluated frequently during the growing season for overall turf quality (i.e. turf density, texture, uniformity, color, growth habit, and freedom from disease and insect damage). Turf quality, spring green-up, color, density, disease, and turf cover were rated on a 1 to 9 scale, where 9 represented the most desirable turf characteristic. All data were subjected to analysis of variance. Means were separated using the least significant difference (LSD) means separation test.

RESULTS AND DISCUSSION

Turf Quality Evaluations

Entries in Tables 1 through 9 are ranked based on seasonal turf quality averages. In both 1997 trials (Tables 1 and 2), SR 7200 was the highest performing variety in the trial (LSD = 5%). The cultivar SR 7200 was followed in each trial by a number of newer cultivars and experimental selections. These newer cultivars/selections performed better than a number of older established varieties like Penncross, Penneagle, and Backspin, among others. Penn G-2 and L-93 were among the best performing creeping bentgrasses in both trials. In the 1998 greens trial (Table 3), the best performing cultivars were two velvet bentgrasses (SR 7200 and EVM Comp) and two creeping bentgrasses (Penn G-2 and Penn G-6). In the 1998 fairway trial (Table 4), one experimental colonial bentgrass (Syn 9BNC) performed significantly better than the other experimental selections and the SR 7100 standard.

In the 1998 NTEP greens trial (Table 5), two velvet bentgrasses (SR 7200 and Pick MVB) ranked with the top performing creeping bentgrasses (Penn A-1, Penn G-1, Penn A-4, L-93, and PST-A2E). All of the top performers surpassed older standard varieties such as Penncross, Pennlinks, Crenshaw, and Providence. A European velvet bentgrass, Bavaria, performed extremely poorly in this and other tests in which it was included. In the 1998 NTEP fairway/tee trial (Table 6), two experimental colonials topped the list of sprayed turf plots. L-93 was the top performing creeping bentgrass. Although the overall quality of the unsprayed plots was lower than that of the sprayed plots, the relative rankings of the cultivars were similar.

The 1999 greens trial did not establish well and this is reflected in the quality ratings. The Penn series and L-93 remain among the top performers (Table 7). In the velvet greens trial (Table 8), there is little significant difference between the highest and lowest performers. In the 1999 fairway trial (Table 9), two velvet bentgrasses and several experimental creeping bentgrasses topped the test.

Dollar Spot

Although effectively controlled with fungicides, dollar spot is an economically important disease of golf course turf. Velvet and colonial bentgrasses have better resistance to dollar spot than creeping bentgrass, although if left untreated, velvet and colonial bentgrasses can be severely damaged under high disease pressure. Within the creeping bentgrasses, L-93 has consistently exhibited moderate to good disease resistance (Tables 2, 3, 5, 6, 7, and 9), whereas Crenshaw, Century, and others (Tables 3 and 5) are highly susceptible to the disease. Highly susceptible creeping bentgrasses suffered damage from dollar spot even when managed under a preventive disease control program (Tables 5 and 6).

Brown Patch

Velvet bentgrasses displayed good resistance to brown patch in most trials (Tables 2, 3, and 5). Even when the epidemic in 2000 reached proportions that affected the velvet bentgrasses (Table 7), they still displayed greater resistance than the creeping or colonial bentgrasses. Colonial bentgrass was more susceptible to brown patch than either the creeping or velvet bentgrasses (Table 7); however, with a preventive spray program, brown patch was controlled in colonial bentgrass (Table 6). Creeping bentgrasses displayed a wide disparity in brown patch resistance (Tables 2, 3, 5, and 7). Idaho bentgrass was similar to colonial bentgrass in susceptibility to brown patch (Table 6). Brown patch was controlled reasonably well in all bentgrass species with a preventive spray program (Tables 5 and 6).

Copper Spot

Copper spot was active in the 1999 fairway trial (Table 9). Colonial bentgrasses and most creeping bentgrasses displayed good resistance

to copper spot. Many velvet bentgrasses and some creeping bentgrasses were moderately to very susceptible.

Establishment and Pythium Root Rot

Creeping bentgrass displayed better establishment on average when compared to velvet or colonial bentgrass (Tables 7, 8, and 9). Velvet bentgrasses established poorly, which may be associated with the greater incidence of Pythium root rot disease observed in velvet bentgrass plots.

Spring Green-up

Many of the colonial bentgrasses, Idaho bentgrass, and most velvet bentgrasses, except Bavaria, had better spring green-up than most creeping bentgrasses (Tables 3, 5, and 6). Some of the newer creeping bentgrass cultivars and experimentals displayed improved spring green-up when compared to older standard varieties.

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Table 1. Performance of bentgrass cultivars and selections in a greens test seeded in September 1997 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 1998-2000 Avg.	Turf Quality[1] 1998 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Dollar Spot[2] 2000 Avg.
1	SR 7200	velvet	7.6	7.4	7.8	7.4	6.8
2	Penn G-2	creeping	6.0	6.1	6.8	5.1	5.8
3	HIP (Princeville)	creeping	5.6	6.0	5.6	5.3	5.7
4	L-93	creeping	5.4	5.2	5.2	5.9	5.8
5	Dcat-um-86-01-95	creeping	5.4	5.9	5.5	4.8	6.0
6	LCB-103	creeping	5.3	5.4	5.7	4.9	5.8
7	Syn OVSE	creeping	5.3	5.9	4.9	5.1	6.2
8	Penn G-6	creeping	5.0	4.8	5.3	4.9	6.2
9	SR 1119	creeping	4.9	5.5	4.7	4.3	5.3
10	SRX 1HTB-3	creeping	4.8	5.3	4.4	4.6	5.2
11	CB 13-94-97	creeping	4.8	5.2	4.4	4.7	5.5
12	Southshore	creeping	4.7	5.0	4.4	4.8	6.0
13	SRX 1DIN	creeping	4.7	5.3	4.5	4.4	5.7
14	SRX 1120	creeping	4.7	5.4	4.3	4.5	5.5
15	CB 2-94-97	creeping	4.7	5.5	4.6	4.0	5.5
16	Atlanta	creeping	4.7	5.5	4.6	3.9	5.0
17	SRX 1HTP-2	creeping	4.6	5.4	4.3	4.2	5.3
18	SRX 1HTR-3	creeping	4.6	5.0	4.5	4.3	5.8
19	Pennlinks	creeping	4.6	4.8	4.2	4.8	7.0
20	CB-94-97	creeping	4.6	4.7	4.5	4.5	6.2
21	Penneagle	creeping	4.5	4.7	4.4	4.4	6.5
22	Syn OVN	creeping	4.5	5.2	4.1	4.2	6.3
23	Penn A-4	creeping	4.5	5.3	4.1	4.0	4.8
24	Putter	creeping	4.4	4.7	4.3	4.2	6.3
25	Syn 96-3	creeping	4.4	5.0	4.3	3.8	5.7
26	Backspin	creeping	4.3	4.8	4.2	4.1	5.5
27	Dcat-um-86-02-96	creeping	4.3	4.8	4.3	3.9	6.0
28	Syn 96-1	creeping	4.3	5.1	4.1	3.7	4.7
29	CB B-95-97	creeping	4.3	4.7	4.0	4.2	5.8
30	Seaside II	creeping	4.3	4.5	3.9	4.5	6.3

Table 1 (continued).

	Cultivar or Selection	Species	Turf Quality[1] 1998-2000 Avg.	Turf Quality[1] 1998 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Dollar Spot[2] 2000 Avg.
31	ISI-ap-4	creeping	4.3	4.3	4.2	4.3	5.8
32	Providence	creeping	4.2	4.1	4.2	4.4	5.8
33	CB 16-94-97	creeping	4.2	4.6	3.7	4.3	6.0
34	CB 3-94-96	creeping	4.2	4.6	4.0	3.9	5.2
35	Syn ODA	creeping	4.2	5.1	3.6	3.8	6.3
36	Cato	creeping	4.0	4.3	3.8	3.7	5.2
37	ISI-ap-3	creeping	3.9	4.4	3.6	3.8	5.5
38	MS4	creeping	3.9	4.5	3.6	3.6	4.5
39	Syn OVL	creeping	3.8	4.4	3.4	3.6	6.7
40	Penncross	creeping	3.7	4.2	3.2	3.6	5.8
41	Mariner	creeping	3.6	3.9	3.3	3.6	6.8
42	SR 1020	creeping	3.5	4.3	3.1	3.1	4.0
43	18th Green	creeping	3.2	4.2	2.7	2.8	5.3
	LSD at 5% =		0.6	0.7	0.9	0.8	1.2

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

Table 2. Performance of bentgrass cultivars and selections in a fairway test seeded in September 1997 at North Brunswick, NJ.

	Cultivar or Selection	Species	-------Turf Quality Average[1]------- 1998-2000 Avg.	1998 Avg.	1999 Avg.	2000 Avg.	Dollar Spot[2] 2000 Avg.	Brown Patch[2] Aug. 2000
1	SR 7200	velvet	7.0	6.7	7.4	6.9	6.3	9.0
2	Penn G-2	creeping	5.8	6.0	6.4	5.2	7.2	5.7
3	LRF-94-A5	creeping	5.7	5.2	6.0	5.8	6.8	5.7
4	Penn G-6	creeping	5.4	5.3	5.4	5.7	4.5	7.3
5	L-93	creeping	5.4	4.8	5.5	6.0	6.8	5.7
6	SRX-1HTB-3	creeping	5.1	4.6	5.5	5.1	5.0	7.0
7	SRX-1DIN	creeping	5.0	4.8	5.4	4.8	6.7	4.3
8	SRX-1HTP-2	creeping	4.9	4.4	5.9	4.5	5.8	6.3
9	SR-1119	creeping	4.9	4.8	5.1	4.8	5.2	5.0
10	Southshore	creeping	4.9	4.3	5.0	5.3	6.5	4.3
11	Pennlinks	creeping	4.7	4.5	5.2	4.5	6.7	6.3
12	Providence	creeping	4.6	3.8	5.3	4.7	7.0	4.0
13	SRX-1120	creeping	4.6	4.2	4.8	4.7	6.2	5.0
14	Penncross	creeping	4.6	4.3	4.9	4.6	5.7	7.3
15	Penneagle	creeping	4.6	4.2	4.8	4.7	6.7	5.3
16	Crenshaw	creeping	4.6	4.4	4.5	4.8	5.0	7.7
17	Seaside II	creeping	4.5	3.7	5.1	4.7	6.2	5.7
18	Cobra	creeping	4.5	4.2	4.7	4.5	4.7	5.0
19	Backspin	creeping	4.3	4.4	4.6	4.0	6.2	6.0
20	SR-1020	creeping	4.2	3.8	4.3	4.4	5.7	5.3
	LSD at 5% =		0.5	0.8	0.7	1.0	1.4	1.6

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

Table 3. Performance of bentgrass cultivars and selections in a greens trial seeded in September 1998 at North Brunswick, NJ. (Sand-based root zone.)

	Cultivar or Selection	Species	------Turf Quality[1]------ 1999-2000 Avg.	1999 Avg.	2000 Avg.	Spring Green-up[2] April 2000	Dollar Spot[3] 2000 Avg.	Brown Patch[3] Aug. 2000
1	SR 7200	velvet	6.7	6.5	6.9	6.3	9.0	8.3
2	Penn G-2	creeping	6.1	6.3	5.8	7.0	7.4	4.0
3	EVM Comp	velvet	5.9	5.6	6.2	5.7	8.8	8.3
4	Penn G-6	creeping	5.8	5.9	5.7	6.0	7.6	5.3
5	Pick MVB	velvet	5.2	5.1	5.2	5.0	8.7	7.7
6	Penn A-4	creeping	5.0	4.9	5.1	6.3	7.9	7.7
7	SRX 1HS	creeping	5.0	4.8	5.2	6.3	8.3	9.0
8	L-93	creeping	4.9	4.7	5.2	5.3	8.9	3.3
9	SRX 1HP	colonial	4.9	4.7	5.1	4.3	7.6	6.7
10	Pick CB 13-94	creeping	4.7	4.3	5.0	6.0	7.7	4.7
11	SRX 102J	creeping	4.6	4.3	4.9	5.3	7.3	4.7
12	Southshore	creeping	4.6	4.4	4.7	5.3	8.1	5.0
13	ODA	creeping	4.5	4.9	4.1	4.7	8.0	5.0
14	Pick CB 2-94	creeping	4.5	4.9	4.1	5.3	7.3	5.7
15	SRX IC4	colonial	4.5	4.4	4.5	6.7	5.7	4.3
16	MS2	creeping	4.4	4.6	4.3	5.3	6.9	6.7
17	7001	velvet	4.4	3.7	5.1	5.0	8.9	7.7
18	SRX 1HB	colonial	4.4	4.5	4.3	4.3	7.5	5.7
19	Pick CB F-97	creeping	4.2	3.8	4.6	5.3	8.6	7.7
20	Pick CB E-97	creeping	4.2	4.3	4.1	5.0	7.6	4.7
21	MS4	creeping	4.2	4.0	4.4	3.3	8.4	9.0
22	MS7	creeping	4.1	4.1	4.1	4.7	8.9	7.7
23	Pick CB 1-94	creeping	4.1	3.5	4.7	6.7	8.1	6.0
24	Providence	creeping	4.1	3.8	4.4	5.0	7.5	5.7
25	ES6	creeping	4.1	4.0	4.1	4.3	8.5	5.7
26	Putter	creeping	4.0	3.9	4.1	5.0	7.4	4.7
27	Cobra	creeping	4.0	3.8	4.1	5.0	8.3	3.0
28	Pick CB 3-94	creeping	3.8	4.0	3.6	4.3	5.8	7.7
29	Cato	creeping	3.7	3.5	4.0	3.3	8.3	5.7
30	Century	creeping	3.7	4.0	3.3	5.0	5.5	4.7

Table 3 (continued).

	Cultivar or Selection	Species	------Turf Quality[1]------ 1999-2000 Avg.	1999 Avg.	2000 Avg.	Spring Green-up[2] April 2000	Dollar Spot[3] 2000 Avg.	Brown Patch[3] Aug. 2000
31	18th Green	creeping	3.6	3.9	3.3	3.7	6.1	7.3
32	Mariner	creeping	3.6	3.2	3.9	4.7	7.2	4.7
33	Penncross	creeping	3.5	3.4	3.5	4.7	8.3	6.0
34	Crenshaw	creeping	3.5	3.7	3.2	4.3	4.3	6.3
35	Pick CB 16-94	creeping	3.4	3.1	3.7	4.7	8.7	6.0
36	MS5	creeping	3.4	3.7	3.1	3.7	9.0	6.0
37	ES1	creeping	3.3	3.8	2.8	4.0	8.6	8.3
38	Bavaria	velvet	2.3	2.7	1.9	3.3	9.0	9.0
39	AT-1	colonial	2.0	1.5	2.5	3.3	8.4	7.7
40	Peterson Crp. Blue	poa	1.4	1.3	1.4	2.7	7.3	9.0
	LSD at 5% =		0.7	0.8	0.8	1.7	1.2	3.0

[1]9 = best turf quality
[2]9 = best spring green-up
[3]9 = least disease

Table 4. Performance of colonial bentgrass cultivars and selections in a fairway test established in September 1998 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 1999-2000 Avg.	Turf Quality[1] 1999 Avg.	Turf Quality[1] 2000 Avg.	Dollar Spot[2] June 2000
1	Syn 9BNC	colonial	5.7	6.1	5.2	8.3
2	Syn 9F7	colonial	5.1	5.5	4.8	8.0
3	9456	colonial	5.0	5.6	4.4	9.0
4	LRF-98-493	colonial	4.9	5.0	4.8	9.0
5	Mom AT 103	colonial	4.9	5.9	3.9	8.7
6	Syn 98Y	colonial	4.8	5.0	4.6	9.0
7	Syn 9DH	colonial	4.8	5.2	4.4	8.7
8	SR 7100	colonial	4.8	5.5	4.1	9.0
9	SRX IC4	colonial	4.5	5.4	3.7	6.7
10	Mom At 106	colonial	4.5	5.0	4.0	9.0
11	AT-1	colonial	3.1	3.0	3.3	9.0
	LSD at 5% =		0.7	0.6	0.8	1.3

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

Table 5. Performance of bentgrass cultivars and selections in the NTEP greens test seeded in November 1998 at North Brunswick, NJ. (Sand-based root zone.)

	Cultivar or Selection	Species	--Turf Quality (Sprayed)[1]-- 1999-2000 Avg.	1999 Avg.	2000 Avg.	Spring Green-up[2] April 2000	--Brown Patch[3]-- Spray Aug. 2000	No Spray Aug. 2000	--Dollar Spot[3]-- Spray 2000 Avg.	No Spray 2000 Avg.	Color[4] Sept. 2000	Density[5] Sept. 2000
1	Penn A-1	creeping	7.1	7.0	7.1	6.7	9.0	1.7	8.2	7.8	7.7	8.3
2	SR 7200	velvet	6.9	7.1	6.6	8.0	9.0	8.3	9.0	8.7	6.3	6.3
3	Pick MVB	velvet	6.4	6.5	6.3	8.3	8.3	8.3	8.9	9.0	6.7	7.0
4	Penn G-1	creeping	6.4	6.3	6.5	6.0	9.0	5.0	8.2	4.5	7.7	7.3
5	Syn 96-3	creeping	6.2	6.4	6.0	5.7	9.0	6.3	6.7	2.8	7.7	7.7
6	PST-A2E	creeping	6.2	5.8	6.5	7.0	9.0	5.3	8.4	6.8	6.7	6.3
7	Penn A-4	creeping	6.1	5.5	6.6	6.0	9.0	5.7	7.9	6.5	6.3	7.0
8	Syn 96-1	creeping	6.0	6.1	5.9	6.0	9.0	5.0	6.8	3.5	6.0	7.0
9	ABT-CRB-1	creeping	6.0	5.9	6.1	6.3	9.0	6.0	7.7	6.3	5.7	6.0
10	Syn 96-2	creeping	5.9	6.1	5.7	5.0	8.3	6.3	6.2	3.5	8.0	7.7
11	Penn A-2	creeping	5.9	5.6	6.1	6.3	9.0	4.3	8.5	7.0	6.0	5.0
12	Penn G-6	creeping	5.9	5.6	6.1	5.0	9.0	5.7	8.2	6.7	7.3	6.7
13	SRX 1NJH	creeping	5.6	5.3	5.9	6.3	8.7	5.3	8.1	6.5	7.0	6.7
14	L-93	creeping	5.5	4.8	6.3	5.3	8.7	4.0	8.7	7.7	5.7	6.0
15	SR 1119	creeping	5.4	5.3	5.4	6.0	9.0	5.0	7.8	5.5	4.7	4.7
16	BAR AS8FUS2	creeping	5.4	5.3	5.4	5.0	9.0	5.0	7.6	5.2	5.7	5.0
17	ISI AP-5	creeping	5.2	5.1	5.3	4.7	9.0	4.3	8.0	7.8	4.7	5.0
18	Imperial	creeping	5.1	5.0	5.2	5.7	9.0	5.3	7.1	5.0	6.3	5.7
19	Backspin	creeping	5.1	4.8	5.4	5.0	9.0	4.3	6.7	4.7	5.0	4.7
20	Century	creeping	5.1	5.1	5.0	5.0	8.7	5.0	6.2	3.5	5.3	5.3

Table 5 (continued).

	Cultivar or Selection	Species	--Turf Quality (Sprayed)[1]-- 1999-2000 Avg.	1999 Avg.	2000 Avg.	Spring Green-up[2] April 2000	--Brown Patch[3]-- Spray Aug. 2000	No Spray Aug. 2000	--Dollar Spot[3]-- Spray 2000 Avg.	No Spray 2000 Avg.	Color[4] Sept. 2000	Density[5] Sept. 2000
21	Crenshaw	creeping	5.0	4.8	5.2	5.0	9.0	5.0	6.0	2.7	6.0	5.3
22	SRX 1120	creeping	5.0	4.6	5.3	5.0	9.0	4.7	7.8	5.3	5.3	4.7
23	Providence	creeping	4.8	4.4	5.1	5.3	8.3	3.0	7.1	5.8	5.7	4.3
24	BAR CB 8US3	creeping	4.7	4.4	5.0	6.0	9.0	4.7	7.2	5.8	4.7	4.3
25	SRX 1BPAA	creeping	4.7	4.5	4.8	4.7	9.0	6.3	8.2	5.8	5.3	4.7
26	7001	velvet	4.6	3.7	5.5	7.3	9.0	8.3	9.0	7.7	6.0	6.3
27	Pick CB 13-94	creeping	4.5	4.4	4.5	5.3	9.0	6.3	8.4	8.2	4.7	4.3
28	Penncross	creeping	3.4	3.7	3.2	3.7	9.0	4.7	8.8	7.5	3.3	3.0
29	Pennlinks	creeping	3.3	3.4	3.1	3.3	9.0	5.0	8.6	6.8	3.3	3.0
30	Bavaria	velvet	2.9	3.6	2.2	5.3	8.0	7.3	8.9	8.7	2.0	1.7
	LSD at 5% =		0.7	0.9	0.8	1.5	0.7	1.9	0.8	2.1	2.2	1.8

[1]9 = best turf quality
[2]9 = earliest spring green-up
[3]9 = least disease
[4]9 = darkest green color
[5]9 = densest turf

Table 6. Performance of bentgrass cultivars and selections in the NTEP fairway/tee trial seeded in November 1998 at North Brunswick, NJ.

			Turf Quality[1]									
	Cultivar or Selection	Species	Spray 1999-2000 Avg.	Spray 1999 Avg.	Spray 2000 Avg.	No Spray 2000 Avg.	Spring Green-up[2] April 2000	Brown Patch[3] Spray Aug. 2000	Brown Patch[3] No Spray Aug. 2000	Dollar Spot[3] Spray 2000 Avg.	Dollar Spot[3] No Spray 2000 Avg.	Density[4] Spray Sept. 2000
1	ISI At-5	colonial	6.9	6.8	7.0	4.5	7.3	9.0	5.0	9.0	8.3	7.0
2	SRX 7MODD	colonial	6.7	6.4	7.0	4.8	7.7	9.0	2.7	8.8	8.0	7.3
3	L-93	creeping	6.5	6.1	6.9	5.2	7.0	9.0	9.0	8.1	6.8	8.3
4	SRX 7MOBB	colonial	6.3	6.3	6.3	3.8	6.0	9.0	2.0	8.8	8.4	7.0
5	PST-OVN	creeping	6.3	6.4	6.1	5.0	5.7	9.0	9.0	7.7	6.3	5.7
6	ABT-COL-2	colonial	5.8	5.8	5.8	4.8	3.7	8.3	1.7	8.8	8.5	4.7
7	Penn G-6	creeping	5.8	5.7	5.9	4.3	5.7	9.0	9.0	6.9	5.6	7.0
8	SRX 1BPAA	creeping	5.8	5.6	5.9	3.7	5.3	9.0	9.0	7.1	5.0	5.7
9	PST-9HG	colonial	5.7	5.6	5.8	4.0	4.7	9.0	4.0	8.6	7.3	4.7
10	Trueline	creeping	5.5	6.0	5.0	3.7	5.3	9.0	8.3	6.8	5.1	4.7
11	Tiger	creeping	5.5	5.1	5.9	4.0	7.0	9.0	2.3	8.7	7.9	4.3
12	Grand Prix	creeping	5.5	6.0	4.9	3.2	5.3	9.0	7.7	5.4	4.3	4.7
13	SR 7100	colonial	5.4	5.1	5.7	4.0	6.0	9.0	3.3	8.6	7.9	5.3
14	SRX 1120	creeping	5.4	5.5	5.3	3.2	5.3	9.0	8.0	6.2	4.3	5.0
15	PST-9PM	colonial	5.3	5.2	5.4	3.0	6.0	9.0	2.3	8.2	7.0	4.3
16	Seaside II	creeping	5.3	5.1	5.4	4.0	5.0	9.0	7.7	7.9	5.9	7.0
17	Imperial	creeping	5.2	5.6	4.9	3.7	4.3	9.0	8.3	5.6	4.4	4.3
18	SR 1119	creeping	5.0	5.3	4.7	3.0	5.3	9.0	9.0	5.6	4.1	4.0
19	Princeville	creeping	4.9	4.7	5.0	3.8	5.3	9.0	7.3	6.3	5.3	3.0
20	Century	creeping	4.7	5.6	3.8	2.2	3.3	9.0	9.0	4.4	3.1	4.3

Table 6 (continued).

	Cultivar or Selection	Species	Turf Quality[1] Spray 1999-2000 Avg.	Turf Quality[1] Spray 1999 Avg.	Turf Quality[1] Spray 2000 Avg.	Turf Quality[1] No Spray 2000 Avg.	Spring Green-up[2] April 2000	Brown Patch[3] Spray Aug. 2000	Brown Patch[3] No Spray Aug. 2000	Dollar Spot[3] Spray 2000 Avg.	Dollar Spot[3] No Spray 2000 Avg.	Density[4] Spray Sept. 2000
21	Golf Star	Idaho	4.7	4.5	4.9	3.8	7.7	9.0	4.3	8.2	7.5	3.7
22	Backspin	creeping	4.6	5.2	4.0	2.8	3.7	9.0	9.0	4.8	4.3	4.7
23	Penncross	creeping	4.6	5.2	4.0	2.0	3.7	9.0	9.0	5.7	4.8	2.7
24	Providence	creeping	4.6	4.7	4.4	3.7	4.7	9.0	6.3	5.6	4.4	4.3
25	Penneagle	creeping	4.2	3.9	4.5	3.0	5.7	9.0	9.0	7.2	5.9	3.0
26	Seaside	creeping	2.4	2.5	2.3	1.8	1.3	9.0	7.3	7.2	6.2	1.3
	LSD at 5% =		0.7	0.7	0.8	1.1	1.7	0.4	2.1	0.8	0.9	1.3

[1]9 = best turf quality
[2]9 = earliest spring green-up
[3]9 = least disease
[4]9 = densest turf

Table 7. Performance of bentgrass cultivars and selections in a putting green trial seeded in September 1999 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 2000 Avg.	Establish-ment[2] Oct. 1999	Root Pythium[3] Nov. 1999	Brown Patch[3] 2000 Avg.	Dollar Spot[3] 2000 Avg.
1	Penn A-1	creeping	5.3	7.0	8.0	4.0	6.0
2	EFD comp	velvet	5.3	4.7	5.7	6.8	6.5
3	EMCB comp	creeping	5.1	5.3	8.0	5.5	4.7
4	L-93	creeping	5.0	5.7	8.7	4.3	6.0
5	Penn G-1	creeping	5.0	7.0	8.3	4.5	4.8
6	Penn A-4	creeping	4.9	7.3	9.0	5.0	4.8
7	Pick 96-2	creeping	4.9	7.0	7.0	6.0	3.5
8	EEC comp	velvet	4.8	4.3	5.7	5.8	6.2
9	MCB comp	creeping	4.7	4.7	7.3	5.8	3.7
10	MCI comp	velvet	4.7	3.3	5.3	5.8	6.3
11	Pick MVB	velvet	4.7	7.0	5.7	5.2	5.5
12	EVD comp	velvet	4.6	4.3	5.0	5.3	7.0
13	Koos Bent	creeping	4.5	6.0	8.3	4.0	4.7
14	Penneagle	creeping	4.4	6.7	8.7	4.0	5.2
15	SR-7200	velvet	4.4	6.3	4.7	5.8	6.3
16	VBC comp	velvet	4.3	4.0	6.0	5.7	5.5
17	South Shore	creeping	4.3	5.7	7.3	4.8	4.8
18	Syn OFT	creeping	4.3	4.3	7.7	4.2	4.2
19	Pennlinks	creeping	4.2	7.0	8.0	4.0	5.8
20	Heriot	colonial	4.2	7.7	7.3	2.3	8.2
21	Crenshaw	creeping	4.1	6.7	8.3	4.5	3.2
22	Syn OBT	creeping	4.1	4.3	8.0	5.0	5.3
23	Putter	creeping	4.1	6.0	7.7	4.0	4.2
24	Matt's Bent	creeping	4.1	6.0	7.0	4.0	3.2
25	BariFera	creeping	4.0	5.7	7.3	3.8	4.5
26	Penn G-6	creeping	3.9	6.3	8.3	5.3	5.5
27	Bardot	colonial	3.9	5.0	6.3	3.2	7.5
28	Regent	creeping	3.6	6.3	7.7	3.7	4.5
29	Penncross	creeping	3.4	7.0	8.7	5.5	4.8

Table 7 (continued).

Cultivar or Selection	Species	Turf Quality[1] 2000 Avg.	Establish-ment[2] Oct. 1999	Root Pythium[3] Nov. 1999	Brown Patch[3] 2000 Avg.	Dollar Spot[3] 2000 Avg.
LSD at 5% =		0.8	1.4	1.3	1.4	1.2

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

Table 8. Performance of velvet bentgrass cultivars and selections in a greens trial seeded in September 1999 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 2000 Avg.	Establish-ment[2] Oct. 1999	Root Pythium[3] Nov. 1999	Dollar Spot[3] 2000 Avg.
1	PST EVN	velvet	5.5	8.3	5.7	4.7
2	EFD Comp	velvet	5.5	5.7	5.0	4.7
3	Pick MVB	velvet	5.4	7.7	5.3	2.0
4	SR 7200	velvet	5.2	7.7	4.7	5.7
5	MCI Comp	velvet	5.1	4.0	6.0	5.3
6	MDD Comp	velvet	5.1	5.7	5.3	2.3
7	EEC Comp	velvet	5.0	5.3	6.7	4.3
8	EVD Comp	velvet	4.7	5.3	5.3	5.0
9	VBC Comp	velvet	4.7	3.7	6.7	3.7
	LSD at 5% =		0.7	1.1	1.4	1.3

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

Table 9. Performance of bentgrass cultivars and selections in a fairway trial seeded in September 1999 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality[1] 2000 Avg.	Establish-ment[2] Oct. 1999	Root Pythium[3] Nov. 1999	Brown Patch[3] 2000 Avg.	Dollar Spot[3] 2000 Avg.	Copper Spot[3] Aug. 2000
1	EFD Comp	velvet	6.6	5.7	6.0	7.2	8.0	4.3
2	SYN OE	creeping	6.6	4.3	9.0	6.0	6.7	9.0
3	SR 7200	velvet	6.3	7.0	5.0	6.7	8.2	6.3
4	EMCB Comp	creeping	6.3	5.7	8.7	6.2	6.7	8.3
5	SYN OPN	creeping	6.2	5.0	7.7	6.0	6.0	8.3
6	EF-115	creeping	6.2	6.0	6.0	4.8	6.5	9.0
7	Penn A-1	creeping	6.0	7.0	8.3	5.7	7.0	8.7
8	EVD Comp	velvet	6.0	5.0	5.7	6.0	7.8	6.3
9	SYN ODO	creeping	5.9	4.7	9.0	6.0	7.0	9.0
10	Penn A-4	creeping	5.8	6.3	8.3	5.5	6.3	8.0
11	MCB Comp	creeping	5.8	4.7	8.7	5.7	5.3	9.0
12	EEC Comp	creeping	5.7	5.3	5.7	6.7	8.3	7.3
13	L-93	creeping	5.7	7.0	9.0	5.8	7.5	9.0
14	A2E	creeping	5.7	4.0	7.7	5.8	7.2	9.0
15	VBC Comp	velvet	5.6	3.7	5.7	7.0	7.3	4.7
16	Penn G-1	creeping	5.6	7.0	8.7	5.8	5.8	8.3
17	OVN	creeping	5.6	6.3	7.3	5.2	6.3	9.0
18	MCI Comp	velvet	5.5	3.7	5.0	6.7	7.5	4.3
19	SYN OBR	creeping	5.4	5.3	8.0	5.0	6.3	7.3
20	SYN OEH	creeping	5.4	5.3	8.3	6.2	6.7	9.0
21	SYN OBR	creeping	5.3	5.0	7.7	5.7	6.7	9.0
22	Penneagle	creeping	5.2	6.0	8.3	6.2	6.5	9.0
23	SYN OMT	creeping	5.2	5.7	7.7	4.2	6.3	9.0
24	8151 Comp	creeping	5.1	3.7	8.7	5.3	5.2	9.0
25	Koos Bent	creeping	5.1	5.7	7.0	4.7	6.0	9.0
26	SYN OFT	creeping	5.1	4.3	8.7	5.2	5.7	9.0
27	Pennlinks	creeping	5.0	6.7	7.3	5.2	6.5	9.0
28	Southshore	creeping	4.9	6.0	9.0	5.3	5.7	9.0
29	Heriot	colonial	4.8	8.0	7.7	1.5	8.0	9.0
30	SYN OBT	creeping	4.8	4.3	8.0	3.7	6.8	9.0

Table 9 (continued).

	Cultivar or Selection	Species	Turf Quality[1] 2000 Avg.	Establish-ment[2] Oct. 1999	Root Pythium[3] Nov. 1999	Brown Patch[3] 2000 Avg.	Dollar Spot[3] 2000 Avg.	Copper Spot[3] Aug. 2000
31	Penn G-6	creeping	4.7	7.3	8.3	4.8	6.2	9.0
32	Putter	creeping	4.6	6.0	7.0	4.2	5.5	9.0
33	BariFera	creeping	4.5	7.0	7.0	4.2	5.3	9.0
34	Crenshaw	creeping	4.4	6.7	7.7	5.5	3.8	7.3
35	Matts Bent	creeping	4.2	6.7	7.0	4.0	4.7	9.0
36	Cobra	creeping	4.1	6.0	7.7	4.8	5.3	9.0
37	Bardot	colonial	4.1	5.7	6.7	1.8	7.8	9.0
38	SYN 9DH	colonial	4.1	5.0	6.7	3.2	6.7	9.0
39	9F7	colonial	4.1	5.3	7.7	2.5	6.2	9.0
40	SYN 9SG	colonial	3.6	2.3	7.7	2.7	6.5	9.0
41	Regent	creeping	3.6	7.0	7.0	3.8	5.2	9.0
42	Penncross	creeping	3.3	6.3	8.3	4.8	5.5	9.0
43	Rasti	colonial	3.1	5.3	6.0	2.3	7.5	9.0
	LSD at 5% =		0.7	1.1	1.3	1.4	1.2	1.9

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

Table 10. Yearly Nitrogen (N) applied and mowing height (Ht) on bentgrass tests established at North Brunswick, NJ.

	1998		1999		2000	
	N[1]	Ht[2]	N	Ht	N	Ht
Table 1 (1997 Green)	3.4	0.28	3.5	0.16	1.8	0.16
Table 2 (1997 Fairway)	2.9	0.41	3.1	0.41	1.8	0.28
Table 3 (1998 Green)			3.5	0.16	2.6	0.16
Table 4 (1998 Fairway)			4.8	0.41	2.4	0.41
Table 5 (1998 NTEP Green)			3.7	0.16	2.6	0.16
Table 6 (1998 NTEP Fairway/Tee)			4.9	0.41	2.4	0.41
Tables 7 and 8 (1999 Green)					2.3	0.16
Table 9 (1999 Fairway)					2.3	0.41

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

Table 11. Pesticides applied in 2000 on bentgrass cultivars and selections in 1998 NTEP greens and fairway/tee tests at North Brunswick, NJ.

Date	Pesticide Product	Product Rate (per 1000 ft^2)	Portion of Plot Treated[1]
1998 NTEP Greens Trial (Table 5)			
12 May	Daconil Ultrex 82.5SDG	3.84 oz	Entire
1 June	Turcam 76W	1 oz	Entire
1 June	Daconil Ultrex 82.5SDG	0.67 oz	Entire
22 June	Bayleton 50W	1 oz	Entire
12 July	Merit 75WSP	0.145 oz	Entire
20 July	Daconil Ultrex 82.5SDG	7.35 oz	Front
28 July	Dursban Pro	2 oz	Entire
10 August	Chipco 26GT 2SC	4 fl oz	Front
31 August	Daconil Ultrex 82.5SDG	5.5 oz	Front
6 October	Daconil Ultrex 82.5SDG	7.35 oz	Entire
1998 NTEP Fairway/Tee (Table 6)			
21 April	Betasan 4E	7.35 fl oz	Entire
28 April	Mecamine BG	1 oz	Entire
2 May	Primer	4 oz	Entire
12 May	Daconil Ultrex 82.5SDG	3.84 oz	Entire
1 June	Daconil Ultrex 82.5SDG	3.67 oz	Entire
2 June	Primer	4 oz	Entire
22 June	Bayleton 50W	1 oz	Entire
12 July	Merit 75WSP	0.145 oz	Entire
20 July	Daconil Ultrex 82.5SDG	7.35 oz	Front
28 July	Dursban Pro	2 oz	Entire
10 August	Chipco 26GT 2SC	4 fl oz	Front
31 August	Daconil Ultrex 82.5SDG	5.5 oz	Front
6 October	Bayleton 50W	1 oz	Entire

[1]*Entire* indicates that the entire trial area was treated with the respective pesticide; *front* indicates that only the front 5/8ths of each NTEP plot was treated with the respective pesticide.