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# **1999 RUTGERS TURFGRASS PROCEEDINGS**

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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.

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 Turf Research Program at Cook College - Rutgers, The State University of New Jersey.

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

## PERFORMANCE OF BENTGRASS CULTIVARS AND SELECTIONS IN NEW JERSEY TURF TRIALS

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A number of *Agrostis* species are used for specialized, close-cut turf including creeping bentgrass (*Agrostis palustris* or *A. stolonifera*), colonial bentgrass (*A. tenuis* or *A. capillaris*), highland or dryland bentgrass (*A. castellana*), and velvet bentgrass (*A. canina*). Creeping and velvet bentgrasses have a dense, prostrate growth habit and are able to persist under very low mowing heights. The more vigorous stolon growth of creeping bentgrass has made this grass more popular for putting green utilization than velvet bentgrass. Moreover, the maintenance requirements of creeping bentgrass are better understood than velvet bentgrass. Creeping bentgrass is well adapted for golf course use in both the cool, temperate and warm, humid environments of the United States. Recent releases of improved creeping bentgrasses have increased the choice of varieties for turf managers.

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 summers. Colonial bentgrasses are fine-textured grasses that have a more upright growth habit and can spread (less aggressively than creeping bentgrasses) through limited rhizomes. Compared to creeping bentgrasses, colonial bentgrasses typically have a brighter green color and better color retention during cool weather. They also generally have better dollar spot resistance and wear tolerance, but are more susceptible to brown patch. Colonial bentgrasses perform best under New Jersey's climate when mowed between 3/8 to

3/4 inch, and thus are better adapted for fairway or tee use.

Velvet bentgrass forms an extremely fine-textured and dense turf that is more upright than creeping bentgrass. It spreads mainly through profuse tillering and short 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). Aggressive nitrogen (N) fertilization and higher cutting heights on velvet bentgrass will produce considerable thatch. It is also susceptible to red thread and copper spot, which are more severe at very low N fertility. Velvet bentgrass has not been used extensively for high maintenance turf, largely because its range of adaptation has not been well recognized. Selections of velvet bentgrass have persisted for many years in trials under New Jersey growing conditions.

Other bentgrasses currently under evaluation for turf include dryland bentgrass and Idaho bentgrass (*A. idahoensis*). Dryland bentgrasses are similar in adaptation and appearance to colonial bentgrasses, but are more blue-green in color and have extensive 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 turf plots, but has a dull green color and an upright growth habit that is less attractive than the creeping, colonial, or velvet bentgrasses. In New Jersey turf trials, this species has exhibited good resistance to dollar spot.

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The New Jersey Agricultural Experiment Station participates in the National Turfgrass Evaluation Program (NTEP), which evaluates many species of turfgrasses, including bentgrasses, at locations throughout the United States. The Rutgers turfgrass breeding program conducts extensive field evaluations of collections and new material developed in its improvement program, and also evaluates cultivars or selections developed in other breeding programs.

## PROCEDURES

Four bentgrass evaluation trials were established in September 1997 or 1998 on loamy soil at the Turf Research Farm in North Brunswick, New Jersey (Tables 1, 2, 4, and 6). In addition, two putting green trials were seeded in November 1998 on a sand-based root zone constructed to USGA guidelines (United States Golf Association, 1993) (Tables 3 and 5). Two of the trials seeded in 1998 included all entries of the 1998 National Bentgrass Test coordinated by NTEP (Tables 3 and 4). The other trials included named cultivars; however, the majority of entries were experimental selections. All sites were well-drained and, except for the higher cut fairway/tee trial seeded in September 1997 (Table 2), were openly exposed to both sunlight and air circulation. The September 1997 trial was blocked from the southern and southwestern exposures by a barn and a line of pine and oak trees. Plots were hand-seeded at a rate of approximately 0.5 lb/1000 ft<sup>2</sup>. All tests used a randomized complete block design with three replications.

The annual rate of N applied and mowing height for each test are presented in Table 7. 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 at 0.406 inch 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 5.5 to 6.5 with agricultural limestone. All tests were irrigated to avoid drought stress.

The 1998 fairway trials (Tables 4 and 6) were sprayed with Aquaduct wetting agent at 6 oz/1000 ft<sup>2</sup> on 20 May and 27 July 1999. The 1998 putting green trials (Tables 3 and 5) were aerified with solid tines on 21 October and topdressed with a sand/peat mixture on 22 October 1999. Plots in the NTEP trials were split; 3/8ths of the plot (rear) was not treated for disease until late October, and the remaining 5/8ths (front) received a preventive disease control program during 1999. The pest control program for the NTEP trials is outlined in Table 8.

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

Entries in Tables 1 through 6 are ranked based on seasonal turf quality averages. The velvet bentgrass cultivar SR 7200 performed very well in both fairway and putting green trials, out-performing many of the older creeping bentgrass varieties. Many of the newer creeping bentgrass cultivars also performed better than the older standard cultivars. A few experimental selections of colonial bentgrass performed as well as the better creeping bentgrasses during the first year of the 1998 NTEP Fairway Trial (Table 4), and some selections performed moderately well under putting green conditions (Table 5). Continued improvement of colonial bentgrass germplasm will make this species a more viable option for golf course fairways over a broader range of climatic conditions. Previous work at Rutgers has shown that colonial bentgrass is more wear tolerant than creeping bentgrass (Bonos et al., 1999).

## Dollar Spot

Although effectively controlled with fungicides, dollar spot is an economically important disease in golf turf. Velvet and colonial bentgrasses have better resistance to dollar spot than creeping bentgrass, although if the disease is left untreated, velvet and colonial can be severely damaged under high disease pressure. Within the creeping bentgrass entries, L-93 has repeatedly exhibited good resistance to dollar spot, whereas Crenshaw has been highly susceptible to the disease. Highly susceptible creeping bentgrass varieties suffered damage from dollar spot (Tables 1 to 5) even when managed under the preventive disease control program (Table 8) in the NTEP trials (Tables 3 and 4). The Idaho bentgrass Golf Star had good resistance to this disease (Table 4).

## Brown Patch

With the exception of the cultivar Bavaria (Table 3), which sustained severe injury from brown patch, velvet bentgrass entries exhibited moderate to good resistance to this disease (Tables 1, 2, 3, and 5). Colonial bentgrass tended to be more susceptible to brown patch than most of the creeping bentgrass entries (Tables 4 and 6). Brown patch was controlled reasonably well under the preventive program (Table 8) in the NTEP putting green trial; however, some disease activity was present (Table 3).

## Copper Spot and Pink Snow Mold

Copper spot activity in the 1998 putting green trial indicated that velvet bentgrass was generally more susceptible to this disease than creeping or colonial bentgrass (Table 5). Some entries of creeping bentgrass, including Penn G-2, Putter, 18th Green, Cato, Mariner, and a number of experimental selections, were damaged to a similar extent as the velvet bentgrasses. Velvet bentgrass entries were consistently damaged by pink snow mold disease in the 1998 putting green trial (Table 5). Creeping bentgrass

entries ranged from poor to moderate resistance to pink snow mold, and three of four colonial bentgrass entries were moderately resistance to this disease (Table 5). The creeping bluegrass (perennial *Poa annua*) entry exhibited excellent resistance to copper spot and pink snow mold (Table 5).

## Winter Color and Spring Green-up

Many creeping bentgrass cultivars have a tendency to turn off-color (purple, yellow, or straw-colored) during the winter months. Some newer selections, however, exhibited better winter color in the 1998 NTEP Fairway Trial (Table 4). Colonial bentgrass entries had better winter color than most of the creeping bentgrass entries. Similarly, colonial bentgrass has better spring green-up than most creeping bentgrass entries (Tables 4 and 6). SR 7200 also had excellent spring green-up compared to creeping bentgrass entries (Table 1).

## ACKNOWLEDGMENTS

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## REFERENCES

- Bonos, S. A., Murphy, J. A., Meyer, W. A., Clarke, B. B., Plumley, K. A., Dickson, W. K., Clark, J. B., Honig, J. A., and Smith, D. A. 1999. Performance of bentgrass cultivars and selections in New Jersey trials. Pages 33 to 48 *in*: Rutgers Turfgrass Proceedings, 1998. A. B. Gould and B. B. Clarke, Eds. Rutgers

Center for Turfgrass Science and New Jersey Turfgrass Association, New Brunswick, NJ. Vol. 30, 212 pp.

Skogley, C. R. 1973. Velvet bentgrass. University of Rhode Island Cooperative Extension Service Bulletin Number 199.

United States Golf Association. 1993. USGA recommendations for a method of putting green construction - the 1993 revision. USGA Green Section Record, March/April. 37 pp.

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

	Cultivar or Selection	Species	-----Turf Quality <sup>1</sup> -----			Spring	Brown	Dollar
			1998-1999 Avg.	1998 Avg.	1999 Avg.	Green-up <sup>2</sup> April 1999	Patch <sup>3</sup> July 1999	Spot <sup>4</sup> 1999 Avg.
1	SR 7200	velvet	7.6	7.4	7.8	9.0	6.7	8.7
2	Penn G-2	creeping	6.4	6.1	6.8	6.0	5.0	7.1
3	HIP (Princeville)	creeping	5.8	6.0	5.6	5.0	5.3	5.3
4	Dcat-um-86-01-95	creeping	5.7	5.9	5.5	5.0	5.0	6.2
5	Grand Prix	creeping	5.6	5.4	5.7	5.3	6.3	6.2
6	Syn OVSE	creeping	5.4	5.9	4.9	5.0	5.0	7.4
7	L-93	creeping	5.2	5.2	5.2	3.7	4.7	7.8
8	SR 1119	creeping	5.1	5.5	4.7	5.3	5.3	5.5
9	Penn G-6	creeping	5.1	4.8	5.3	4.3	4.3	5.8
10	CB 2-94-97	creeping	5.1	5.5	4.6	4.0	5.3	5.3
11	Atlanta	creeping	5.1	5.5	4.6	4.7	5.7	4.8
12	SRX 1DIN	creeping	4.9	5.3	4.5	4.0	5.3	6.0
13	SRX 1HTP-2	creeping	4.9	5.4	4.3	5.0	7.0	6.0
14	SRX 1HTB-3	creeping	4.9	5.3	4.4	3.0	7.0	5.3
15	SRX 1120	creeping	4.8	5.4	4.3	5.0	4.0	6.1
16	CB 13-94-97	creeping	4.8	5.2	4.4	4.7	5.7	6.2
17	SRX 1HTR-3	creeping	4.8	5.0	4.5	4.7	6.7	5.3
18	Southshore	creeping	4.7	5.0	4.4	4.7	4.3	6.0
19	Penn A-4	creeping	4.7	5.3	4.1	1.7	4.3	6.3
20	Syn OVN	creeping	4.7	5.2	4.1	5.0	6.0	7.7
21	Syn 96-3	creeping	4.6	5.0	4.3	4.3	4.3	5.3
22	CB-94-97	creeping	4.6	4.7	4.5	3.7	5.0	6.8
23	Syn 96-1	creeping	4.6	5.1	4.1	3.3	4.7	5.0
24	Penneagle	creeping	4.6	4.7	4.4	4.7	4.3	7.4
25	Dcat-um-86-02-96	creeping	4.5	4.8	4.3	4.3	3.0	6.8
26	Pennlinks	creeping	4.5	4.8	4.2	4.7	3.7	7.5
27	Putter	creeping	4.5	4.7	4.3	3.7	3.3	7.3
28	Backspin	creeping	4.5	4.8	4.2	2.7	5.3	5.7
29	Syn ODA	creeping	4.3	5.1	3.6	2.7	4.0	7.3
30	CB B-95-97	creeping	4.3	4.7	4.0	4.0	4.7	5.6

(Continued)

Table 1 (continued).

	Cultivar or Selection	Species	-----Turf Quality <sup>1</sup> -----			Spring	Brown	Dollar
			1998-1999 Avg.	1998 Avg.	1999 Avg.	Green-up <sup>2</sup> April 1999	Patch <sup>3</sup> July 1999	Spot <sup>4</sup> 1999 Avg.
31	CB 3-94-96	creeping	4.3	4.6	4.0	4.3	5.0	3.8
32	ISI-ap-4	creeping	4.3	4.3	4.2	3.7	5.3	7.1
33	CB 16-94-97	creeping	4.2	4.6	3.7	3.3	4.7	6.6
34	Seaside II	creeping	4.2	4.5	3.9	3.3	4.7	7.8
35	Providence	creeping	4.2	4.1	4.2	4.7	4.3	7.3
36	Cato	creeping	4.1	4.3	3.8	4.3	4.7	6.3
37	MS4	creeping	4.1	4.5	3.6	4.0	7.0	6.5
38	ISI-ap-3	creeping	4.0	4.4	3.6	4.0	3.0	6.7
39	Syn OVL	creeping	3.9	4.4	3.4	3.0	4.0	7.3
40	Penncross	creeping	3.7	4.2	3.2	3.3	4.0	7.4
41	SR 1020	creeping	3.7	4.3	3.1	4.0	4.7	3.5
42	Mariner	creeping	3.6	3.9	3.3	4.0	3.0	6.5
43	18th Green	creeping	3.5	4.2	2.7	3.3	4.0	5.0
LSD at 5% =			0.6	0.7	0.9	1.9	1.5	1.2

<sup>1</sup>9 = best turf quality

<sup>2</sup>9 = best spring green-up

<sup>3</sup>9 = least brown patch

<sup>4</sup>9 = least dollar spot

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

	Cultivar or Selection	Species	-----Turf Quality <sup>1</sup> -----			Dollar Spot <sup>2</sup> Oct. 1999	Brown Patch <sup>3</sup> 1999 Avg.
			1998- 1999- Avg.	1998 Avg.	1999 Avg.		
1	SR-7200	velvet	7.1	6.7	7.4	8.0	6.8
2	Penn G-2	creeping	6.2	6.0	6.4	4.7	5.3
3	LRF-94-A5	creeping	5.6	5.2	6.0	5.7	7.3
4	Penn G-6	creeping	5.3	5.3	5.4	4.3	7.2
5	L-93	creeping	5.2	4.8	5.5	6.3	7.3
6	SRX-1HTP-2	creeping	5.1	4.4	5.9	4.7	8.0
7	SRX-1DIN	creeping	5.1	4.8	5.4	4.0	6.7
8	SRX-1HTB-3	creeping	5.1	4.6	5.5	4.7	7.9
9	SR-1119	creeping	5.0	4.8	5.1	3.7	6.1
10	Pennlinks	creeping	4.9	4.5	5.2	5.0	7.3
11	Southshore	creeping	4.7	4.3	5.0	4.0	6.3
12	Penncross	creeping	4.6	4.3	4.9	5.0	7.7
13	Providence	creeping	4.6	3.8	5.3	5.0	7.3
14	SRX-1120	creeping	4.5	4.2	4.8	4.0	6.1
15	Penneagle	creeping	4.5	4.2	4.8	5.0	6.7
16	Backspin	creeping	4.5	4.4	4.6	3.3	5.9
17	Crenshaw	creeping	4.5	4.4	4.5	2.0	6.6
18	Cobra	creeping	4.5	4.2	4.7	4.7	5.8
19	Seaside II	creeping	4.4	3.7	5.1	6.3	5.7
20	SR-1020	creeping	4.1	3.8	4.3	3.7	5.3
LSD at 5% =			0.6	0.8	0.7	0.9	1.1

<sup>1</sup>9 = best turf quality

<sup>2</sup>9 = least dollar spot

<sup>3</sup>9 = least brown patch; rating represents an average of three ratings taken during June and July

Table 3. Performance of bentgrass cultivars and selections in the 1998 National Bentgrass Putting Green Test seeded in November 1998 on a sand-based root zone at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality <sup>1</sup> 1999 Avg.	Establishment <sup>2</sup> Nov. 1999	Brown Patch <sup>3</sup> July 1999	Brown Patch <sup>3</sup> Sprayed Aug. 1999	Brown Patch <sup>3</sup> Unsprayed Aug. 1999	Dollar Spotted <sup>4</sup> Sprayed Sept. 1999	Dollar Spotted <sup>4</sup> Unsprayed Sept. 1999
1	SR 7200	velvet	7.1	7.0	8.0	9.0	9.0	8.7	5.7
2	Penn A-1	creeping	7.0	7.7	5.3	8.0	5.7	7.7	5.3
3	Pick MVB	velvet	6.5	6.3	8.7	9.0	9.0	9.0	4.3
4	Syn 96-3	creeping	6.4	6.3	6.3	9.0	8.7	5.0	2.3
5	Penn G-1	creeping	6.3	8.0	4.3	9.0	7.0	7.3	4.0
6	Syn 96-1	creeping	6.1	7.0	5.7	9.0	8.3	6.7	2.7
7	Syn 96-2	creeping	6.0	5.7	6.7	9.0	7.7	5.7	2.7
8	ABT-CRB-1	creeping	5.9	6.0	5.0	8.7	6.0	7.0	4.3
9	PST-A2E	creeping	5.8	5.0	4.3	8.7	5.7	8.3	4.7
10	Penn G-6	creeping	5.6	6.7	5.3	9.0	6.3	7.3	5.0
11	Penn A-2	creeping	5.6	7.0	3.3	6.0	4.7	8.0	4.3
12	Penn A-4	creeping	5.5	8.0	4.0	9.0	4.3	6.7	4.0
13	BAR AS8FUS2	creeping	5.3	5.7	4.0	8.7	5.7	7.0	2.7
14	SR 1119	creeping	5.3	7.0	4.7	8.0	7.0	7.3	3.7
15	SRX 1NJH	creeping	5.3	5.7	6.3	9.0	6.0	7.0	3.7
16	Century	creeping	5.1	6.0	4.7	8.0	6.7	5.7	3.0
17	ISI AP-5	creeping	5.1	6.3	5.3	7.7	6.7	6.3	4.3
18	Imperial	creeping	5.0	6.0	3.7	8.7	6.0	6.7	3.0
19	Crenshaw	creeping	4.8	7.7	4.3	9.0	7.3	6.0	3.3
20	Backspin	creeping	4.8	7.0	5.0	8.7	6.3	7.3	4.0

(Continued)

Table 3 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup> 1999 Avg.	Establishment <sup>2</sup> Nov. 1999	Brown Patch <sup>3</sup> July 1999	Brown Patch <sup>3</sup> Sprayed Aug. 1999	Brown Patch <sup>3</sup> Unsprayed Aug. 1999	Dollar Spot <sup>4</sup> Sprayed Sept. 1999	Dollar Spot <sup>4</sup> Unsprayed Sept. 1999
21 L-93	creeping	4.8	7.0	6.0	7.7	5.3	8.0	5.0
22 SRX 1120	creeping	4.6	5.3	3.3	6.7	5.0	7.7	4.3
23 SRX 1BPAA	creeping	4.5	6.3	3.7	6.3	4.7	7.7	4.7
24 BAR CB 8US3	creeping	4.4	5.0	4.7	8.3	6.3	6.3	2.3
25 Providence	creeping	4.4	7.0	3.3	7.7	6.0	7.0	4.3
26 Pick CB 13-94	creeping	4.4	6.0	5.7	9.0	7.7	8.3	3.7
27 Pennncross	creeping	3.7	6.7	4.3	8.0	5.3	8.0	5.3
28 7001	velvet	3.7	1.3	8.7	9.0	9.0	9.0	5.7
29 Bavaria	velvet	3.5	7.3	5.7	7.0	7.0	9.0	8.0
30 Pennlinks	creeping	3.4	6.7	3.7	9.0	6.3	8.0	4.3
		LSD at 5% =	0.9	1.6	1.6	1.8	1.3	1.8

<sup>1</sup>9 = best turf quality

<sup>2</sup>9 = best establishment

<sup>3</sup>9 = least brown patch

<sup>4</sup>9 = least dollar spot

Table 4. Performance of bentgrass cultivars and selections in the 1998 National Bentgrass Fairway/Tee Test seeded in September 1998 at North Brunswick, NJ.

Cultivar or Selection	Species	Turf Quality <sup>1</sup> 1999 Avg.	Seedling-Vigor <sup>2</sup> Oct. 1998	Cover (%) Oct. 1998	Winter Color <sup>3</sup> March 1999	Spring Green-up <sup>4</sup> April 1999	Brown Patch <sup>5</sup> Un-sprayed 1999 Avg.	Dollar Spotted <sup>6</sup> Sprayed 1999 Avg.	Dollar Spotted <sup>6</sup> Un-sprayed 1999 Avg.
1 ISI At5	colonial	6.8	4.3	58	5.3	7.7	4.8	8.3	7.0
2 PST-OVN	creeping	6.4	4.7	60	5.3	4.0	6.8	8.5	6.7
3 SRX 7MODD	colonial	6.4	4.0	60	5.7	8.3	4.2	7.8	6.5
4 SRX 7MOBB	colonial	6.3	4.7	65	5.0	6.3	5.0	8.0	6.2
5 Trueline	creeping	6.1	7.7	87	4.0	5.7	6.3	8.2	6.2
6 L-93	creeping	6.0	5.3	73	2.7	4.0	7.8	8.5	5.8
7 Grand Prix	creeping	6.0	5.3	72	2.7	4.0	8.2	6.8	4.5
8 ABT-COL-2	colonial	5.9	5.7	82	5.3	5.0	3.5	8.5	6.3
9 Penn G-6	creeping	5.6	7.7	94	2.3	4.0	6.8	7.7	4.2
10 PST 9HG	colonial	5.6	5.7	75	6.3	6.0	4.0	7.5	5.8
11 SRX 1120	creeping	5.6	4.3	40	4.3	5.7	7.5	7.0	4.7
12 Century	creeping	5.6	4.7	65	3.0	4.0	6.7	6.7	3.7
13 SRX 1BPAA	creeping	5.5	6.0	78	5.7	4.0	7.3	7.7	5.8
14 Imperial	creeping	5.5	7.0	82	3.3	4.7	8.3	6.0	2.8
15 SR 1119	creeping	5.3	4.3	53	4.0	4.0	6.7	7.5	4.8
16 PST-9PM	colonial	5.3	4.0	60	5.3	6.3	3.3	8.5	6.8
17 SR 7100	colonial	5.2	7.0	88	3.7	8.3	4.5	8.3	6.3
18 Seaside II	creeping	5.1	6.3	73	2.3	3.7	7.0	8.3	5.2
19 Backspin	creeping	5.1	9.0	96	3.3	4.0	7.2	6.2	3.2
20 Tiger	colonial	5.0	7.0	85	2.3	6.7	3.7	7.5	4.7

(Continued)

Table 4 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup> 1999 Avg.	Seedling-Vigor <sup>2</sup> Oct. 1998	Cover (%) Oct. 1998	Winter Color <sup>3</sup> March 1999	Spring Green-up <sup>4</sup> April 1999	Brown Patch <sup>5</sup> Un-sprayed 1999 Avg.	Dollar Spot <sup>6</sup> Sprayed 1999 Avg.	Dollar Spot <sup>6</sup> Un-sprayed 1999 Avg.
21 Pennncross	creeping	4.9	8.0	93	3.3	4.0	4.7	6.7	4.2
22 Providence	creeping	4.7	4.7	55	2.0	3.7	7.2	6.8	3.7
23 Princeville	creeping	4.6	7.7	87	4.0	4.3	7.3	6.7	4.5
24 Golf Star	Idaho	4.5	6.0	70	3.3	5.0	4.2	8.5	7.3
25 Penneagle	creeping	3.7	6.7	88	3.0	4.7	6.7	7.3	4.7
26 Seaside	creeping	2.3	8.7	95	3.7	7.0	6.2	8.3	7.0
		LSD at 5% =	0.7	2.1	1.4	1.4	1.2	0.8	1.5

<sup>1</sup>9 = best turf quality  
<sup>2</sup>9 = best seedling vigor  
<sup>3</sup>9 = best winter color (green)  
<sup>4</sup>9 = best spring green-up  
<sup>5</sup>9 = least brown patch  
<sup>6</sup>9 = least dollar spot

Table 5. Performance of cultivars and selections in a bentgrass putting green trial seeded in November 1998 on a sand-based root zone at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality <sup>1</sup> 1999 Avg.	Seedling-Vigor <sup>2</sup> Nov. 1998	Establishment <sup>3</sup> April 1999	Brown Patch <sup>4</sup> July 1999	Brown Patch <sup>4</sup> Aug. 1999	Copper Spot <sup>5</sup> Sept. 1999	Dollar Spot <sup>6</sup> Oct. 1999	Pink Snow Mold <sup>7</sup> Dec. 1999
1	SR-7200	velvet	6.5	6.5	6.0	9.0	9.0	6.0	6.3	3.3
2	Penn G-2	creeping	6.3	6.7	6.7	9.0	9.0	5.7	5.7	6.0
3	Penn G-6	creeping	5.9	6.3	8.0	9.0	9.0	9.0	5.0	4.7
4	EVM Comp	velvet	5.6	4.0	4.0	9.0	9.0	5.0	7.0	3.3
5	Pick MVB	velvet	5.1	6.0	4.3	9.0	9.0	5.3	5.3	2.7
6	Penn A-4	creeping	4.9	7.3	6.3	7.3	9.0	7.7	5.0	5.3
7	ODA	creeping	4.9	6.3	5.0	7.0	9.0	7.3	5.3	5.3
8	Pick CB 2-94	creeping	4.9	6.0	6.3	8.0	9.0	6.7	4.0	4.7
9	SRX 1HS	creeping	4.8	6.0	5.7	9.0	9.0	9.0	5.0	4.0
10	SRX 1HP	colonial	4.7	6.0	5.7	7.7	9.0	6.7	5.0	5.3
11	L-93	creeping	4.7	6.3	6.3	8.0	9.0	7.0	4.7	4.7
12	MS2	creeping	4.6	6.0	6.3	6.0	9.0	5.3	4.7	4.7
13	SRX 1HB	colonial	4.5	6.0	6.0	7.0	9.0	6.7	3.7	5.3
14	SRX IC4	colonial	4.4	6.0	5.3	7.0	9.0	8.7	3.7	6.3
15	Southshore	creeping	4.4	6.3	7.3	5.3	9.0	8.3	5.0	3.3
16	Pick CB E-97	creeping	4.3	6.0	6.0	7.3	9.0	8.0	4.3	6.3
17	Pick CB 13-94	creeping	4.3	6.0	5.3	7.3	9.0	6.0	4.3	4.3
18	SRX 102J	creeping	4.3	6.0	5.7	7.3	9.0	6.0	5.0	5.3
19	MS7	creeping	4.1	5.3	4.7	8.0	9.0	5.7	5.3	5.0
20	Pick CB 3-94	creeping	4.0	5.3	5.7	5.7	8.3	6.0	3.7	5.7

(Continued)

Table 5 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup> 1999 Avg.	Seedling-Vigor <sup>2</sup> Nov. 1998	Establishment <sup>3</sup> April 1999	Brown Patch <sup>4</sup> July 1999	Brown Patch <sup>4</sup> Aug. 1999	Copper Spot <sup>5</sup> Sept. 1999	Dollar Spot <sup>6</sup> Oct. 1999	Pink Snow Mold <sup>7</sup> Dec. 1999
21 Century	creeping	4.0	5.0	4.7	5.3	9.0	9.0	4.0	3.7
22 ES6	creeping	4.0	5.7	4.7	6.7	9.0	6.0	6.0	3.0
23 MS4	creeping	4.0	5.0	4.7	9.0	9.0	7.0	6.3	3.0
24 Putter	creeping	3.9	5.7	5.3	8.0	6.0	6.3	5.3	3.7
25 18th Green	creeping	3.9	6.0	5.0	6.7	8.3	4.0	4.3	3.0
26 Pick CB F-97	creeping	3.8	6.0	5.7	9.0	9.0	7.7	5.3	3.3
27 Cobra	creeping	3.8	6.3	7.0	5.3	9.0	7.0	4.7	5.0
28 ES1	creeping	3.8	6.3	5.7	8.3	9.0	6.0	4.0	2.7
29 Providence	creeping	3.8	7.0	7.0	9.0	9.0	8.0	5.0	5.0
30 Crenshaw	creeping	3.7	6.0	4.7	5.7	7.3	7.3	3.7	4.7
31 7001	velvet	3.7	2.3	3.0	9.0	9.0	6.3	6.7	2.7
32 MS5	creeping	3.7	5.0	4.3	8.0	9.0	6.3	5.0	2.7
33 Pick CB 1-94	creeping	3.5	5.3	5.0	8.3	7.7	8.3	6.3	4.0
34 Cato	creeping	3.5	5.0	6.0	6.7	9.0	5.7	6.3	4.3
35 Penncross	creeping	3.4	6.7	6.3	7.7	8.3	7.3	5.7	4.0
36 Mariner	creeping	3.2	6.7	7.0	6.7	8.7	6.0	4.7	3.0
37 Pick CB 16-94	creeping	3.1	6.0	5.0	4.7	9.0	6.3	4.7	4.3
38 Bavaria	velvet	2.7	7.0	5.3	9.0	9.0	4.7	8.0	3.0
39 AT-1	colonial	1.5	5.0	4.3	9.0	9.0	6.7	6.7	3.0
40 Peterson's bluegrass		1.3	6.0	7.0	9.0	9.0	9.0	4.7	8.0

(Continued)

Table 5 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup> 1999 Avg.	Seedling-Vigor <sup>2</sup> Nov. 1998	Establishment <sup>3</sup> April 1999	Brown Patch <sup>4</sup> July 1999	Brown Patch <sup>4</sup> Aug. 1999	Copper Spot <sup>5</sup> Sept. 1999	Dollar Spot <sup>6</sup> Oct. 1999	Pink Snow Mold <sup>7</sup> Dec. 1999
		0.8	1.0	1.3	2.7	1.2	2.6	1.4	1.5
LSD at 5% =									

- <sup>1</sup>9 = best turf quality
- <sup>2</sup>9 = best seedling vigor
- <sup>3</sup>9 = best establishment
- <sup>4</sup>9 = least brown patch
- <sup>5</sup>9 = least copper spot
- <sup>6</sup>9 = least dollar spot
- <sup>7</sup>9 = least pink snow mold

Table 6. Performance of colonial bentgrass cultivars and selections in a fairway test seeded in September 1998 at North Brunswick, NJ.

Cultivar or Selection	Species	Turf Quality <sup>1</sup> 1999 Avg.	Winter Color <sup>2</sup> March 1999	Spring Green-up <sup>3</sup> April 1999	Brown Patch <sup>4</sup> 4 Aug. 1999	Brown Patch <sup>4</sup> 20 Aug. 1999	Brown Patch <sup>4</sup> Sept. 1999	Dollar Spot <sup>5</sup> Sept. 1999	Dollar Spot <sup>5</sup> Oct. 1999
1 Syn 9BNC	colonial	6.1	6.0	6.0	8.7	5.0	4.0	7.3	6.0
2 Mom AT 103	colonial	5.9	5.3	5.3	8.0	7.7	5.0	9.0	7.3
3 9456	colonial	5.6	6.7	6.3	6.7	7.0	5.0	8.7	7.7
4 Syn 9F7	colonial	5.5	5.3	6.3	9.0	6.0	5.0	7.0	5.3
5 SR 7100	colonial	5.5	4.7	7.3	7.3	8.3	5.7	8.0	5.7
6 SRX IC4	colonial	5.4	2.7	4.3	9.0	9.0	9.0	6.0	4.0
7 Syn 9DH	colonial	5.2	6.3	6.0	9.0	7.0	5.0	6.7	5.0
8 Syn 98Y	colonial	5.0	5.0	5.3	6.3	5.0	4.0	7.7	6.3
9 LRF-98-493	colonial	5.0	5.7	6.0	7.7	6.0	3.7	7.3	5.7
10 Mom At 106	colonial	5.0	6.3	6.7	7.3	7.7	5.0	8.3	6.7
11 AT-1	colonial	3.0	3.7	3.0	9.0	8.3	7.0	8.0	4.0
		LSD at 5% =	0.6	1.6	2.4	2.6	2.4	1.5	1.7

<sup>1</sup>9 = best turf quality  
<sup>2</sup>9 = best winter color (green)  
<sup>3</sup>9 = best spring green-up  
<sup>4</sup>9 = least brown patch  
<sup>5</sup>9 = least dollar spot

Table 7. Yearly nitrogen (N) applied and mowing height (Ht) on bentgrass tests established at North Brunswick, NJ.

	1998		1999	
	N <sup>1</sup>	Ht <sup>2</sup>	N	Ht
Table 1 (1997 Green) .....	3.4	9/32	3.5	5/32
Table 2 (1997 Fairway) .....	2.9	13/32	3.1	13/32
Table 3 (1998 NTEP Green) .....			3.7	5/32
Table 4 (1998 NTEP Fairway) .....			4.9	13/32
Table 5 (1998 Green) .....			3.5	5/32
Table 6 (1998 Fairway) .....			4.8	13/32

<sup>1</sup>Annual N applied (lb/1000 ft<sup>2</sup>)

<sup>2</sup>Mowing height in inches

Table 8. Pesticides applied in 1999 on bentgrass cultivar and selections in 1998 NTEP Greens and Fairway/Tee tests at North Brunswick, NJ.

Date	Pesticide Product	Product Rate	Portion of Plot Treated
<b>1998 Greens Trial (Table 3)</b>			
25 May	Banner Maxx 1.3 MC	1.0 fl oz/M	Front <sup>1</sup>
22 June	Chipco 26019 50WDG	2.0 oz/M	Front
7 July	Turcam 76	1.0 oz/M	Front+Rear <sup>2</sup>
9 July	Subdue 1G	18.7 oz/M	Front+Rear
19 July	Heritage 50WG	0.4 oz/M	Front
	Banner Maxx 1.3 MC	1.0 fl oz/M	Front
10 Aug	Dursban Pro	1.5 oz/M	Front+Rear
27 Aug	Heritage 50WG	0.4 oz/M	Front
	Banner Maxx 1.3 MC	1.0 fl oz/M	Front
28 Oct	Chipco 26019 50WDG	2.0 oz/M	Front+Rear
12 Nov	Cleary 3336 4.5F	3.6 fl oz/M	Front+Rear
12 Nov	Daconil Ultrex 82.5 SDG	8.0 oz/M	Front+Rear
8 Dec	Engage 10G (PCNB)	5.0 lb/M	Front+Rear
<b>1998 Fairway Trial (Table 4)</b>			
27 Jan	Engage 10G (PCNB)	5.0 lb/M	Front+Rear
5 Apr	2,4-D 4L	0.75 lb ai/A	Front+Rear
5 Apr	Dicamba 4L	0.25 lb ai/A	Front+Rear
19 Apr	Bensumec 4LF	2.5 gal/A	Front+Rear
25 May	Banner Maxx 1.3 MC	1.0 fl oz/M	Front
22 Jun	Chipco 26019 50WDG	2.0 oz/M	Front
19 July	Heritage 50WG	0.4 oz/M	Front
	Banner Maxx 1.3 MC	1.0 fl oz/M	Front
27 Aug	Heritage 50WG	0.4 oz/M	Front
	Banner Maxx	1.0 fl oz/M	Front
9 Sep	Sevin 50W	5.0 lb/M	Front+Rear
13 Sep	Dylox 6.2G	3.4 lb/M	Front+Rear
28 Oct	Chipco 26019 50WDG	2.0 oz/M	Front+Rear
8 Dec	Engage 10G (PCNB)	5.0 lb/M	Front+Rear

<sup>1</sup> Front indicates that only the front 5/8ths of each NTEP plot was treated with the respective pesticide

<sup>2</sup> Front+Rear indicates that the entire trial area was treated with the respective pesticide