

Performance of Bentgrass Cultivars and Selections under Putting Green Conditions (1998-2002)

P.J. Landschoot, B.S. Park, and D. Livingston

Funding Sources: National Turfgrass Evaluation Program, The Pennsylvania Turfgrass Council

Introduction

Tests of commercially available turfgrass cultivars and experimental selections are conducted annually in University Park, PA to provide turfgrass managers, seed industry representatives, county extension agents, and other interested persons with information about turfgrass characteristics and performance. In September 1998, twenty-nine bentgrass cultivars and selections were established at the Joseph Valentine Turfgrass Research Center in University Park, PA. Entries were supplied by the National Turfgrass Evaluation Program (NTEP). The following is a report on the performance of these entries from 1998 through 2002.

Materials and Methods

Entries were seeded on September 26, 1998 in 5 by 9 foot plots at a rate of 1.1 lbs seed/1000 ft². The soil was a mix of 80% sand : 20% peat and the entire test site received full sunlight. Three replicate plots of each entry were used in this test and plots were arranged in a randomized complete block design. Prior to seeding, the test area received starter fertilizer (10-13-3) at 1.0 lb N/1000 ft². The test was mowed at 0.25 inch during 1998. In 1999, the mowing height was gradually lowered from 0.25 to 0.125 inch. To promote rapid establishment, 5.0 lbs N/1000 ft² was applied between the date of seeding and December 2, 1998 over five individual applications.

Assessments of Turfgrass Performance

All assessments of turfgrass performance were made on a visual basis. Care was taken to ensure consistent and accurate evaluations. The following performance criteria were used to assess bentgrass cultivars and selections.

Quality: Quality indicates the overall appearance of the turf and can incorporate several components including: density, texture (measure of leaf width), uniformity, and

freedom from disease and insect damage. Quality is rated using a scale of 1 to 9, where 9 = highest quality.

Seedling vigor: This rating is a visual estimate of percent ground cover and plant height during the early stages of seedling establishment and reflects the rate of establishment. The plots were rated shortly after seeding using a scale of 1 to 9, where 9 = most vigorous seedling growth.

Spring green-up: Spring green-up provides an indication of how soon the turf breaks out of winter dormancy. The plots were rated for spring green-up using a scale of 1-9, with 9 = the most uniform green color.

Color: Color ratings reflect the inherent color of the entry, not yellowing or browning due to mower injury, drought stress, disease, etc. Color ratings are taken when grass is not under stress. Color is rated on a scale of 1-9, with 9 = the darkest green color.

Texture: This rating provides an indication of the relative coarseness/fineness of turf leaf width. Texture is rated on a scale of 1-9, where 9 = the finest-textured turf.

Density: Density is a visual estimate of the number of plants per unit area. Density is rated on a scale of 1-9, with 9 = the most dense turf.

Disease ratings: Disease ratings provide an indication of an entry's reaction to a particular disease. Disease ratings are based on a scale of 1-9 (with 1 = extensive disease damage and 9 = no disease present). Multiple disease ratings of dollar spot and brown patch (warm and cool temperature) are included in this report. A rating for red leaf spot was taken in May 2000. All disease infestations occurred naturally.

Results and Discussion

Interpretation of Results

Data for the above criteria are presented in Tables 1, 2, and 3. Cultivars that are commercially available are in bold type and experimental selections are in plain type. Differences between two entries are statistically significant only if the LSD (Least Significant Difference) value, listed at the bottom of each column in Tables 1-3, is exceeded by the numerical difference between two entries. For example, if cultivar 'A' is 3.0 units higher in quality than cultivar 'B', then this difference is only significant if the LSD value is 3.0 or less. If the LSD is greater than 3.0, then the numerical difference between the two cultivars may be due to inherent variability in the test area or some other element of chance.

Keep in mind that the results of this test reflect cultivar performance for the management regime imposed at this site and environmental conditions in central Pennsylvania.

Summary of Results

Syn 96-1, Syn 96-3, Pick Syn 96-2, **Penn A-4**, and **Penn A-1** received the highest combined quality ratings from 1999-2002 (Table 1). Although quality ratings take several factors into account, these cultivars and selections ranked higher than other entries primarily due to their superior density, uniformity, and lack of severe disease susceptibility. Two velvet bentgrasses, **Bavaria** and **SR 7200** performed poorly over the duration of the test

Seedling vigor (Table 2) was greatest with **Penn G-1** and **Penncross**, however, sixteen other selections and cultivars did not differ from these cultivars. The selection that was slowest to establish was PST-A2E. By the summer of 1999, all plots in this test showed complete turf cover and were able to tolerate daily mowing.

Spring green-up ratings from 2000 and 2001 revealed that **Backspin**, **Century**, the three velvet bentgrasses (**SR 7200**, **Bavaria**, and **Vesper**) along with seven other cultivars and selections broke winter dormancy sooner than all other selections and cultivars (Table 2). While Pick CB 13-94 showed the slowest combined spring green-up, fifteen other varieties and selections did not differ statistically from this entry.

Turfgrass color ratings in 2000 and 2002 show that **Vesper** and 10 other cultivars and selections were the darkest bentgrasses (Table 2). **Bavaria** exhibited the lightest shade of green.

Leaf texture was rated in 2001 (Table 2). **Vesper**, **SR 7200**, and Pick Syn 96-2 showed the finest leaf texture. **Penncross** followed by SRX 1BPAA, **Brighton**, and **Pennlinks** displayed the coarsest leaf texture.

Turfgrass density ratings for all cultivars and selections are listed in Table 2. Due to extremely poor turfgrass quality, density could not be accurately measured for **SR 7200** and **Bavaria** in 2002. Therefore, density ratings for all other cultivars and selections were analyzed separately in 2002. **Vesper**, **SR 7200**, Pick Syn 96-2, and Syn 96-3, provided the highest density values from 1999-2001 (Table 2). **Bavaria** showed the lowest density rating from 1999-2001 and **Penncross** and **Pennlinks** showed low density ratings for all four years of the test. Examining combined average quality data in Table 1 and density values in Table 2, in general, selections displaying greater density also showed greater quality values.

Differences in disease susceptibility were noticed among entries during the test period and are reported in Table 3. An infestation of cool temperature brown patch was evident in the test area in May 1999. Disease ratings revealed that most entries were not severely affected by this disease. Entries that were most severely affected included Syn 96-3 and Pick Syn 96-2. Although warm temperature brown patch was not a significant problem in 1999 or 2000, a moderate infestation was noted in 2002.

Bengal, L-93, and twelve other varieties and selections displayed the highest degree of susceptibility to warm temperature brown patch in 2002.

The velvet bentgrasses showed very good resistance to dollar spot in 2000 and 2002 (Table 3). Creeping bentgrass cultivars and selections with the least susceptibility to dollar spot included: **Penn A-1, Penn G-1, Penn A-2, Bengal, L-93, ISI Ap-5, PST-A2E, SRX 1NJH**, and **Penncross**. **Crenshaw** showed the greatest degree of dollar spot susceptibility on all three rating dates.

Table 1. Quality ratings of bentgrass cultivars and selections for 1999-2002. This trial was established in September, 1998 at the Joseph Valentine Research Center, University Park, PA.

Entry ²	Species ³	Turfgrass Quality Ratings ¹				Combined Ave. 1999-02
		Combined Season Averages				
		1999	2000	2001	2002	
Syn 96-1	CRB	7.9	7.3	8.2	7.8	7.8
Syn 96-3	CRB	7.9	7.4	7.9	7.9	7.8
Pick Syn 96-2	CRB	7.8	7.1	8.1	7.7	7.7
Penn A-4	CRB	8.0	7.2	7.3	7.1	7.4
Penn A-1	CRB	7.7	6.6	7.4	7.8	7.4
Penn G-6	CRB	7.1	7.2	7.6	6.9	7.2
Penn G-1	CRB	7.3	6.8	7.0	7.4	7.1
Penn A-2	CRB	7.4	6.7	6.8	7.3	7.0
Century	CRB	7.5	7.3	6.6	6.7	7.0
Bengal (BAR AS 8FUS2)	CRB	7.1	7.1	7.0	6.7	7.0
ABT-CRB-1	CRB	8.3	6.3	6.6	6.5	6.9
L-93	CRB	7.3	6.9	6.8	6.6	6.9
ISI Ap-5	CRB	6.8	6.9	6.9	6.8	6.9
PST-A2E	CRB	7.7	6.8	6.1	6.6	6.8
Imperial	CRB	7.1	6.7	6.7	6.5	6.8
SRX 1NJH	CRB	6.7	6.7	6.7	6.3	6.6
SR 1119	CRB	6.9	6.9	6.2	5.9	6.5
BAR CB 8US3	CRB	6.9	6.2	6.4	6.2	6.5
Backspin	CRB	6.9	6.2	6.3	6.2	6.4
Pick CB 13-94	CRB	5.9	6.2	6.8	6.7	6.4
Providence	CRB	6.8	6.2	6.0	6.1	6.3
Brighton (SRX 1120)	CRB	6.6	6.4	5.8	6.0	6.2
Crenshaw	CRB	7.1	5.5	6.6	5.7	6.2
SRX 1BPAA	CRB	6.3	6.3	5.9	5.9	6.1
Vesper (Pick MVB)	VLT	8.4	4.5	4.2	5.7	5.7
Pennlinks	CRB	5.4	5.5	5.6	5.1	5.4
Penncross	CRB	5.4	5.4	4.9	5.0	5.2
SR 7200	VLT	7.2	4.1	4.5	1.5	4.3
Bavaria	VLT	4.0	1.4	1.0	1.0	1.9
LSD at 5% level ⁴		0.5	0.9	0.8	0.6	0.5

¹ Refer to 'Assessments of Turfgrass Performance' for an explanation of performance criteria ratings.

² Names that are in bold type are commercially available cultivars, those that are in plain type are experimental selections (not available to the general public).

³ Bentgrass species designated by the following letters: CRB = creeping bentgrass, VLT = velvet bentgrass.

⁴ LSD = least significant difference. The LSD values at the bottom of each column represent the minimum difference between any two entries necessary to be 95% confident that the difference is not attributable to chance.

Table 2. Ratings of bentgrass cultivars and selections for 1998-2002. This trial was established in September, 1998 at the Joseph Valentine Research Center, University Park, PA.

Entry ²	Species ³	Turfgrass Ratings ¹					
		Seedling	Spring	Color		Density	
		Vigor	Green-up	2000, 2002	Texture	1999-01	2002
		10/13/98	2000-01	2000, 2002	2001	1999-01	2002
Syn 96-1	CRB	7.3	6.8	6.0	7.3	8.2	8.3
Syn 96-3	CRB	5.7	7.2	6.5	7.7	8.3	7.8
Pick Syn 96-2	CRB	6.3	6.3	7.2	8.0	8.3	8.2
Penn A-4	CRB	6.3	7.0	6.0	6.7	8.0	7.0
Penn A-1	CRB	7.0	6.7	6.3	7.7	8.1	7.5
Penn G-6	CRB	6.7	7.0	6.8	7.0	7.5	7.2
Penn G-1	CRB	7.7	6.0	6.5	7.0	7.4	7.7
Penn A-2	CRB	7.3	6.3	6.8	6.7	7.6	7.5
Century	CRB	7.0	7.5	5.8	6.7	7.5	7.0
Bengal (BAR AS 8FUS2)	CRB	6.3	6.8	6.2	6.7	7.4	6.8
ABT-CRB-1	CRB	6.0	6.0	5.8	7.0	8.0	6.7
L-93	CRB	7.3	6.2	6.0	6.0	7.0	6.3
ISI Ap-5	CRB	6.7	5.7	6.8	6.0	6.9	6.8
PST-A2E	CRB	4.0	6.8	6.8	6.7	7.7	6.7
Imperial	CRB	6.7	7.0	5.2	6.3	7.3	6.7
SRX 1NJH	CRB	5.3	6.0	7.0	5.7	6.9	6.5
SR 1119	CRB	6.7	6.3	6.5	6.0	6.8	6.3
BAR CB 8US3	CRB	6.0	6.3	5.8	6.7	7.0	6.0
Backspin	CRB	7.0	7.7	5.2	6.7	7.4	6.5
Pick CB 13-94	CRB	6.7	5.5	6.3	5.7	6.3	6.8
Providence	CRB	7.3	6.2	5.2	5.7	6.8	6.3
Brighton (SRX 1120)	CRB	5.0	5.7	5.7	5.0	6.6	5.7
Crenshaw	CRB	7.0	6.0	6.0	6.0	6.9	6.0
SRX 1BPAA	CRB	6.7	5.8	6.2	4.7	6.0	5.3
Vesper (Pick MVB)	VLT	6.0	7.2	7.3	9.0	8.9	8.8
Pennlinks	CRB	7.3	5.8	4.8	5.0	5.3	4.7
Penncross	CRB	7.7	5.8	5.3	4.0	5.2	4.8
SR 7200	VLT	6.3	7.5	6.5	9.0	8.4	--
Bavaria	VLT	7.0	7.2	3.0	5.3	2.3	--
LSD at 5% level ⁴		1.1	0.9	0.8	1.0	0.6	0.7

¹ Refer to 'Assessments of Turfgrass Performance' for an explanation of performance criteria ratings.

² Names that are in bold type are commercially available cultivars, those that are in plain type are experimental selections (not available to the general public).

³ Bentgrass species designated by the following letters: CRB = creeping bentgrass, VLT = velvet bentgrass.

⁴ LSD = least significant difference. The LSD values at the bottom of each column represent the minimum difference between any two entries necessary to be 95% confident that the difference is not attributable to chance.

Table 3. Disease ratings of bentgrass cultivars and selections for 1999, 2000 and 2002. This trial was established in September, 1998 at the Joseph Valentine Research Center, University Park, PA.

Entry ²	Species ³	Turfgrass Disease Ratings ¹							
		Brown Patch				Red Leaf		Dollar Spot	
		5/99 ⁴	7/99 ⁵	8/00 ⁵	8/02 ⁵	Spot	5/00	8/00	7/02
Syn 96-1	CRB	9.0	8.7	9.0	6.7	5.3	6.7	7.7	6.0
Syn 96-3	CRB	6.7	8.3	8.7	7.3	6.7	7.3	6.7	6.0
Pick Syn 96-2	CRB	7.7	8.0	9.0	7.0	6.0	6.3	6.3	5.7
Penn A-4	CRB	9.0	7.7	6.3	5.7	5.7	6.7	8.0	7.0
Penn A-1	CRB	9.0	8.0	8.0	6.7	5.0	8.0	8.3	8.0
Penn G-6	CRB	8.3	8.0	8.0	5.7	5.7	7.0	8.0	7.3
Penn G-1	CRB	9.0	8.3	7.7	5.3	4.0	8.0	8.0	7.7
Penn A-2	CRB	8.0	8.3	8.3	6.7	5.0	8.7	8.7	8.0
Century	CRB	9.0	8.0	8.7	6.0	3.7	6.7	7.0	5.3
Bengal (BAR AS 8FUS2)	CRB	8.3	8.7	7.0	5.0	5.7	8.0	8.0	7.3
ABT-CRB-1	CRB	8.7	8.7	8.7	7.0	2.3	7.7	7.3	6.7
L-93	CRB	8.7	8.0	8.0	5.0	6.0	9.0	8.7	8.0
ISI Ap-5	CRB	9.0	8.0	7.3	5.7	8.0	8.3	8.0	7.7
PST-A2E	CRB	9.0	8.0	8.0	7.0	4.7	9.0	8.7	7.7
Imperial	CRB	9.0	8.0	8.3	6.0	4.3	6.7	7.7	6.7
SRX INJH	CRB	9.0	8.7	9.0	7.3	7.0	8.0	8.0	7.0
SR 1119	CRB	9.0	8.3	8.7	6.0	7.7	8.3	7.7	5.5
BAR CB 8US3	CRB	8.3	8.3	7.7	5.7	3.7	6.7	7.7	7.0
Backspin	CRB	9.0	8.0	8.0	6.0	7.0	6.7	7.0	6.0
Pick CB 13-94	CRB	8.3	8.7	9.0	6.7	6.0	7.7	8.0	7.0
Providence	CRB	8.7	7.7	7.0	5.0	4.0	6.3	7.0	6.7
Brighton (SRX 1120)	CRB	9.0	8.0	8.0	5.3	6.0	7.7	8.0	6.3
Crenshaw	CRB	8.0	8.7	8.3	5.3	3.7	3.7	5.0	4.0
SRX 1BPAA	CRB	8.7	7.7	9.0	7.0	8.0	8.3	8.3	7.3
Vesper (Pick MVB)	VLT	9.0	9.0	9.0	8.0	3.7	9.0	8.3	8.7
Pennlinks	CRB	8.3	9.0	7.7	6.0	6.3	7.7	8.0	7.7
Penncross	CRB	8.3	8.3	8.7	5.7	7.3	8.3	8.0	7.5
SR 7200	VLT	9.0	9.0	9.0	--	4.0	9.0	9.0	--
Bavaria	VLT	9.0	9.0	9.0	--	9.0	9.0	8.7	--
LSD at 5% level ⁶		1.0	0.8	1.3	1.6	1.8	1.1	1.1	1.1

¹ Refer to 'Assessments of Turfgrass Performance' for an explanation of performance criteria ratings.

² Names that are in bold type are commercially available cultivars, those that are in plain type are experimental selections (not available to the general public).

³ Bentgrass species designated by the following letters: CRB = creeping bentgrass, VLT = velvet bentgrass.

⁴ Cool temperature brown patch.

⁵ Warm temperature brown patch

⁶ LSD = least significant difference. The LSD values at the bottom of each column represent the minimum difference between any two entries necessary to be 95% confident that the difference is not attributable to chance.