
BENTGRASS (*AGROSTIS* spp.) CULTIVAR
CHARACTERIZATIONS
FOR 1994 IN TORINO, ITALY

Research Progress Report No. 301
of
Green Section, Italian Golf Federation
by
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INTRODUCTION

Creeping bentgrass is widely used as the preferred grass species on putting greens in Italy. Pennecross has been the cultivar most widely accepted and used throughout the world for the past 20 years. In the past 6 years, a number of commercial companies have released new creeping bentgrass cultivars. Thus, there is a need to assess their potential for use under golf course putting green conditions in Italy. Accordingly, the Italian Golf Federation (F.I.G.) initiated a bentgrass cultivar putting green evaluation study in cooperation with the Torino Golf Club north of Torino, Italy.

Creeping bentgrass (*Agrostis stolonifera* L. var *stolonifera*) is uniquely adapted morphologically for use on putting greens (Beard, 1982). Extensive, prostrate lateral stem development via stolons and high shoot-leaf density can be sustained under frequent, close mowing of 4 to 6 mm (0.16-0.25 in). The stolon development allows turf recovery from ball marks and other damages to the surface. Creeping bentgrass is a cool-season, C-3 perennial turfgrass that has an optimum growing temperature of 16 to 24°C (60-75°F). It responds to nitrogen (N) fertilization and irrigation.

It should be noted that this is a F.I.G. Green Section Research Progress Report on the initial performance of these turfgrass cultivars. Further, that final conclusions concerning the adaptation and performance of these creeping bentgrass cultivars under the conditions of the study in Italy can not be drawn under after a minimum of 4 and preferably 4 years of evaluation. It requires that long for the turf-soil ecosystem to stabilize in terms of the soil physical characteristics, microorganisms, disease causing fungi, insect pests, and nematode populations.

MATERIALS AND METHODS

Eleven commercially available cultivars of creeping bentgrass (*Agrostis stolonifera* L. var. *stolonifera*) and one cultivar of colonial bentgrass (*Agrostis capillaris* L.) were planted to a specially constructed experimental putting green located at the Torino Golf Course north of Torino, Italy. The plot size was 2.0 by 1.75 meters (6.6 x 5.7 ft), arranged in a randomized block design with four replications. In addition, 5 advanced experimental selections of creeping bentgrass from Pennsylvania State University were located in an adjacent set of plots, involving a 1.0 x 1.0 meter (3.3 x 3.3 ft) plot size with 2 replications in a randomized block design. Root zone profile construction was a high-sand composition meeting Texas-USGA specifications, including a subsurface drainage system.

The experimental area was planted May 4, 1992. Preplant fertilization involved of 1.0 kg each of N, P, and K per 100 square meters (2.0 lb/1,000 sq ft) incorporated into the upper 100 mm of the root zone. All cultivars were planted at a seeding rate of 0.5 kg per 100 square meters (1 lb/1,000 sq ft), with the seed lightly raked into the surface. Care was taken to avoid contamination of seed between plots. No lateral movement occurred and successful turfgrass establishment was achieved with distinct genotype perimeters between individual cultivar plots.

Subsequent cultural practices on the experimental putting green involved mowing five times per week in multiple directions at a 5 mm height, with clippings removed. The fertilization program consisted of 0.35 kg of nitrogen (N) per 100 m² (0.7 lb/1,000 sq ft) per growing month from May through September. The base phosphorus (P) and potassium (K) levels were applied as needed to maintain these nutrient levels in the high range based on an annual chemical soil test. The pH of the root zone was 6.8.

Supplemental water was applied as needed to prevent visual wilt of the turf, via a newly installed irrigation system involving gear driven, pop-up heads arranged in a tight spacing which sustained uniform moisture conditions across the experimental area. Topdressing was practiced at two-month intervals at a rate of 0.16 m³ per 100 m² (0.2 cu yd/1,000 sq ft). No turf cultivation or vertical cutting has been practiced on the turfed plots, to avoid interplot genotype contamination.

Disease and insect problems have been minimal, except for dollar spot (*Sclerotinia homoeocarpa*) which was allowed to develop as no fungicide applications were made during the 1994 growing season. All emerging weeds were manually removed during the 1992 growing season. In 1993, after the turfs had fully stabilized, all weeds were allowed to develop across the experimental area.

Turfgrass quality and morphological assessments were made on the experimental area. The turfgrass quality involved visual estimates made by 2 people at 15-day intervals throughout the growing season. The visual estimates were based on a composite of two components: (a) uniformity of appearance and (b) shoot density. The rating scale was 9 = best and 1 = poorest. A rating of 5.0 or higher represented an acceptable quality putting surface.

Morphological assessments were made in September of each growing season. They consisted of actual shoot density counts conducted on a 645 mm² area of turf. Measurements of leaf width were based on the mid-point of the second youngest leaf, with 10 leaves measured per plot. All data were summarized at the end of each growing season and statistically assessed by analysis of variance.

RESULTS

Turfgrass Quality. Visual estimates of turfgrass quality, although subjective, remain the best, cost-effective means of assessing the composite turfgrass quality. The estimates reflect primarily 2 key components of turfgrass quality: (a) shoot/leaf density and (b) uniformity, along with the other components growth habit and smoothness. Color is described. A rating of 5.0 or higher indicates an acceptable quality putting green.

The comparative biweekly visual assessments of turfgrass quality across the 12 bentgrass (*Agrostis* spp.) cultivars are summarized for the 1994 growing season in Table 1. Ranking highest in mean seasonal turfgrass quality were Southshore, Penneagle, Putter, Providence, and Pennlinks. Ranking decidedly inferior and unacceptable for putting green surfaces at a seasonal mean below 5.0 were Astoria and Seaside, plus Emerald and National. Two Pennsylvania State University selections, PSU A1 and G1, ranked higher than any of the 12 commercially available bentgrass cultivars.

Table 1. Comparative seasonal turfgrass quality ratings, shoot density, leaf blade width, and moss invasion of 17 bentgrass (*Agrostis* spp.) cultivars in 1994. Torino, Italy.

Cultivar Treatment	Seasonal Turfgrass Quality Mean**	Shoot Density (per sq dm)	Leaf Blade Width (mm)	Moss Invasion Seasonal Mean (% area)
Southshore***	6.7 a*	1509 a*	0.84*	0.1 a*
Penneagle	6.6 a	1241 bcd	0.92	0.9 ab
Providence	6.4 ab	1272 bc	0.94	1.5 ab
Putter	6.4 ab	1425 ab	0.96	0.5 a
Pennlinks	6.3 ab	1504 a	0.93	1.9 ab
Penncross	5.8 c	1195 bcd	0.93	2.6 ab
Cobra	5.8 c	1022 cde	0.89	3.6 ab
SR 1020***	5.1 d	1419 ab	0.84	2.4 ab
National	4.8 d	1013 cde	0.94	11.7 c
Emerald***	4.2 e	1010 cde	0.95	10.7 cd
Seaside	3.6 f	755 f	0.96	26.9 d
Astoria	3.4 f	835 ef	0.96	33.8 e
PSU A1	7.4 a	2241	0.75	0.1 a
PSU G1	7.2 a	2612	0.69	0.1 a
PSU G6	6.7 b	2378	0.73	0.4 a
PSU G2	6.5 b	2548	0.73	0.3 a
PSU DF1	5.8 c	2053	0.76	3.8 b

*Numbers followed by the same letter(s) are not significantly different based on the Duncan test ($p=0.05$).

**Turfgrass quality ratings based on 1 to 9, with 9=best and 1=poorest.

***Substantial dollar spot (*Sclerotinia homeocarpa*) infestation, indicating serious susceptibility.

SUMMARY

Shoot Density. A high shoot density is preferred for putting greens as it causes the leaves to be narrower in width and more vertical in growth habit. A high density also results in the turf being more competitive against weed invasion. However, certain previous cultivars of very high density have tended to form a puffy surface over time, if not mowed closely and frequently.

The shoot densities of 12 bentgrass (*Agrostis* spp.) cultivars are summarized in Table 1. Shoot densities ranged from 2,612 to 755 shoots per square decimeter, a 3+ fold differential. Ranking highest in density were Southshore and Pennlinks, followed by Providence and SR 1020. Ranking lowest and unacceptable in turf density were Seaside and the colonial bentgrass, Astoria. Neither cultivar sustained an acceptable putting green turf at this close cutting height, and thus both would be especially prone to annual bluegrass (*Poa annua*) invasion. All 5 PSU bentgrass selections were substantially higher in shoot density than were the commercially available cultivars.

Leaf Texture. The leaf blade widths of the 12 bentgrass (*Agrostis* spp.) cultivars are summarized in Table 1. Leaf textures among the 12 cultivars ranged from 0.84 mm for Southshore and SR 1020 to 0.96 mm for Astoria, Providence, and Seaside; and 0.95 mm for Emerald. The leaf width variation among most of the commercial bentgrass cultivars was minimal, except for Southshore, SR 1020, and Penncross which were more narrow. In contrast, the PSU bentgrass selections all ranked narrower in leaf blade width, as well as having the highest shoot densities.

Moss Invasion. Differential rates of moss invasion were observed during 1993 as shown in Table 1. Those bentgrass (*Agrostis* spp.) cultivars with lower shoot densities exhibited the most proneness of moss invasion, which ranged from a minimal amount to as high as 43% coverage at certain times during the year. Cultivars with the highest rates of moss invasion were Astoria and Seaside, with National and Emerald also exhibiting substantial moss invasion problems. Four PSU bentgrass selections ranked very low in proneness to moss invasion at less than 1% for the seasonal mean.

Bentgrass cultivar characterization were initiated in May of 1992 under putting green conditions at the Torino Golf Club. The experimental area was a well drained, high-sand root zone. This progress report represents assessments made during the second full growing season of a 4-year study. The findings reveal substantial variations in turfgrass quality and morphological characteristics of 17 bentgrass cultivars. Ranking high in quality were Southshore, Penneagle, Putter, Providence and Pennlinks, followed by Cobra and Penncross. Both Astoria and Seaside were totally unacceptable. Southshore, Pennlinks, Providence and SR 1020 exhibited a high shoot density, as well as being low in proneness to moss invasion. Ranking even higher than any of the commercially available bentgrass cultivars were several PSU experimental selections.

Acknowledgements:

This turfgrass research initiative was developed by the Italian Golf Federation Green Section under the F.I.G. presidency of Giuseppe Silva.

Special appreciation is given to the Torino Golf Club and its Club Manager, Renato Bianco, and its President, Alberto Brignone, for providing the host experimental site and turf maintenance of the putting green.

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