

Evaluation of Turfgrass Species for Use on Putting Greens

Final Report

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Summary

Eleven bentgrasses (*Agrostis palustris* Huds.) and four annual bluegrasses (*Poa annua* L.) were established at the Red Deer Golf and Country Club in August of 1999. These grasses were evaluated for their overall quality and suitability for use on putting greens. The study revealed that all of the bentgrass cultivars tested were considered to be acceptable for use on a putting green under the NTEP standards. All ten of the bentgrasses tested demonstrated qualities superior or equal to those expressed by the standard entry, Penncross. The cultivar Penn A-4, with its strong color and superior overall quality ranked as the best overall cultivar in the trial. Cato, Southshore, Imperial, A-1, G-2 and G-6 were also highly rated. As for the bluegrasses, none of the bluegrass cultivars were considered acceptable. The bluegrass biotype, 97-Quilt I-15, was ranked the highest for the bluegrasses for overall quality. Currently, only Peterson's Creeping Bluegrass is commercially available. Although winter injury was not specifically evaluated, spring quality ratings and winter injury are highly correlated. May quality ratings showed that Lofts L-93, Southshore, Cato, Penn A-4, Penn A-1, Penn-G-2 and Penn G-6 were significantly better than Penncross.

Introduction

Traditionally, the creeping bentgrass cultivar, Penncross, has been the most commonly used turfgrass cultivar for putting greens in the Canadian Prairie Provinces. However, this cultivar is not without its weaknesses. The inability of Penncross to effectively compete with other weedy grass species and its mottled colour in both the spring and the fall, have led to the development of new bentgrass cultivars. This trial was established to evaluate these new cultivars for their suitability for use on the Canadian Prairies.

Annual bluegrass (*Poa annua* L.) can be routinely found encroaching into bentgrass greens and in some cases completely dominating the green's plant population. Many turf professionals have chosen not to control, but rather to convert to annual bluegrass greens to utilize this strong competitive characteristic. Researchers have been studying annual bluegrass and are in the process of conducting seed multiplication to ensure the seed is available in the future. Three biotypes of annual bluegrass and one creeping bluegrass have been included in this study to evaluate their performance under green maintenance conditions.

Materials and Methods

Eleven cultivars of creeping bentgrass, three biotypes of annual bluegrass and one creeping bluegrass were seeded on a bentgrass nursery at the Red Deer Golf and Country Club on 19 August 1999. The bentgrass cultivar Penncross was designated as a standard, against which the attributes of the other entries were compared (Table 1).

Plots were replicated four times in a Randomized Complete Block Design (RCBD) and measured 1.5m by 2m. The rootzone was a sand/peat mixture. The plots were maintained at a mowing height of 0.150" and were fertilized at a rate of 0.5kg N/100m² (1b N/1000ft²) per growing month. The area was routinely irrigated to avoid physiological drought stress to the turf. A preventative snow mould fungicide program was applied in the fall of each year.

Table 1. Grasses used in the putting green trial, 1999-2002.

| Botanical Name | Common Name | Cultivar |
|---------------------------------|--------------------|------------------------|
| <i>Agrostis palustris</i> Huds | Creeping Bentgrass | Penn A-4 |
| <i>Agrostis palustris</i> Huds | Creeping Bentgrass | Penn A-1 |
| <i>Agrostis palustris</i> Huds. | Creeping Bentgrass | Southshore |
| <i>Agrostis palustris</i> Huds. | Creeping Bentgrass | Imperial |
| <i>Agrostis palustris</i> Huds. | Creeping Bentgrass | Penn G-2 |
| <i>Agrostis palustris</i> Huds. | Creeping Bentgrass | Penn G6 |
| <i>Agrostis palustris</i> Huds. | Creeping Bentgrass | Seaside II |
| <i>Agrostis palustris</i> Huds. | Creeping Bentgrass | Loft's L-93 |
| <i>Agrostis palustris</i> Huds. | Creeping Bentgrass | 18 th Green |
| <i>Agrostis palustris</i> Huds. | Creeping Bentgrass | Penncross |
| <i>Agrostis palustris</i> Huds. | Creeping Bentgrass | Cato |
| <i>Poa reptans</i> | Creeping bluegrass | Petersen's |
| <i>Poa annua</i> L. | Annual bluegrass | 97 Quilt I-25 |
| <i>Poa annua</i> L. | Annual bluegrass | 97 Quilt I-15 |
| <i>Poa annual</i> L. | Annual bluegrass | 97 Quilt I-12 |

The plots were evaluated on a monthly basis for three quality factors, colour density and area cover. These ratings were based on the National Turfgrass Evaluation Program (NTEP) protocols where numeric values are assigned to individual plots where 9 is best and 1 is poorest, and 6 is considered acceptable. Colour was evaluated by 1 is a brown dormant turf and 9 is a very uniform dark green colour. Turf density, a measure of the number of shoots per unit area, was rated based on 1 is a thin, weak turf stand and 9 is a very dense tight-knit stand. The third factor rated was area cover and values ranged from a 1 for a complete absence of turf to a 9 for complete cover with the desired turf. The presence of weeds or voids in the turf reduced this rating.

Results were evaluated based on those grasses that consistently performed the best. Generated data was first analyzed using an Analysis of Variance (ANOVA) test. When statistically significant treatment differences are present, least significant difference (LSD) values are presented at the bottom of each table. Cultivar differences that were greater than the LSD value indicate a strong probability that the differences were as a result of the individual grass and did not occur by chance. Therefore, within a column, if the same letter follows a number there is no significant difference between the grasses.

Results

Colour Assessment

The combined year's analysis for colour ranked the cultivars Penn A-4, Penn A-1, Penn G-2, Penn G-6 and Loft's L-93 as the best in the trial. When compared to the trial standard entry, Penncross, colour ratings were equal or consistently better for the following bentgrass cultivars: Penn A-4, Lofts L-93, Imperial, Penn A-1, Cato, Penn G-2, Penn G-6, and Southshore. The cultivars: 18th Green and Seaside II were not able to display a consistency of turf colour to equal the turf colour of Penncross (Table 2).

When rated for turf colour, a significant difference was observed between the bentgrass and the bluegrass biotypes. The bluegrass biotypes tended to consistently display a lighter hue of green than that of the bentgrasses. This inherent colour difference was consistent throughout the trial period and was reflected by the lower scores of the bluegrass entries (Tables 2). Their best colour scores were generally recorded during the August rating period in each of the three years of the trial. The biotype 97 Quilt I-15 displayed the best turf colour of the bluegrasses in the trial.

Table 2. Overall turf colour ratings, 1999 to 2002.

| Cultivars | Colour | Colour Superior or Equal to the Colour of Penncross |
|-----------------------------|-------------|---|
| Penn A-4 | 6.85 A | 17 out of 17 ratings |
| Penn A-1 | 6.78 AB | 17 out of 17 ratings |
| Penn G-2 | 6.78 AB | 17 out of 17 ratings |
| Penn G-6 | 6.72 ABC | 17 out of 17 ratings |
| Lofts L-93 | 6.65 ABCD | 17 out of 17 ratings |
| Cato | 6.64 BCD | 17 out of 17 ratings |
| Southshore | 6.57 CD | 17 out of 17 ratings |
| Imperial | 6.51 D | 16 out of 17 ratings |
| Penncross | 6.24 E | |
| 18 th Green | 6.03 F | 12 out of 17 ratings |
| Seaside II | 5.74 G | 9 out of 17 ratings |
| 97 Quilt I-15 | 5.03 H | 6 out of 17 ratings |
| 97 Quilt I-25 | 4.94 HI | 7 out of 17 ratings |
| Peterson's | 4.81 I | 7 out of 17 ratings |
| 97 Quilt I-12 | 4.47 J | 3 out of 17 ratings |
| LSD_{0.05} = | 0.20 | |

* Within a column, if the same letter follows a number there is no significant difference between treatments

Quality Assessment

Colour, area cover and density ratings for each variety were combined to create an overall quality rating. The bentgrass varieties performed well, with eight of the ten varieties scoring higher than the standard, Penncross. The overall quality of the two remaining bentgrasses cultivars: 18th Green and Seaside II were not significantly different than the standard, Penncross. Penn A-4 scored the best overall quality rating for the grasses evaluated in this trial. (Table 3).

The bluegrasses did not fair as well, as all of biotypes received a rating lower than Penncross. In general, the bluegrasses did not score as well in the spring rating as the bentgrasses, but by August, the overall turf quality of these bluegrass biotypes was much improved (data not shown). The bluegrass biotype, 97 Quilt I-15 was ranked the highest for the bluegrasses for overall quality (Table 3).

Table 3. Overall quality ratings, 2000 to 2002.

| Cultivars | Overall Quality | Quality Superior or Equal to the Quality of Penncross |
|---------------------------|-----------------|---|
| Penn A-4 | 7.335 A | 17 out of 17 ratings |
| Penn A-1 | 7.100 B | 17 out of 17 ratings |
| Penn G-6 | 7.078 B | 17 out of 17 ratings |
| Imperial | 7.039 BC | 17 out of 17 ratings |
| Penn G-2 | 7.022 BC | 17 out of 17 ratings |
| Southshore | 7.014 BC | 17 out of 17 ratings |
| Cato | 6.976 BC | 16 out of 17 ratings |
| Lofts L-93 | 6.904 C | 16 out of 17 ratings |
| Penncross | 6.551 D | |
| 18 th Green | 6.528 D | 11 out of 17 ratings |
| Seaside II | 6.400 D | 11 out of 17 ratings |
| 97 Quilt I-15 | 5.517 E | 9 out of 17 ratings |
| Peterson's | 5.496 E | 8 out of 17 ratings |
| 97 Quilt I-25 | 5.303 F | 5 out of 17 ratings |
| 97 Quilt I-12 | 5.072 G | 3 out of 17 ratings |
| LSD_{0.05} | 0.16 | |

* Within a column, if the same letter follows a number there is no significant difference between treatments

Winter Injury

Although winter injury was not specifically evaluated, spring quality ratings and winter injury are highly correlated. May quality ratings showed that Lofts L-93, Southshore, Cato, Penn A-4, Penn A-1, Penn-G-2 and Penn G-6 were significantly better than Penncross.

Table 4. May turf quality ratings, 2000 to 2002.

| Cultivars | May Quality Combined Years | Equal to or Superior to Penncross |
|--------------------------|----------------------------|-----------------------------------|
| Penncross | 5.25 BC | |
| 18 th Green | 5.08 CD | 1 out of 3 Ratings |
| Lofts L-93 | 5.60 ABC | 3 out of 3 Ratings |
| Imperial | 5.10 BCD | 2 out of 3 Ratings |
| Penn A-4 | 5.50 ABC | 3 out of 3 Ratings |
| Cato | 5.33 ABC | 3 out of 3 Ratings |
| Penn A-1 | 5.85 A | 3 out of 3 Ratings |
| Penn G-2 | 5.60 ABC | 3 out of 3 Ratings |
| Penn G-6 | 5.67 AB | 3 out of 3 Ratings |
| Southshore | 5.33 ABC | 3 out of 3 Ratings |
| Seaside II | 4.68 DE | 2 out of 3 Ratings |
| Peterson's | 5.08 CD | 2 out of 3 Ratings |
| 97 Quilt I-15 | 4.42 E | 1 out of 3 Ratings |
| 97 Quilt I-25 | 4.50 E | 1 out of 3 Ratings |
| 97 Quilt I-12 | 4.50 E | 1 out of 3 Ratings |
| LS_{0.05} | 0.53 | |

* Within a column, if the same letter follows a number there is no significant difference between treatments

Discussion

Over the three year trial period, it proved difficult to effectively compare bentgrasses with bluegrasses. The inherent differences in colour, tillering habit and uniformity were all major factors that made the two grass species dissimilar.

What the study did reveal was, all of the bentgrass cultivars tested received an acceptable or higher rating for use on a putting green under the NTEP standards. All of the ten bentgrasses tested demonstrated qualities superior or equal to those expressed by the standard entry, Penncross. The cultivar Penn A-4, with its strong color and tight knit density ranked as the best overall cultivar in the trial. None of the bluegrasses were able to produce an acceptable turf quality and were not equal to the trial standard, Penncross. Currently, only Peterson's Creeping Bluegrass is commercially available.

The Prairie Turfgrass Research Centre would like to acknowledge the following companies for supplying seed for this trial: Prairie Seeds Inc., Hannas Seeds, Jacklin Seed, Miller Seeds, Pickseed Canada, Early's Farm & Garden Centre and Dawson Seed Co. Ltd. In addition, support for the maintenance of the plots from the Red Deer Golf and Country Club and their course superintendent, Wayne Brown, is gratefully acknowledged.