TURFGRASS PERFORMANCE FOR GOLF COURSES IN SOUTHCENTRAL ALASKA

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Turfgrass varieties were evaluated for winter survival and overall quality on a sand-based golf green meeting USGA specifications (foreground) and under soil-based fairway conditions (background). Photo credit: Tim Evers

Introduction

Grasses for ground cover have uses that include lawns, sports fields, golf course fairways and greens, and other aesthetic and functional uses, and they must possess the same survival characteristics as related forage grasses. Research in Alaska on grass varieties with turfgrass potential has been minimal, with most earlier efforts evaluating them as forage crops. Klebesadel, et al. (1964) compared variety and source of Kentucky bluegrasses and red fescues from the circumpolar north in studies at Palmer (latitude 60° 35'). After the severe winter of 1961–62, winterkill of Alaska-adapted grasses ranged from 8 to 40 percent, while varieties from the contiguous United States, Sweden, and Canada were 85 to 100 percent winterkilled. Kill was attributed to ice sheets, alternating freezing and thawing, and very low temperatures without snow cover.

Klebesadel and Taylor (1971) summarized the problems of unadapted grasses, noting that grasses historically available in Alaska through the grass seed trade had been varieties from outside the state. Two Alaska varieties that have demonstrated excellent turfgrass characteristics, Nugget Kentucky bluegrass (*Poa pratensis* L.) and Arctared creeping red fescue (*Festuca rubra* L.) were initially identified as potential forage crops and revegetation species (Klebesadel et al. 1964, Mitchell, 1986). When a number of turfgrass species, including Kentucky bluegrass, creeping red fescue, chewings fescue, and hard fescue, were subjected to frequent mowing and evaluated (Mitchell (1985), the adapted species (i.e., Nugget and Arctared) were significantly more winterhardy than those from more southerly latitudes or maritime regions.

Included in many commercial mixes marketed in Alaska are bluegrass varieties Merion and Sydsport, and fescue varieties Boreal and PennLawn. Although they demonstrated good survival in most years, over time Nugget and Arctared became dominate in mixes with other bluegrasses and red fescues.

There are currently more than 20 public golf courses in Alaska that suffer varying degrees of winter turf injury from diseases, ice suffocation, and winterkill. For example, during the winter of 2001–2002, essentially every green and many fairways in Alaska suffered some degree of winter injury resulting in significant expense to reseed. The current study evaluated and compared new varieties and species against Nugget and Arctared on sand-based greens and soil-based fairways. We also assessed overseeding with rough bluegrass and bentgrass as a remedial treatment to establish playable greens.

Materials and Methods

In July 2001, selected varieties of bluegrasses and bentgrasses were seeded to a 100 percent sand green (2000-square-foot plot area) meeting United States Golf Association (USGA) specifications. After evaluations for

Table 1. Cultivar information for the green and fairway turfgrass variety trials 2001–2002. Palmer, Alaska (latitude 61º 35')

Kentucky bluegrass *(Poa pratensis)*	
Nugget	joint release by Agricultural & Forestry Experiment Station and USDA-ARS (1966)
Banff	University of Alberta
Arcadia	SRO
Alpine	Rutgers University/Pickseed West, Inc
Showcase	University of Rhode Island/SRO
SR2000	University of Rhode Island/SRO
SR2100	University of Rhode Island/SRO
Touchdown	Rutgers University/Pickseed West, Inc
Park	University of Minnesota AES
Blue Knight	DLF-Jenks
Roughstock Bluegrass *(Poa trivialis)*	
Sabre II	Cebeco International
Bariviera	Barenbrug Research
Winterplay	Turf-Seed, Inc.
Creeping Bentgrass *(Agrostis stolonifera)*	
18th Green	University of Manitoba
Penn A4	Penn State University
Penn G6	Penn State University
Pennlinks	Penn State University
L-93	Rutgers University/Lofts
Nu-Penn Blend, (Penn A and G traits)	Penn State varieties/Tee-2-Green
Providence (SR1019)	University of Rhode Island/SRO
Velvet bentgrass *(Agrostis canina)*	
SR 7200	University of Rhode Island/SRO
Colonial bentgrass *(Agrostis capillaris)*	
SR 7100	SRO
Poa annua subsp. *Reptans*	
True Putt	University of Minnesota
Fine Fescues (*Festuca*)	
Arctared, creeping red fescue (*F. rubra* subsp. *rubra*)	Agricultural & Forestry Experiment Station/USDA-ARS
Shademaster, creeping red fescue (*F. rubra* subsp. *rubra*)	Turf-Seed, Inc.
Aurora Gold, hard fescue *(F. brevipila)*	Turf-Seed, Inc.
Bighorn, sheeps fescue (*F. ovina* subsp. *hirtula*)	Turf-Seed, Inc.
Perennial Ryegrass/Bluegrass *(Lolium perenne/Poa pratensis)*	
Champion Blue (Blend of SR4000, 4100, 4200 and SR 2000, 2001)	SRO
Tufted Hairgrass *(Deschampshia caespitosa)*	
Nortran	Agricultural & Forestry Experiment Station (1986)

Research green in early May 2002 shows relative degrees of winter survival of turfgrass varieties. As shown in these photos, Nugget Kentucky bluegrass (dark-colored plots) demonstrated good survival and early greenup while adjacent creeping bentgrass (light-colored plots) were either dead or slow to recover.
Photo credit: Allen Mitchell

overwintering in the spring of 2002, surviving variety plots were split and overseeded with selected varieties for in-season remediation and overwintering assessment for 2002–03. Those that did not survive were replaced with other varieties. The fairway variety trial was seeded in June 2002 on a Knik silt loam (Typic Eutrocryept).

Both the green and fairway trials were arranged in randomized complete block design with four replications. Individual plots in the 2001 green trial were 4 x 8 ft and subplots in 2002 were 4 x 4 ft. The subplots were not treated in split block fashion, but in a randomized complete block design. Individual plots in the 2002 fairway trial were 6 x 12 ft.

The green seedings were covered with a tarp that allowed water infiltration until all plots germinated. All trials were irrigated as required. Table 1 lists cultivar information for the 2001 and 2002 green trials and the 2002 fairway trials.

Mowing height for the green trial was 0.25 inch in 2001 and 0.16 inch in 2002. Fairway trials were mowed at 1.0 inches for the establishment year.

Seeding rates per 1000 ft^2 were as follows:

Green

Kentucky Bluegrass (KBG), 1X: 4 lb, 2X: 8 lb
KBG/*Poa trivialis* blend, 1X: 2 lb/2 lb 2X, 4 lb/4 lb
Bentgrass, 2 lb

Fairway

Kentucky Bluegrass, 4 lb
Bentgrass, 2 lb; Fescues, 6 lb
Hairgrass, 4 lb

On-site research green variety trial at Settler's Bay Golf Course in Wasilla, Alaska. Photo credit: Allen Mitchell.

Fertilizer rates per 1000 ft^2 were as follows:

Green 2001

4.0 lb N, 2.5 lb P2 O5, 2.5 lb K2O (establishment year)
Elemental S supplied to reduce pH from 8.3 to 7.8.
Micronutrients applied as S.T.E.M. (2 oz)

Green 2002

8.0 lb N, 3.7 lb P2O5, 3.7 lb K2O, 2.0 lb S
Fall treatments of FFII 14-3-3 PCNB fungicide/fertilizer combination were applied in 2001 and 2002.

Fairway 2002

1.5 lb N, 5.8 lb P2O5, 6.2 lb K2O, 2.0 lb S (establishment)

Turfgrass was evaluated for establishment, winter survival/live cover (expressed as percentage), overall quality, color, density, and texture utilizing the National Turfgrass Evaluation Program (NTEP) rating system. In that system, ideal turf is given a value of 9 and poorest or dead turf is given 1.

Results and Discussion

Green

Table 2 summarizes survival for the winter of 2001–2002. The *Poa trivialis* varieties tested did not survive either alone or in combination with Nugget KBG. While the winter was not particularly severe in terms of temperature, a high number of golf course greens statewide suffered significant injury and most had to be reseeded. At all seeding rates, Nugget showed earliest greenup and highest percent live cover throughout the growing season. Percent cover was somewhat less at the lower seeding rate for Nugget, but showed little difference after early June. Creeping bentgrass performed poorly, with severe winter injury, but did recover somewhat. Of the six cultivars tested, 18th Green showed the most potential for northern climates. It has been cited by others as performing well at colder latitudes (Brown and Ross, 1997).

Recovery and eventual spread of the winter-injured bentgrasses were delayed due to moss cover of the dead areas. Subsequent to the June 27 evaluation, the entire green was verticut and all bentgrass and Nugget/Sabre II plots were split, with half the plot overseeded as noted in Table 3. The dead plots (Sabre II and Bariviera) were

Student assistant Eric Beiler mows research green at the Palmer Research and Extension Center. The green was established in 2001 to test potential cold tolerant turfgrass cultivars for Alaska golf courses.
Photo credit: Allen Mitchell.

Table 2. Turfgrass Survival/Cover in Greens Trial Seeded July, 2001.

Cultivar	Evaluation Date 2002						
	5/6	5/14	5/28	6/27	7/26	8/8	10/30
	% Live Cover						
Nugget KBG (1X)	63.8	73.8	85.5	94.3	95.3	97.8	98.0
Nugget KBG (2X)	86.3	91.3	94.5	97.3	97.0	98.0	98.0
Nugget/ Sabre II (1X)	18.8[1]	19.0	45.0	75.8	83.3	91.3	93.3
Nugget/ Sabre II (2X)	17.5[1]	16.5	36.3	66.3	76.7	87.5	91.7
18th Green	1.0	7.3	9.0	32.5	71.6	77.5	91.7
Penn A4	1.0	2.3	3.0	6.8	20.0	33.8	58.3
Penn G6	1.0	5.8	9.5	20.0	41.7	67.5	76.7
Penn L	1.0	1.5	1.5	4.5	16.7	31.3	70.0
L-93	1.0	1.3	2.5	8.9	33.3	43.8	75.0
Nu-Penn	1.0	2.4	6.3	12.8	17.3	44.5	56.7
Sabre II	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bariviera	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.S.D. (.05)	5.0	7.2	7.8	11.7	26.0	18.7	23.8

[1] Sabre II winterkilled; % cover represents survival of Nugget Kentucky bluegrass

reseeded to True Putt and Banff KBG, respectively. The green was again covered with a tarp until the overseeded plots germinated (10 days).

Table 3 summarizes the greens' turfgrass quality for the 2001 seeding and the 2002 overseeding. The June ratings are for 2001 seeding only, and clearly demonstrate the poor performance of all but the adapted Nugget KBG. The remaining quality ratings compare the original 2001 seeding with the various 2002 overseeding treatments. Among the overseeded cultivars, bentgrasses emerged first (6 to 7 days), followed by the *Poa* entries (10 to 12 days). The June and July evaluations ranked Nugget KGB plots above other cultivars in overall quality. By late July, some reseeded plots improved to the point that they were playable (True Putt, Penn G-6, SR7200, and Winterplay). This improved playability was late in the playing season. Had the plots been reseeded earlier, playable quality would likewise have occurred earlier.

Table 3. Performance of Turfgrass Cultivars in a Greens Trial

Quality Rating (1-9); 9 = ideal turf

Cultivar	Seeding Year	Evaluation Date 2002				
		June	July	Aug	Sept	Oct[1]
			----------Quality----------			
Nugget KBG	2001	8.0	8.0	8.0	8.0	8.3
Nugget (2X)	2001	8.3	8.7	7.8	8.0	8.0
Nugget/ Sabre II	2001	6.5	6.0	6.8	7.5	7.0
Winterplay/ Nugget	2002		5.3	6.8	7.8	7.3
Nugget/ Sabre II (2X)	2001	5.9	4.3	5.8	5.8	6.7
Winterplay/ Nugget (2X)	2002		6.0	7.0	8.0	7.3
True Putt	2002		6.7	7.3	7.3[2]	8.0
Pennlinks	2001	1.0	1.3	2.0	4.3	4.0
Penn G6	2001	2.4	2.7	4.3	5.5	5.3
Penn G6	2002		6.0	6.8	8.5	7.7
Penn A4	2001	1.1	1.3	2.3	3.3	2.0
Penn A4	2002		5.3	6.8	8.8	8.3
L-93	2001	1.0	2.0	2.8	4.0	4.3
Velvet/L-932002	6.7	6.3	8.0	7.7		
Nu-Penn	2001	1.3	2.0	3.0	4.0	3.3
Colonial/Nu-Penn	2002	4.7	6.0	7.3	8.0	
18th Green	2001	3.0	3.7	4.8	6.5	7.3
Winterplay/ 18th Green	2002	6.0	7.0	7.8	6.7	
Banff KBG	2002		2.7	5.5	5.8	6.7
L.S.D. (.05)		0.9	1.2	1.3	1.2	1.7

[1] An October evaluation was possible only because of an exceptionally late fall in 2002.

[2] True Putt flowered.

Table 4. Fairway Turfgrass Evaluation for Establishment 2002

Turfgrass Rating (1-9); 9 = dark green, disease-free, weed-free, ideal turf. (Seeded 6/26/02)

Cultivar	Evaluation			
	Color	Disease	Weeds	Quality
		----------7/23/02----------	--9/07/02--	
Kentucky Bluegrass				
Nugget	7.0	8.3	4.0	7.3
Arcadia	8.0	8.7	4.0	8.0
Showcase	8.0	9.0	4.0	8.0
SR2000	7.0	8.3	2.7	8.7
SR2001	6.7	8.7	1.7	7.7
Alpine	6.0	9.0	5.0	7.7
Touchdown	7.0	9.0	2.0	7.7
Banff	6.0	8.7	5.0	7.0
Park	6.7	8.3	4.3	6.3
Blue Knight	8.0	8.7	2.7	8.0
Bentgrass				
Velvet SR 7200	6.3	2.7	4.7	7.0
Colonial SR 7100	5.7	2.3	6.0	8.0
Providence	5.0	3.0	4.7	7.3
SR1119	5.0	4.3	5.0	7.3
SR1020	4.7	5.0	5.0	7.3
Penncross	5.3	4.0	6.3	7.7
Penn G6	4.7	4.0	5.3	7.3
Penn A4	5.3	3.3	3.7	7.3
Fescue				
Arctared Creeping Red	6.7	7.3	5.3	6.3
Shademaster Creeping Red	7.0	6.3	7.3	7.3
Aurora Gold Hard Fescue	8.3	8.3	3.0	6.3
Big Horn Sheeps	9.0	8.7	2.3	7.0
Perennial Ryegrass/KBG				
Champion Blue	7.3	8.3	8.0	7.7
Tufted Hairgrass				
Nortran	5.7	7.3	4.7	6.0
LSD (.05)	1.2	1.3	1.1	1.0

Nugget rated high in August and September and the Winterplay overseeding of Nugget continued to improve. The September evaluation showed improvements in both the 2001 and 2002 overseeded bentgrass cultivars. Of the 2001 seeded bentgrass cultivars, 18th Green ranked highest, while SR7200 velvet bentgrass performed best of all 2002 overseeded plots. True Putt and SR7200 established earliest and were playable by mid-July (NTEP rating 6.7).

Fairway

Fairway establishment (2002) was evaluated July 23 and September 9. Selected parameters are summarized in Table 4. The bentgrasses generally emerged earlier than bluegrass, fescue, and hairgrass (data not shown). The following observations were made:

• The bentgrass cultivars were most affected by disease (primarily fusarium seedling damping off).

• Late emerging bluegrass plots had more weeds than other grasses.

• Bluegrasses and fine fescues rated higher for color than bentgrasses and hairgrass. Disease discoloration was a partial factor.

• The September quality evaluation showed greater differences within than between species. Essentially all cultivars demonstrated improvement in quality over the July rating and went into winter in good condition.

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