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Lateral Spread and Divot Recovery of Creeping Bentgrass Cultivars in Non-mowed and Mowed Settings

Marcus Jones
Iowa State University

Nick E. Christians
Iowa State University, nchris@iastate.edu

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Abstract
Creeping bentgrass (Agrostis stolonifera L.) creates a dense, high-quality playing surface and is commonly used for intensely managed turf areas on golf courses. Its popularity is partially due to its aggressive lateral growth, which allows this species to partially recuperate in areas continuously subjected to wear and divoting. A host of improved cultivars of creeping bentgrass were released on the market that possess improved agronomic characteristics such as vertical shoot growth, higher shoot densities, and narrower leaf blades. While many believe these morphological characteristics create an improved playing surface there are questions about the ability of these improved varieties to spread laterally compared with traditional varieties. While it is generally agreed that creeping bentgrass possesses relatively high recuperative potential, minimal research has focused on differences among cultivars of creeping bentgrass. The objectives were to determine differences in lateral spread and recuperative potential of creeping bentgrass cultivars in mowed and non-mowed settings.

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Marcus Jones, graduate student
Nick Christians, university professor
Department of Horticulture

Introduction

Creeping bentgrass (*Agrostis stolonifera* L.) creates a dense, high-quality playing surface and is commonly used for intensely managed turf areas on golf courses. Its popularity is partially due to its aggressive lateral growth, which allows this species to partially recuperate in areas continuously subjected to wear and divoting. A host of improved cultivars of creeping bentgrass were released on the market that possess improved agronomic characteristics such as vertical shoot growth, higher shoot densities, and narrower leaf blades. While many believe these morphological characteristics create an improved playing surface there are questions about the ability of these improved varieties to spread laterally compared with traditional varieties. While it is generally agreed that creeping bentgrass possesses relatively high recuperative potential, minimal research has focused on differences among cultivars of creeping bentgrass. The objectives were to determine differences in lateral spread and recuperative potential of creeping bentgrass cultivars in mowed and non-mowed settings.

Materials and Methods

Twenty-four commercially available cultivars of creeping bentgrass were removed from established plots and transplanted in the center of a 1.0 × 1.0 m plot on June 1. Prior to transplant, the area was fumigated with Basamid in order to minimize weed competition. The plugs were irrigated to encourage establishment and were not subject to mowing.

Divot injury was simulated on August 3 by removing a core of soil and turf from established plots and backfilling with native soil. Established plots were irrigated to prevent wilt and mowed three times weekly at 1.27 cm.

Digital images were taken bimonthly and semiweekly for the non-mowed and mowed plots, respectively. Lateral spread and recuperative potential of creeping bentgrass cultivars was quantified using digital image analysis (DIA).

Results and Discussion

Lateral spread. Differences among cultivars were observed for lateral spread ($P < 0.05$). Penncross had the fastest establishment rate and Bengal had the slowest (Table 1). The cultivars SR 1150, Crenshaw, Imperial, Kingpin, L-93, MacKenzie, Crystal Bluelinks, Pennlinks II, Penn G-6, Putter, Memorial, Penn A-4, and Tyee all had establishment rates statistically similar to Penncross. One factor influencing shoot density in creeping bentgrass is stolon internode length. Longer internodes usually yield faster growth rates and shorter internodes slower growth rates. Internode length was positively correlated with lateral spread in our study ($P = 0.0058$).

Recuperative potential. Differences among cultivars were observed for divot recovery rate ($P < 0.05$). Imperial had the fastest recovery rate and Alpha the slowest (Table 1). The cultivars Penn G-6, Alister, SR 1150, Crystal Bluelinks, Southshore, Penncross, L-93, and Century all had divot recovery rates statistically similar to Imperial. Correlation revealed shoot density does not significantly influence divot recovery rate ($r^2 = 0.075$ $p = 0.1662$).

Table 1. Creeping bentgrass establishment rate, internode length, divot recovery rate, and shoot density by cultivar.

Cultivar	Establishment rate	Internode length	Divot recovery rate	Shoot density
	Log_e(coverage) d^{-1}	cm	(coverage) d^{-1}	tillers/dm^2
Penncross	0.04427	3.1		
Penncross	0.04584	3.0	1.54512	1233
L-93	0.04200	3.7	1.49147	1127
T-1	0.03847	3.0	1.34497	1387
Alpha	0.03912	3.6	1.24392	1413
Putter	0.04064	2.8	1.45260	1220
Southshore	0.03887	3.4	1.55863	1120
Kingpin	0.04250	3.4	1.32732	1420
Crenshaw	0.04370	3.9	1.41507	1287
Imperial	0.04370	3.3	1.67947	1307
Century	0.03835	3.3	1.47720	1293
Penn A-4	0.03974	3.4	1.45153	1213
Crystal Bluelinks	0.04125	3.0	1.58099	1293
Alister	0.03650	2.8	1.59508	1307
Pennlinks II	0.04090	3.1	1.43824	1240
oo7	0.03779	3.0	1.46656	1547
MacKenzie	0.04134	3.2	1.40922	1360
Tyee	0.03931	3.5	1.46953	1360
SR 1150	0.04479	3.0	1.58871	1413
Memorial	0.03989	3.0	1.46798	1173
Independence	0.03805	2.9	1.38668	1320
LS-44	0.03544	2.9	1.39781	1286
Bengal	0.03301	2.6	1.31271	1367
Declaration	0.03532	3.0	1.40977	1447
Penn G-6	0.04067	2.6	1.63786	1347
Mean	0.04006	3.1	1.46452	1312
LSD	0.006713	0.8	0.2085	183