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# Germination Curves Describe Variation in Germination Characteristics in Cultivars of Creeping Bentgrass

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# Germination Curves Describe Variation in Germination Characteristics in Cultivars of Creeping Bentgrass

## **Abstract**

Since its introduction, Penncross has set the standard for creeping bentgrass (*Agrostis stolonifera* L.) cultivars. Recently released cultivars of creeping bentgrass possess improved vegetative characteristics compared with Penncross, but the germination characteristics have not been studied. Germination characteristics such as speed, synchrony, and viability determine the success of newly seeded areas. Traditional establishment from seed involves sowing seed into bare soil or turf that has been treated with non-selective herbicides. In either case, the newly emerging seedlings face little competition from surrounding plants. Although germination characteristics are important when using traditional establishment methods, superior germination characteristics may be necessary when using non-traditional seeding methods such as interseeding. The objectives of this study were to determine differences in germination speed, synchrony, percentage, and weight within and among cultivars of creeping bentgrass, and to investigate the relationship between these germination characteristics and seed weight.

## **Keywords**

RFR A9049, Horticulture

## **Disciplines**

Agricultural Science | Agriculture | Plant Pathology

# Germination Curves Describe Variation in Germination Characteristics in Cultivars of Creeping Bentgrass

## RFR-A9049

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### Introduction

Since its introduction, Penncross has set the standard for creeping bentgrass (*Agrostis stolonifera* L.) cultivars. Recently released cultivars of creeping bentgrass possess improved vegetative characteristics compared with Penncross, but the germination characteristics have not been studied. Germination characteristics such as speed, synchrony, and viability determine the success of newly seeded areas. Traditional establishment from seed involves sowing seed into bare soil or turf that has been treated with non-selective herbicides. In either case, the newly emerging seedlings face little competition from surrounding plants. Although germination characteristics are important when using traditional establishment methods, superior germination characteristics may be necessary when using non-traditional seeding methods such as interseeding. The objectives of this study were to determine differences in germination speed, synchrony, percentage, and weight within and among cultivars of creeping bentgrass, and to investigate the relationship between these germination characteristics and seed weight.

### Materials and Methods

The cultivars L-93, T1, Apha, Penn A-1, Penn A-4, Crystal Bluelinks, Pennlinks II, Penncross, Tyee, 007, MacKenzie, SR1150, Memorial, Independence, and Declaration were evaluated in this study. Each cultivar was represented by two to four seed lots from production year 2007. Standard germination tests were conducted according to the rules

established by the Association of Official Seed Analysts (AOSA). Germination was deemed complete when the radical protruded approximately 2 mm and germination was recorded once or twice daily for 14 days. A logistic function was used to obtain parameters for mean germination time (MGT) as a measure of germination speed,  $T_{10-90}$  as a measure of germination synchrony, and final germination percentage (FGP) as a measure of germination capability. Seed weight was determined by using an Ames blower to separate 0.25 grams of seed into two seed weight fractions.

### Results and Discussion

Differences were observed for all germination parameters ( $P < 0.01$ ) among cultivars of creeping bentgrass and improved varieties exhibited superior MGT ( $P < 0.01$ ),  $T_{10-90}$  ( $P < 0.01$ ), and FGP ( $P < 0.05$ ) compared with Penncross.

*Mean germination time.* MGT values ranged from 3.4644 to 4.1881 days among cultivars of creeping bentgrass (Table 1). Pennlinks II germinated faster (smaller MGT) compared with all other cultivars. In addition, cultivars Penn A-4, Crystal Bluelinks, Declaration, T-1, Independence, and Penn A-1 had MGT values significantly smaller than Penncross.

*Germination synchrony.*  $T_{10-90}$  values ranged from 1.3003 to 2.0447 days among cultivars of creeping bentgrass (Table 1). T-1 and Penncross had the smallest and largest  $T_{10-90}$ , respectively. The  $T_{10-90}$  value for T-1 was statistically different compared with the  $T_{10-90}$  of cultivars Memorial, MacKenzie, Penn A-1, Tyee, Pennlinks II, SR 1150, Penn A-4, and Penncross. In addition, cultivars L-93, Alpha, Crystal Bluelinks, Independence, Declaration, and 007 all had

T<sub>10-90</sub> values statistically different compared with Penncross.

*Final germination percentage.* Values for FGP ranged from 98.4324 to 93.5228% among creeping bentgrass cultivars. T-1 and Declaration had the largest and smallest FGP values, respectively. The FGP for T-1 was statistically different compared with FGP values for cultivars Crystal Bluelinks, Memorial, Independence, Penncross, and Declaration. In addition, cultivars L-93, MacKenzie, 007, Penn A-1, Tyee, and SR 1150 had FGP values statistically greater compared with Penncross.

*Seed weight.* Cultivars T-1 and Alpha had seed weight statistically greater compared with Penncross and 007, and MacKenzie had seed weights statistically less than Penncross. Seed weight was negatively correlated with germination speed ( $r^2 = 0.22$ ,  $P = >0.0001$ ). However, seed weight does not statistically influence germination synchrony or percentage.

**Table 1. Predicted values for mean germination time (MGT), for the time from 10 to 90% of final germination percentage (T<sub>10-90</sub>), and final germination percentage (FGP) for 15 creeping bentgrass cultivars.**

Cultivar	MGT	Germination parameters		
		T <sub>10-90</sub>	FGP	Weight
		<u>Standard cultivar</u>		
Penncross	4.0929	2.0447	94.9193	0.1114
		<u>Improved cultivars</u>		
Pennlinks II	3.4644	1.7929	96.7101	0.1363
Penn A-4	3.6559	1.9334	96.8993	0.1336
Crystal Bluelinks	3.7383	1.4345	96.3414	0.0872
Declaration	3.7728	1.5581	93.5228	0.1351
T-1	3.8218	1.3003	98.4324	0.1625
Independence	3.8235	1.4557	95.1806	0.1358
Penn A-1	3.9001	1.7498	97.2262	0.1182
Alpha	3.9222	1.3999	96.8050	0.1532
Memorial	3.9266	1.6947	96.3088	0.0924
L-93	4.0315	1.3965	97.8763	0.1187
Tyee	4.0848	1.7576	97.1186	0.1102
007	4.1070	1.5610	97.4182	0.0690
SR1150	4.1357	1.8411	96.9556	0.1251
Mackenzie	4.1881	1.7220	97.4528	0.0741
Mean	3.9110	1.6428	96.6112	0.1175
<b>LSD</b>	<b>0.1681</b>	<b>0.3893</b>	<b>2.0534</b>	<b>0.0301</b>