Creeping Bentgrass Varieties for Dollar Spot Resistance under Reduced Inputs in Chicago

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Introduction

Creeping bentgrass (*Agrostis stolonifera*) is highly susceptible to dollar spot (*Clarireedia jacksonii*). Annually, a majority of foliar fungicide applications target dollar spot, but bentgrass breeding efforts have begun to change that. Newer varieties are much less susceptible to dollar spot. In the upper Midwest, reductions in fungicide use is now possible in large acreage areas as long as dollar spot resistance is considered in tee and fairway renovations. Ultimately, turfgrass variety trial research helps golf course superintendents promote environmental stewardship in the game of golf.

Objectives

- ❑ Evaluate dollar spot susceptibility of newer creeping bentgrass varieties.
- ❑ Reduce fungicide input need for dollar spot control.

Materials and Methods

- ❑ **Bentgrass Variety Trial, Bob Berry Sunshine Course, Lemont, IL**
  - Randomized Complete Block Design (RCBD) with 4 replications
  - 18 creeping bentgrass varieties selected for dollar spot resistance
- ❑ **Site Description**
  - USGA spec rootzone originally constructed in 2003 and 2009
  - Site previously: 2003 NTEP National Bentgrass Test - Fairway/Tee, and 2009-10 NCERA-221 Reduced Input Bentgrass Cultivar Trial
- ❑ **Seeding and Fertilization**
  - Aug 28, 2023: Creeping bentgrass seed (1 lb/1000 sq ft) plus Forever Green Natural 4-3-0 fertilizer added to aid uniform application.
  - Fall 2023: Nitrogen by liquid urea (0.15 lb N/1000 sq ft) applied to aid establishment on Oct 4, 10, and 19.
  - Fertility 2024: Forever Green Natural 4-3-0 fertilizer (0.5 lb N/1000 sq ft) applied as normal maintenance on Apr 16, May 21, Jun 20, July 18, and Aug 29.
  - Oct 9, 2024. A fungicide application (Secure 0.5 fl oz/1000 sq ft) was triggered by threshold used (≥10% dollar spot damage per plot).
- ❑ **Data Collection**
  - Visual Turf Quality (1–9 scale, 6 = minimum acceptable and 9 = best)
  - Dollar Spot (% infection centers per plot)
  - Normalized Difference Vegetation Index (NDVI) (GreenSeeker, Trimble Inc., Westminster, CO)
- ❑ **Data Analysis**
  - Statistical analysis conducted by date within each year (ARM, GDM Solutions, Inc., Brookings, SD).
  - Area Under the Progress Curve (AUPC) summarized entire year; estimated by trapezoidal integration method (Madden et al., 2007).

Table 1. Creeping bentgrass fairway variety trial at Bob Berry Sunshine Course, Lemont IL.

Number	Creeping Bentgrass Variety	Seed Company
1	Barracuda	Mountain View Seed
2	Centennial	Mountain View Seed
3	Oakley	Mountain View Seed
4	Piper	Mountain View Seed
5	Piranha	Mountain View Seed
6	Flagstick	DLF/Seed Research of Oregon
7	Macdonald	DLF/Seed Research of Oregon
8	Mackenzie	DLF/Seed Research of Oregon
9	OO7	DLF/Seed Research of Oregon
10	OO7XL	DLF/Seed Research of Oregon
11	777	DLF/Seed Research of Oregon
12	Pure Distinction	Pure Seed Testing
13	Pure Eclipse	Pure Seed Testing
14	PST-0DSF	Pure Seed Testing
15	Puregreen	Pure Seed Testing
16	PST-0MRN	Pure Seed Testing
17	PST-0R20	Pure Seed Testing
18	PST-RODS	Pure Seed Testing

Table 2. Summary ANOVA table for evaluated parameters in 2024. NS = not statistically significant, * = significant at 0.05 level of probability (or p value of 0.05), ** = significant at p-value of 0.01, and *** = significant at p-value of 0.001. AUPC = Area Under Progress Curve. Dash = data not collected.

Source	29 Jan	15 Feb	15 Mar	18 Apr	1 May	4 Jun	20 Jun	2 Jul	16 Jul	30 Jul	13 Aug	27 Aug	3 Sep	24 Sep	9 Oct	21 Oct	7 Nov	26 Nov	AUPC
Dollar Spot	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	*	NS	NS
Visual Quality	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	*	*	NS	NS	NS
NDVI	NS	NS	NS	NS	**	**	NS	NS	NS	NS	NS	NS	NS	NS	*	**	**	NS	NS

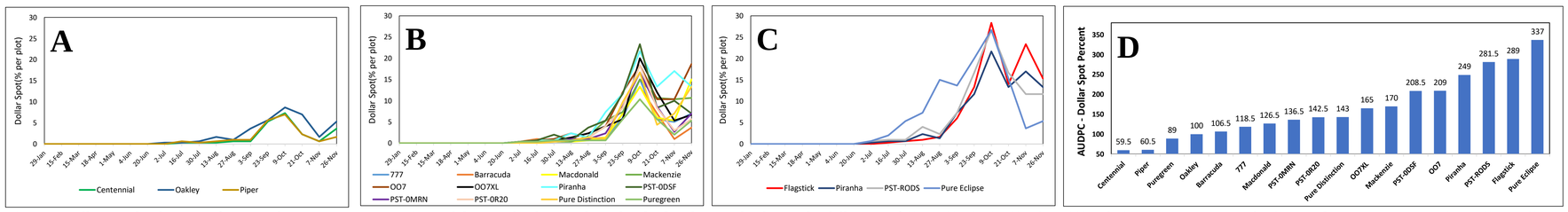

Figure 1. Dollar spot development of creeping bentgrass varieties in 2024 with line graphs showing those that displayed mean plot damage by dollar spot of A) <10%, B) 10-20%, C) >20% and D) entire year summary by Area Under Disease Progress Curve (AUDPC).

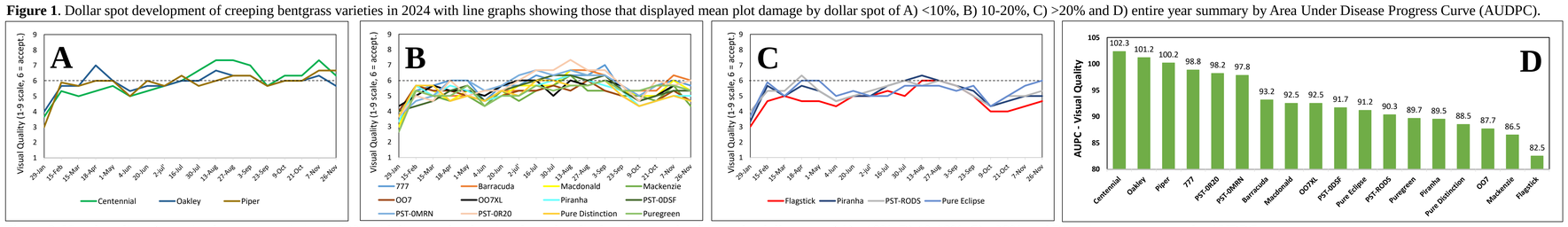

Figure 2. Visual quality of creeping bentgrass varieties in 2024 with line graphs showing those that displayed mean plot damage by dollar spot of A) <10%, B) 10-20%, C) >20%, and D) entire year summary by AUDPC.

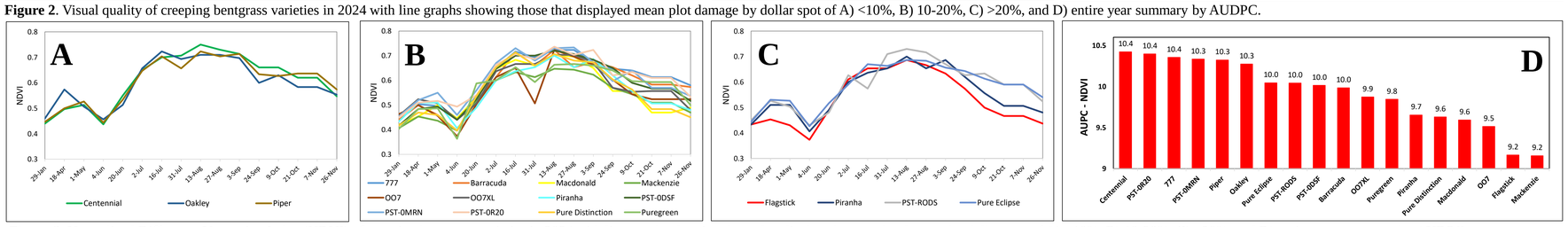

Figure 3. Normalized Difference Vegetation Index (NDVI) of creeping bentgrass varieties in 2024 with line graphs showing those that displayed mean plot damage by dollar spot of A) <10%, B) 10-20%, C) >20%, and D) entire year summary by AUDPC.

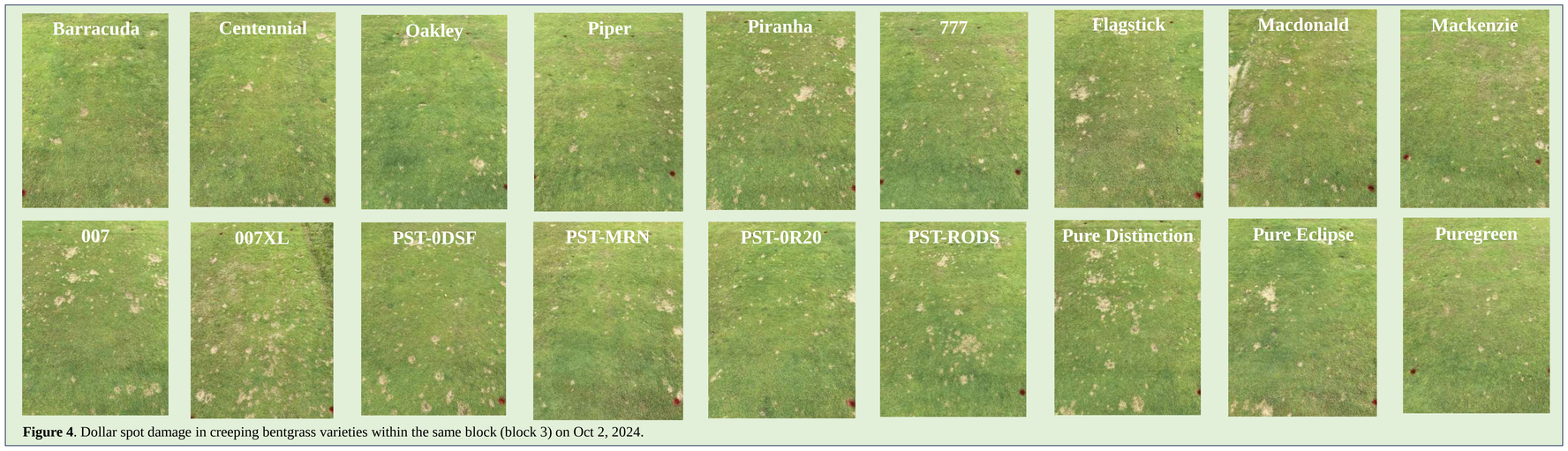

Figure 4. Dollar spot damage in creeping bentgrass varieties within the same block (block 3) on Oct 2, 2024.

DOLLAR SPOT DURING RECOVERY – NOV 7, 2024

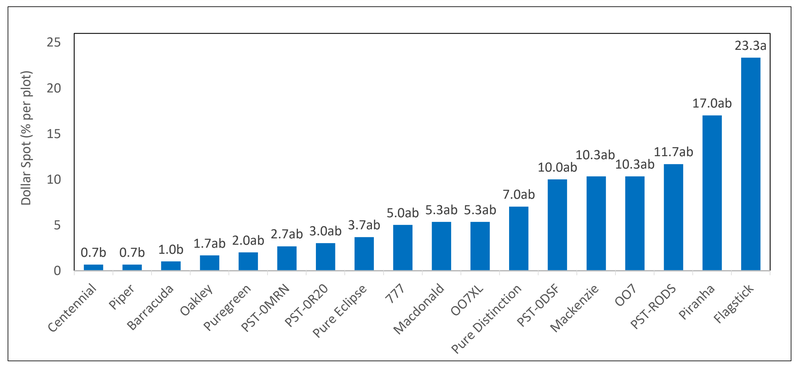

Figure 5. Dollar spot injury differed across eighteen creeping bentgrass varieties when rated on Nov 7, 2024.

RESULTS AND DISCUSSION

Dollar Spot

- Creeping bentgrass varieties showed significant differences for dollar spot on Nov 7, 2024. (Table 2, Fig 5).
- 'Centennial', 'Barracuda', and 'Piper' saw <10% dollar spot during the year and were different versus 'Flagstick' on Nov 7, 2024. Figs. 1A , 5.
- 'Flagstick' was most susceptible to dollar spot disease. Figs. 1A, 1C, 5.

Visual Quality

- Due to dollar spot damage, 'Centennial' had better visual quality versus 'Flagstick' on Oct 9 and Oct 21. Table 2, Figs. 2A & 2C.

NDVI

- Due to dollar spot damage, 'Piper' had higher NDVI versus 'Flagstick' on Oct 9 and Oct 21. Table 2, Figs. 3A & 3C.

CONCLUSIONS

Overall, 'Oakley', 'Piper' and 'Centennial' displayed the greatest resistance to dollar spot (<10%). In contrast, 'Flagstick' appeared most susceptible. Visual turf quality and NDVI differences in the fall were due to damage by dollar spot. Fungicides were largely not necessary indicating microclimate conditions and/or dollar spot inoculum were lacking. Following a single curative fungicide application, rapid recovery was observed in certain varieties, indicating recuperative ability differences also exist. This research can help: 1) Aid the validation of dollar spot resistant creeping bentgrass varieties, and 2) be used to test fungicide programs to achieve reduced inputs in fairways.

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