

# RUTGERS

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***The New Jersey Turfgrass Association***

In Cooperation with  
Rutgers Center for Turfgrass Science  
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# **2016 RUTGERS TURFGRASS PROCEEDINGS**

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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State University of New Jersey in cooperation with the New Jersey Turfgrass Association. The purpose of this document is to provide a forum for the dissemination of information and the exchange of ideas and knowledge. The proceedings provide turfgrass managers, research scientists, extension specialists, and industry personnel with opportunities to communicate with co-workers. Through this forum, these professionals also reach a more general audience, which includes the public.

This publication includes lecture notes of papers presented at the 2016 GREEN EXPO Turf and Landscape Conference. Publication of these lectures provides a readily available source of information

covering a wide range of topics and includes technical and popular presentations of importance to the turfgrass industry.

This proceedings also includes research papers that contain original research findings and reviews of selected subjects in turfgrass science. These papers are presented primarily to facilitate the timely dissemination of original turfgrass research for use by the turfgrass industry.

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Dr. Ann Brooks Gould, Editor  
Dr. Bruce B. Clarke, Coordinator

# PERFORMANCE OF BENTGRASS CULTIVARS AND SELECTIONS IN NEW JERSEY TURF TRIALS

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Bentgrass species possess a distinct ability to form very dense, uniform, and fine textured surfaces under an extremely low height of cut. As a result, bentgrasses are often used in specialized, high maintenance areas such as golf course fairways, tees, and putting greens. There are three bentgrass species predominantly used for turf: creeping bentgrass (*Agrostis palustris* Huds.; synonym = *A. stolonifera* L.), colonial bentgrass (*A. tenuis* L. or *A. capillaris* L.), and velvet bentgrass (*A. canina* L.). In addition, highland or dryland bentgrasses (*A. castellana* Boiss. & Reut.) can be options for turf in stressful areas, but these tend to be less commonly utilized because they are less attractive than the more common species when a high quality turf is needed. Due to an aggressive growth habit and adaptability to a variety of climates, creeping and velvet bentgrasses are most suitable for the very low cutting heights required for golf course greens in the United States. Colonial bentgrasses respond best to a slightly higher height of cut, therefore these are usually better suited for lower maintenance fairways in temperate areas of the United States.

Creeping bentgrasses are highly stoloniferous and have a prostrate growth habit, which allows for persistence under very low mowing heights. Cutting heights of 1/10 of an inch are not uncommon on many top tier golf courses. This species is highly adapted to both cool, temperate as well as warm, humid regions of the United States, making it the most popular species used on golf course putting greens in temperate areas. Its vigorous spreading growth habit also contributes to its ability to repair damaged areas quickly. In 1954, H. B. Musser released 'Penncross,' the first seeded synthetic variety of creeping bentgrass (Musser, 1959). Since then, breeding efforts have markedly improved creeping bentgrasses to withstand the increasing demands of

the game of golf including the need, when compared to older varieties, for better turf quality, darker green color, improved shoot density, improved traffic tolerance and recuperative ability, and increased disease and stress tolerances.

Creeping bentgrasses are susceptible to a number of pathogens and pests. Dollar spot (caused by the fungus *Sclerotinia homoeocarpa*) is one of the main disease problems of close-cut creeping bentgrass. However, these grasses can also be susceptible to brown patch (*Rhizoctonia solani*), copper spot (*Gloeocercospora sorghi*), anthracnose (*Colletotrichum cereale*), and diseases caused by *Pythium* spp.

Colonial bentgrass, also referred to as browntop, has traditionally been used as a lawn and golf course grass in areas of Northern Europe and New Zealand that have mild (cool and humid) summers. Compared to creeping bentgrasses, colonial bentgrasses have a finer leaf texture and a more upright and less aggressive spreading growth habit and are generally better adapted for fairway or tee use in the warmer summer climates of the northern United States. Colonial bentgrasses perform best in New Jersey when mowed no lower than 3/8 of an inch. They typically have a brighter green color and better color retention during cool weather compared to creeping bentgrasses. Although colonial bentgrasses generally have better dollar spot resistance and wear tolerance, they are much more susceptible than creeping bentgrasses to brown patch and do not spread through stolons. While not lethal, the playability of golf courses may be affected if brown patch is not controlled on colonial bentgrass turfs. Current breeding efforts include improving the tolerance of colonial bentgrasses to this disease and improved quality under fairway conditions.

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Velvet bentgrass forms the finest-textured and densest turf of the bentgrasses and can nearly resemble green velvet when managed properly. It spreads mainly through profuse production of erect tillers with short stolons. This grass can tolerate very close mowing, heat, cold, and shade, and is one of the most drought tolerant of the bentgrasses used for turf (Skogley, 1973). Due to the density and vigor of this turf, even under very low mowing conditions, it has been shown to be extremely effective at preventing the encroachment of the most prolific weed on a golf course, *Poa annua*. The spread of velvet bentgrass via stolons is more aggressive than colonial bentgrass, but not as strong as creeping bentgrass.

Velvet bentgrass can form excessive thatch, especially at high fertility rates, increased irrigation, and higher cutting heights, and can thus become problematic if not maintained properly. Years of mismanagement and the subsequent poor turf quality has given velvet bentgrass a poor reputation, but recent research showed that when managed properly, velvet bentgrass can create a superior turf (Brilman and Meyer, 2000).

Velvet bentgrass can be susceptible to red thread (caused by *Laetisaria fuciformis*) and copper spot, but generally has good resistance to dollar spot and brown patch. Seedlings of velvet bentgrasses are susceptible to Pythium seedling root rot during establishment.

During colder weather, velvet bentgrass will turn a dark purple color and will take longer than the other bentgrass species to “green-up” in the spring. Velvet bentgrass has not been used extensively for high maintenance turf, largely because its range of adaptation has not been well characterized. Selections of velvet bentgrass have persisted for many years in trials under New Jersey growing conditions. Recent research at Rutgers indicates that the species may one day serve as a viable alternative to creeping bentgrass for use on golf course greens in the northeastern United States as long as proper cultural management inputs are implemented. Some of the major breeding objectives for velvet bentgrass include resistance to copper spot and Pythium diseases, and better wear tolerance.

The New Jersey Agricultural Experiment Station participates in the National Turfgrass Evaluation Program (NTEP), which evaluates many species of turfgrass including bentgrasses at various locations throughout the United States. The Rutgers turfgrass

breeding program conducts extensive field evaluations of collections and new material developed in the improvement program, many of which are a result of recent collection trips within the United States and throughout Europe and Asia. Collections from the British Isles, Norway, Sweden, Spain, Portugal, France, Finland, Switzerland, Scotland, Italy, Greece, Poland, Holland, Hungary, Bulgaria, Romania, Croatia, China, and the Slovak Republic serve to enhance the genetic diversity of the germplasm used in this breeding program. The Rutgers turfgrass breeding program focuses on improving turfgrasses for overall quality, color, density, uniformity, texture, disease resistance, salt tolerance, traffic tolerance, and many traits that improve the usefulness of turfgrasses throughout the world.

## PROCEDURES

Bentgrass evaluation trials were established at the Rutgers Horticultural Research Farm II in North Brunswick, NJ in the fall of 2012 (Tables 1, 2), 2013 (Tables 3, 4), 2014 (Tables 5 to 8), and 2015 (Tables 9 to 11). Trials were established on a modified Nixon loam. Plot size was 3 x 5 ft for all trials except for the NTEP Greens (Table 5) and NTEP Fairway (Table 6) trials where plot size was 4 x 6 ft and 8 x 6 ft, respectively. Plots were hand-seeded at a rate of approximately 1.0 lb per 1000 ft<sup>2</sup>. All tests were arranged in a randomized complete block design with three replications.

All sites were well drained and openly exposed to both sunlight and air circulation. The annual rate of nitrogen applied, mowing height, cultivation/topdressing practices, and pesticide applications for each test are presented in Table 12. The putting green tests were mowed five to six times per week during periods of active growth with a triplex or walk-behind reel mower equipped to collect clippings. The fairway tests were mowed three times per week with a triplex reel mower and clippings were removed during periods of active growth. Soil pH was maintained in the range of 5.4 to 6.8 with agricultural limestone. All tests were irrigated to avoid drought stress.

Plots were evaluated frequently during the growing season for overall turf quality (i.e., turf density, texture, uniformity, color, growth habit) and presence of disease, insect, or herbicide damage. Turf quality (Tables 1 to 11), establishment (Tables 9 to 11), spring green-up (Tables 2, 4 to 6, 10), genetic color, leaf texture, and turf density (Tables 5, 6) and disease

were rated on a 1 to 9 scale, where 9 represented the most desirable turf characteristic. Disease ratings included dollar spot (Tables 1, 3 to 5, 7 to 9, 11), brown patch (Tables 5, 10, 11), anthracnose (Table 5) copper spot (Table 10), and *Bipolaris leaf spot* (caused by *Bipolaris sorokiniana*) (teleomorph: *Cochliobolus sativus*) (Table 10). All data were subjected to analysis of variance. Means were separated using Fisher's protected least significant difference (LSD) means separation test.

## RESULTS AND DISCUSSION

### Turf Quality Evaluations

Entries in Tables 1 through 8 are ranked according to their overall multi-year quality average. Tables 9 through 11 are ranked by the average turf quality for 2016 only. Throughout all of the years that turf quality was assessed, a few varieties in each bentgrass species stood out as better performing entries.

For creeping bentgrasses maintained at a putting green height of cut (Tables 1, 3, 5, 7, 9), 777, L93XD, Piranha, Chinook, LNS, and the experimental selections PPG-AP 102 (B/C/D), PST-R0PS, PSD Comp, PGF Comp, PPS Comp, UCE Comp, GSM Comp, MMM Comp, MSP Comp, 4759-7,8,10,12, 4738-7-12, 4757-8-12, and 4740-1-6 all performed very well, while Penncross, Southshore, Putter, Alpha, Crenshaw, Penn G-2, and SR1119 were consistently among the poorest performers. At fairway height (Tables 6, 8, and 11), Piranha, L93XD, LNS, Chinook, and the experimental selections UCE Comp, LSC Comp, KAC Comp, LFW Comp, MMM Comp, MSP Comp, and MGC Comp had excellent turf quality while the lowest scoring cultivars consisted of Penncross, Southshore, Crenshaw, Alpha, and Kingpin.

Overall turf quality for velvet bentgrasses was evaluated in the 2012 and 2015 trials (Tables 2 and 10) under greens height of cut. The experimental entries PPG-AC 101, LVP Comp, SFV Comp, EVP Comp, CCV Comp, and WBV Comp outperformed named cultivars such as SR 7200, Villa, and Greenwich, which displayed poor quality in these trials under these greens-type management conditions.

As mentioned previously, colonial bentgrasses perform better at fairway cutting height and typically have poorer performance under putting green conditions. Nevertheless, there were several experimental colonials in putting green trials (Tables 3, 9)

that exhibited excellent turf quality at greens height: PDC Comp (Table 3) and ELC Comp, ECS Comp, and EDC Comp (Table 9). Under fairway conditions however (Tables 4, 6, 8, 11), Puritan, Musket, and the experimental selections PPG-AT 103, AT 12-4, AT 12-2, AT 12-17, 8197-8,10,12, 8197-1-6, 8189-7,8,11,12, PDC Comp, DLFPS-AT/3026, WLC Comp, WMC Comp, WEC Comp, EDC Comp, ECS Comp, and MDF Comp were the best performing colonial bentgrasses, while SR 7150, Glory, Tiger 2, and Alister generally exhibited the poorest performance under fairway cutting heights when included in trials.

### Dollar Spot

*Sclerotinia homoeocarpa*, the causal agent of this widespread turfgrass disease, causes silver-dollar shaped spots of dead turf which can converge to form larger damaged areas (Belanger et al., 2005). While potentially one of the more damaging turf diseases on golf courses in the northeast, dollar spot can be easily controlled with the use of fungicides; however this can be expensive due to the prevalence of the fungus. Also becoming more prevalent is the pathogen's resistance to fungicides, particularly DMI fungicides (Smiley et al., 2005). In addition, increased fungicide use is not beneficial to the environment.

Breeding for dollar spot resistance in bentgrass is an important objective of the Rutgers breeding program. Typically, velvet and colonial bentgrasses have better resistance to dollar spot than creeping bentgrass, however the results from recent trials (Tables 1, 3 to 5, 7 to 9, 11) indicate that significant improvements in creeping bentgrass have been made, and many creeping bentgrasses can outperform colonial bentgrasses (Table 9). Cultivars such as Declaration, Barracuda, 13M, Memorial, and Chinook, as well as experimental entries CMC Comp, EBC Comp, PSD Comp, PGT Comp, DPG Comp, FSM Comp, PPG-AP 102B, 4739-7-12, 4738-7-12, 4733-7-9,11, MMM Comp, KAC Comp, UCE Comp, WFC Comp, and MGC Comp all show a high resistance to this disease, while Independence, Ninety-Six Two, Crenshaw, Alpha, Putter, Pure Distinction, and experimental entries including PST-0CV6, and the PSG-TAV entries were more susceptible.

### Brown Patch

Velvet bentgrass typically exhibits the greatest tolerance to brown patch among the bentgrass species used for turf, while colonial bentgrass is the most susceptible. In recent years, dramatic

improvements have been made in breeding colonial and creeping bentgrasses for improved brown patch resistance. Brown patch data is reported in Tables 5, 10, and 11. In 2016, creeping bentgrasses generally displayed acceptable tolerance to this disease, exhibiting little significant separation between entries (Table 5), where all entries of the NTEP putting greens trial exhibited excellent tolerance to brown patch with the exception of Pennncross. Similarly, all entries in the 2015 velvet bentgrass greens trial exhibited superior brown patch tolerance (Table 10).

Over the past few years, significant research has focused on improving brown patch resistance in colonial bentgrass. In the 2015 fairway trial (Table 11), enhanced disease tolerance is evident. The cultivar Heritage and the experimental selections ELC Comp, MDF Comp, BPT Comp, EDC Comp, DDS Comp, and HLT Comp exhibited significantly improved brown patch resistance over entries such as Glory, Capri, Tiger 2, Musket, DML, and ECS Comp.

### Spring Green-Up

Spring green-up data was collected on trials from 2012 velvet trial (Table 2), 2013 fairway trial (Table 4), the 2014 NTEP trials (Tables 5, 6), and the 2015 velvet trial (Table 10). The NTEP fairway trial contained both creeping and colonial bentgrass species, whereas the NTEP greens/tee trial contained only creeping bentgrass species.

In general, velvet bentgrass has the poorest spring green-up compared to colonial and creeping bentgrass and can even exhibit a purplish color during cold winter months and into the spring. In 2016 there was no statistical difference between velvet bentgrass entries in the 2012 velvet greens trial (Table 2), although in the 2015 velvet putting green trial (Table 10) in which there was a statistical difference, Villa and the experimental entries EVP Comp and CCV Comp outperformed entries SR 7200, PST-VR01, and LVP Comp.

Creeping bentgrasses in the NTEP putting green trial (Table 5) showed a wide range of variability, with entries like L-93XD, Piranha, PST-ROPS, 777, GDE, and Barracuda receiving the highest ratings for spring green-up, while Pennncross, Armor, and Pure Select were the slowest to green up. In the NTEP fairway

trial (Table 6), colonial bentgrasses Puritan, DLFPS-AT/3026, and Musket showed the earliest green-up. In the same trial, no creeping bentgrasses performed as well as any colonial bentgrass. Within the creeping bentgrasses in this trial, Luminary, Declaration, L-93XD, and Piranha displayed earlier green-up than V-8, Kingdom, Armor, Nightlife, and Pennncross. In the 2013 fairway trial (Table 4), most entries showed excellent green up, with Capri, AT 12-3, AT 12-2, 8189-7,8,11,12, 8197-1-6, and 8197-8,10,12 exhibiting the earliest green-up, although PPGW-02, Exeter, SR 7150, and Golfstar were the slowest.

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Table 1. Performance of creeping bentgrass cultivars and selections in a putting green trial seeded in September 2012 at North Brunswick, NJ.

Cultivar or Selection	-----Turf Quality'-----					Dollar Spot <sup>2</sup> Sept. 2016
	2013-2016 Avg.	2013 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	
1 PSD Comp	6.6	6.0	7.2	7.1	6.1	6.0
2 PPG-AP 102B	6.2	6.3	6.4	6.5	5.5	5.0
3 PGF Comp	6.1	6.0	5.6	7.2	5.3	3.7
4 FPG Comp	6.0	6.2	5.1	6.7	5.9	5.0
5 PPG-AP 102C	6.0	6.4	6.0	6.3	5.1	4.0
6 11-CMC Comp	5.9	5.5	6.1	6.7	5.5	5.7
7 PDD Comp	5.9	6.2	5.9	6.1	5.3	4.7
8 11-EBC Comp	5.6	5.3	5.7	5.9	5.5	7.0
9 FSC Comp	5.5	6.0	5.2	5.4	5.1	4.0
10 AP-18	5.4	6.3	4.9	5.8	4.8	3.3
11 Barracuda	5.4	6.2	5.1	5.2	5.1	4.7
12 Luminary	5.3	5.6	5.0	5.5	5.1	4.0
13 Flagstick	5.2	5.2	5.4	5.4	4.8	5.0
14 Declaration	5.1	5.7	5.2	5.1	4.2	5.3
15 Center Cut II	5.1	5.3	5.2	5.3	4.5	3.3
16 Center Cut III Blend	4.9	5.1	5.1	5.1	4.6	4.0
17 PST-SYN-R0PS	4.8	5.4	3.9	5.6	4.5	2.7
18 Pure Distinction	4.8	6.1	3.7	5.5	3.9	2.0
19 GMC-12K	4.8	5.4	4.4	4.4	4.9	3.7
20 Proclamation	4.7	6.0	4.8	4.3	3.7	3.3
21 Pure Select	4.7	5.5	4.2	4.8	4.1	2.7
22 Shark	4.7	5.6	4.1	4.5	4.4	3.3
23 OO7	4.7	5.6	4.1	4.8	4.1	3.7
24 PinUp	4.6	5.9	4.1	4.6	3.9	2.0
25 Authority	4.6	5.7	4.0	4.6	4.2	3.0

(Continued)

Table 1. Creeping bentgrass putting green trial, 2012 (continued).

Cultivar or Selection	Turf Quality <sup>1</sup>					Dollar Spot <sup>2</sup> Sept. 2016
	2013-2016 Avg.	2013 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	
26 DKH8-25	4.5	5.4	3.8	4.8	4.1	2.7
27 P21-4	4.4	5.5	4.0	4.3	3.5	2.0
28 Benchmark DSR	4.2	4.7	3.9	4.1	4.1	3.0
29 RH93-12	4.2	4.9	3.9	5.0	3.1	3.7
30 RH 931	4.2	5.2	3.5	4.7	3.5	3.3
31 PST-0KPS Bulk	4.2	3.8	3.7	4.6	4.4	3.3
32 SR 1150/OO7	4.1	4.6	4.1	4.2	3.5	3.3
33 DKH8-35	4.1	5.5	3.0	4.5	3.7	3.5
34 P21-3	4.1	5.4	3.3	4.4	3.3	3.0
35 13M	4.1	4.4	4.2	4.0	3.7	5.3
36 Tye/007	4.1	4.2	4.2	3.9	3.9	3.3
37 Vitagreen/Tye	4.1	4.7	4.1	3.6	3.8	5.7
38 DKH8-11	4.1	5.5	2.7	4.9	3.2	6.0
39 Tye	4.0	5.2	3.7	4.0	3.2	3.3
40 DKH8-22	4.0	5.0	3.2	4.2	3.5	3.3
41 DKH8-33	3.9	5.2	2.9	4.5	3.2	2.3
42 P21L2-619	3.9	4.1	3.8	4.0	3.8	4.3
43 P21L2-627	3.9	4.4	4.4	3.6	3.5	3.7
44 P21-7	3.9	4.4	4.3	4.1	3.1	5.3
45 Independence	3.9	5.5	3.1	4.1	3.0	2.7
46 Memorial	3.9	4.8	4.5	3.3	2.9	4.3
47 Mackenzie/Focus	3.9	4.4	3.7	3.9	3.4	2.7
48 V-8	3.8	4.4	3.7	3.8	3.3	2.3
49 Mackenzie/Tye	3.8	4.4	3.3	3.9	3.7	3.0
50 P21L2-31	3.8	4.9	3.9	3.2	3.1	3.7

(Continued)



Table 1. Creeping bentgrass putting green trial, 2012 (continued).

Cultivar or Selection	Turf Quality <sup>1</sup>					Dollar Spot <sup>2</sup> Sept. 2016
	2013-2016 Avg.	2013 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	
51 P21-8	3.8	4.5	3.9	3.6	3.2	3.3
52 P21-1	3.8	4.7	3.0	4.1	3.1	2.7
53 P21-5	3.8	5.3	3.3	3.7	2.7	3.7
54 P21L2-315	3.7	4.4	3.7	3.5	3.3	4.0
55 P21-6	3.7	4.9	3.9	3.2	3.0	3.0
56 L-93	3.7	4.1	4.0	3.5	3.1	3.7
57 DKH8-13	3.7	4.5	2.9	4.0	3.1	3.7
58 Penneagle II	3.6	4.9	3.2	3.5	3.1	2.7
59 P21-2	3.6	4.5	3.4	3.4	3.2	5.0
60 T-1	3.6	3.9	3.4	3.5	3.4	2.7
61 DKH8-31	3.6	5.0	3.0	3.4	2.9	3.0
62 AZH9-4257	3.6	4.9	2.7	3.9	2.8	3.7
63 SR 1150	3.5	4.2	3.4	3.5	3.1	3.3
64 P21L2-22	3.5	3.7	3.5	3.5	3.5	3.7
65 PSG-1TAVH08-3	3.5	4.7	2.2	5.0	2.2	3.0
66 Kingpin	3.5	3.7	3.7	3.2	3.5	3.3
67 P21L2-1311	3.5	3.8	3.1	3.5	3.6	2.7
68 P21L2-167	3.4	4.1	3.1	3.1	3.3	4.7
69 PSG-1TAVH08-2	3.3	4.8	1.9	4.6	2.1	4.3
70 Penncross	3.3	3.8	2.8	3.1	3.3	2.7
71 CANH9-73	3.3	4.6	3.0	3.3	2.1	5.7
72 PSG-1TAVH08-1	3.3	4.7	2.0	4.3	2.1	2.0
73 CANH9-7	3.2	4.5	2.7	3.3	2.3	3.7
74 Ninety-Six Two	3.2	4.3	2.6	3.0	2.7	1.7
75 A-4	3.2	4.7	2.8	2.9	2.3	2.0

(Continued)

Table 1. Creeping bentgrass putting green trial, 2012 (continued).

Cultivar or Selection	Turf Quality <sup>1</sup>					Dollar Spot <sup>2</sup> Sept. 2016
	2013-2016 Avg.	2013 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	
76 CANH9-722	3.2	4.5	2.4	3.6	2.2	2.5
77 Mackenzie	3.1	3.8	3.0	3.1	2.9	2.7
78 Imperial	2.9	4.2	2.9	2.7	2.2	4.7
79 CANH9-720	2.9	4.5	2.6	3.0	1.7	1.3
80 SR 1119	2.9	3.8	2.2	2.7	2.7	2.3
81 Alpha	2.8	3.9	2.4	2.5	2.4	1.7
82 Putter	2.8	3.6	2.5	2.6	2.4	1.7
83 Southshore	2.8	3.5	2.5	2.9	2.3	2.0
84 Sandhill	2.8	1.9	2.5	3.0	3.5	3.0
85 Penn G-2	2.6	1.7	2.6	3.2	2.7	3.0
86 Providence	2.4	3.5	2.5	2.0	1.7	4.3
LSD at 5% =	0.5	0.8	0.9	0.9	0.9	2.2

<sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

<sup>2</sup>Dollar spot rated on a 1 to 9 scale, where 9 = best disease resistance

Table 2. Performance of velvet bentgrass cultivars and selections in a putting green trial seeded in September 2012 at North Brunswick, NJ.

Cultivar or Selection	Turf Quality <sup>1</sup>					Spring Green-up <sup>2</sup> March 2016
	2013-2016 Avg.	2013 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	
1 PPG-AC 101	6.0	6.1	6.5	5.9	5.5	5.7
2 SPV Comp	4.9	4.8	5.5	4.3	5.1	4.0
3 CS1 Comp	4.9	4.6	5.2	5.1	4.6	4.3
4 DS2 Comp	4.7	3.8	4.9	4.6	5.7	4.3
5 DCS Comp	4.6	4.7	4.6	4.2	5.0	4.7
6 Vitagreen	4.5	4.9	4.7	3.7	4.6	5.3
7 Legendary	4.4	4.9	5.4	3.9	3.6	5.3
8 CS2 Comp	4.2	3.6	4.3	4.4	4.3	4.7
9 DS1 Comp	3.8	3.3	3.8	4.1	4.2	5.7
10 Greenwich	3.4	4.3	4.2	3.1	2.1	5.7
11 Villa	3.4	3.7	3.8	3.2	3.0	6.0
12 SR7200	2.8	4.0	2.4	2.3	2.4	4.3
13 CANH9-1412	2.7	4.7	3.1	1.8	1.4	4.
LSD at 5% =	0.7	0.9	0.8	0.6	1.1	1.9

<sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

<sup>2</sup>Spring green-up rated on a 1 to 9 scale, where 9 = earliest spring green-up

Table 3. Performance of creeping and colonial bentgrass cultivars and selections in a putting green trial seeded in September 2013 at North Brunswick, NJ.

	Cultivar or Selection	Species	Turf Quality <sup>1</sup>					Dollar Spot <sup>2</sup> 2016 Avg.
			2014- 2016 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	2016 Avg.	
1	PPG-AP 102D	Creeping	6.2	6.3	6.7	5.7	6.3	
2	PPS Comp	Creeping	6.2	6.2	6.8	5.7	6.5	
3	777	Creeping	6.0	6.6	6.6	5.1	4.4	
4	PPG-AP 102B	Creeping	5.9	6.4	5.9	5.4	6.7	
5	DPG Comp	Creeping	5.9	5.6	6.3	5.7	6.6	
6	L93XD	Creeping	5.7	5.3	6.4	5.4	5.9	
7	PGT Comp	Creeping	5.6	5.7	5.6	5.6	7.1	
8	Luminary	Creeping	5.6	6.2	5.8	4.7	5.6	
9	Barracuda	Creeping	5.5	6.1	5.8	4.7	6.7	
10	AP 23	Creeping	5.4	5.9	5.6	4.8	6.4	
11	AST-1-12-3023	Creeping	5.4	6.3	5.6	4.5	5.0	
12	FWT Comp	Creeping	5.4	5.6	6.1	4.5	5.7	
13	Pure Distinction	Creeping	5.4	6.0	5.8	4.3	4.2	
14	FSM Comp	Creeping	5.3	5.3	5.5	5.1	7.4	
15	PDC Comp	Colonial	5.3	5.8	4.6	5.4	8.4	
16	OO7	Creeping	5.2	5.5	5.5	4.5	5.0	
17	Pin Up 2	Creeping	5.1	5.5	5.7	4.1	5.3	
18	AP 16	Creeping	5.1	5.9	5.2	4.3	4.8	
19	AST-1-12-3008A	Creeping	5.1	5.9	5.1	4.3	5.7	
20	Declaration	Creeping	5.1	5.8	5.4	4.2	5.5	
21	Focus	Creeping	5.0	5.4	5.1	4.5	5.4	
22	Shark	Creeping	5.0	5.7	5.5	3.7	3.9	
23	AST-1-12-3010A	Creeping	5.0	5.6	4.8	4.5	6.6	
24	Flagstick	Creeping	4.9	4.9	5.2	4.8	6.0	
25	Flagstick + OO7	Creeping	4.9	5.2	5.5	4.2	4.8	

(Continued)

Table 3. Creeping and colonial bentgrass putting green trial, 2013 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup>					Dollar Spot <sup>2</sup> 2016 Avg.
		2014-2016 Avg.	2014 Avg.	2015 Avg.	2016 Avg.		
26 Authority	Creeping	4.9	5.2	5.3	4.3	5.8	
27 Pure Select	Creeping	4.9	5.9	4.9	3.9	3.9	
28 SDR Comp	Colonial	4.9	5.1	4.6	4.8	7.5	
29 FTP Comp	Creeping	4.8	5.2	5.6	3.8	6.2	
30 Benchmark DSR	Creeping	4.7	4.8	4.5	4.9	6.4	
31 PSY Comp	Colonial	4.7	5.3	4.6	4.4	7.5	
32 Pin Up	Creeping	4.7	5.2	5.3	3.4	4.0	
33 AST-1-12-3004A	Creeping	4.6	5.0	5.0	3.7	4.4	
34 AP 18	Creeping	4.6	5.2	5.0	3.5	4.9	
35 Proclamation	Creeping	4.5	4.7	4.9	4.0	4.7	
36 AST-1-12-8001A	Creeping	4.5	5.8	4.5	3.2	3.7	
37 V-8	Creeping	4.5	5.3	4.2	4.0	5.6	
38 Flagstick + Tye	Creeping	4.4	5.0	4.2	3.9	5.4	
39 AST-1-12-3006A	Creeping	4.4	5.3	4.1	3.7	5.4	
40 AST-1-12-3007A	Creeping	4.4	5.1	4.3	3.6	5.5	
41 TPD Comp	Creeping	4.4	5.1	4.3	3.6	5.3	
42 DTO Comp	Colonial	4.4	4.8	4.2	4.2	7.8	
43 Runner	Creeping	4.3	5.0	4.4	3.6	4.5	
44 DTT Comp	Colonial	4.3	4.4	4.7	4.0	7.6	
45 AST-1-12-3001A	Creeping	4.3	5.0	4.5	3.3	3.0	
46 AST-1-12-3024	Creeping	4.3	4.5	4.4	3.8	4.5	
47 MCT Comp	Creeping	4.3	5.1	5.0	2.8	2.8	
48 Tye	Creeping	4.2	4.7	4.2	3.6	5.4	
49 Capri	Colonial	4.2	5.3	3.3	4.0	7.8	
50 AST-1-12-3026	Creeping	4.2	4.6	4.3	3.6	4.3	

(Continued)

Table 3. Creeping and colonial bentgrass putting green trial, 2013 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup>				Dollar Spot <sup>2</sup> 2016 Avg.
		2014-2016 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	
51 PST-0CVR Bulk	Creeping	4.1	4.9	4.3	3.2	4.3
52 13M	Creeping	4.1	4.4	4.1	3.8	5.4
53 Flagstick + Mackenzie	Creeping	4.0	4.3	4.1	3.7	4.4
54 Focus + 96-2	Creeping	4.0	4.8	4.1	3.0	3.8
55 AP 15	Creeping	4.0	4.6	4.1	3.3	4.6
56 PST-0CV6	Creeping	3.9	4.8	3.8	3.2	4.0
57 T-1	Creeping	3.9	4.7	3.8	3.3	4.7
58 MCC Comp	Creeping	3.9	5.2	4.2	2.4	2.6
59 FT-12	Colonial	3.9	5.1	3.5	3.2	7.3
60 SR 1150	Creeping	3.9	4.7	3.8	3.0	5.2
61 Focus + Mackenzie	Creeping	3.9	4.2	4.1	3.3	4.5
62 Independence	Creeping	3.9	4.5	4.2	2.8	3.5
63 EBM	Colonial	3.8	4.9	3.4	3.0	6.9
64 Mackenzie + Tyee	Creeping	3.7	4.4	3.6	3.1	4.9
65 Ninety-Six Two	Creeping	3.6	4.9	3.4	2.5	3.4
66 Alpha	Creeping	3.5	3.7	3.0	3.7	5.7
67 Mackenzie	Creeping	3.4	3.9	3.2	3.3	4.6
68 Memorial	Creeping	3.4	3.5	3.0	3.8	6.9
69 L-93	Creeping	3.4	3.7	3.2	3.4	5.3
70 AST-1-12-3009A	Creeping	3.3	4.2	3.0	2.9	4.6
71 PST-0COL	Creeping	3.3	4.2	2.2	3.5	6.9
72 Kingpin	Creeping	3.3	3.6	3.4	3.0	5.0
73 Tiger 2	Colonial	3.3	4.7	3.0	2.4	6.1
74 Greentime	Colonial	3.3	4.0	3.4	2.4	7.2
75 Penn A-4	Creeping	3.2	3.7	2.8	3.2	5.2

(Continued)

Table 3. Creeping and colonial bentgrass putting green trial, 2013 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup>				Dollar Spot <sup>2</sup> 2016 Avg.
		2014-2016 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	
76 Century	Creeping	3.0	2.6	3.5	2.9	4.0
77 Putter	Creeping	3.0	3.7	2.6	2.7	4.9
78 Penn G-2	Creeping	2.9	2.4	3.2	3.2	5.3
79 Crenshaw	Creeping	2.9	3.5	3.2	2.1	3.6
80 Imperial	Creeping	2.8	3.5	2.7	2.2	4.2
81 Glory	Colonial	2.8	3.9	2.3	2.2	6.1
82 SR 1119	Creeping	2.6	2.0	2.7	3.1	4.0
83 Penncross	Creeping	2.6	3.0	2.2	2.6	5.2
84 Southshore	Creeping	2.5	2.9	2.5	2.2	5.0
85 SR 7100	Colonial	2.5	3.1	2.1	2.4	5.8
LSD at 5% =		0.8	0.9	1.2	1.2	1.5

<sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

<sup>2</sup>Dollar spot rated on a 1 to 9 scale, where 9 = best disease resistance; data is an average of four rating dates

Table 4. Performance of colonial bentgrass cultivars and selections in a fairway trial seeded in September 2013 at North Brunswick, NJ.

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----				Spring Green-up <sup>2</sup> March 2016	Dollar Spot <sup>3</sup> June 2016
	2014-2016 Avg.	2014 Avg.	2015 Avg.	2016 Avg.		
1 8197-8,10,12	7.1	7.3	6.9	7.1	7.3	7.7
2 8197-1-6	6.8	6.6	6.9	7.0	7.3	8.0
3 AT 12-4	6.7	7.1	7.0	6.1	6.3	8.0
4 8189-7,8,11,12	6.7	6.2	7.4	6.5	7.3	7.7
5 AT 12-2	6.7	6.7	6.8	6.6	7.3	7.7
6 PDC Comp	6.6	7.4	7.4	5.0	6.0	6.3
7 AT 12-17	6.6	6.7	6.5	6.5	7.0	8.3
8 AT 12-3	6.5	6.7	6.9	6.0	7.3	8.7
9 8191-7-12	6.5	6.5	6.8	6.4	5.7	7.7
10 PPG-AT-103	6.5	7.3	6.8	5.4	5.7	6.7
11 AT 12-9	6.5	6.9	6.5	6.0	7.0	8.7
12 AT 12-16	6.4	6.5	6.9	6.0	6.7	8.0
13 8195-1-6	6.4	6.4	6.7	6.3	7.0	8.7
14 AT 12-8	6.4	6.7	6.5	5.9	6.7	8.3
15 Musket	6.3	7.1	6.5	5.4	6.0	6.3
16 AT 12-5	6.3	6.6	6.3	6.1	6.3	8.3
17 AT 12-13	6.3	6.7	5.8	6.5	5.7	9.0
18 AT 12-19	6.3	6.9	6.1	5.9	6.7	7.7
19 SDR Comp	6.3	6.6	6.8	5.6	6.7	6.7
20 Puritan	6.3	7.3	6.1	5.6	6.3	5.7
21 AT 12-11	6.3	6.4	6.5	5.9	6.0	8.3
22 DTO Comp	6.2	5.9	6.8	5.9	7.0	6.7
23 PSY Comp	6.2	6.2	6.5	6.1	6.7	6.0
24 DTT Comp	6.2	6.3	6.3	6.0	6.3	7.3
25 AT 12-6	6.2	6.4	6.1	6.1	6.7	8.3

(Continued)



Table 4. Colonial bentgrass fairway trial, 2013 (continued).

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----				Spring Green-up <sup>2</sup> March 2016	Dollar Spot <sup>3</sup> June 2016
	2014-2016 Avg.	2014 Avg.	2015 Avg.	2016 Avg.		
26 Heritage	6.0	6.8	6.1	5.2	6.3	5.3
27 AT 12-1	6.0	6.7	6.1	5.3	6.7	8.3
28 AT 12-10	6.0	6.6	6.2	5.3	6.3	7.0
29 AT 12-18	6.0	6.3	6.2	5.6	6.3	7.0
30 AT 12-14	5.9	6.3	6.0	5.5	5.3	8.7
31 Capri	5.8	6.0	5.6	5.8	7.7	7.7
32 8200-2,4-6	5.8	5.8	6.1	5.5	6.3	7.7
33 FT12	5.7	6.9	5.8	4.6	5.0	7.7
34 8190-8-10,12	5.7	5.4	6.0	5.8	6.0	7.0
35 AT 12-12	5.7	5.9	5.4	5.7	5.7	8.0
36 8191-2,4,6	5.5	5.1	5.9	5.6	7.0	6.7
37 EBM	5.2	5.5	5.1	5.1	6.3	8.0
38 AT 8	4.9	5.9	4.2	4.7	5.0	4.3
39 AT 10	4.5	4.7	4.4	4.2	5.3	5.7
40 Greentime	4.4	5.1	4.0	4.1	5.0	5.7
41 PGGW-06	4.2	4.8	4.3	3.5	6.3	7.0
42 Tiger 2	4.2	5.3	3.6	3.5	5.0	5.7
43 PGGW-01	4.1	4.9	3.8	3.6	5.0	4.3
44 PGGW-03	4.0	5.1	3.8	3.2	5.0	4.7
45 SR 7100	4.0	4.6	3.6	3.7	5.7	5.0
46 PGGW-05	4.0	5.0	3.6	3.2	6.3	3.7
47 Manor	3.9	4.0	4.5	3.2	6.3	6.0
48 G. Egmont	3.9	4.4	3.7	3.7	5.7	6.3
49 PST-Syn-R911	3.8	4.4	3.7	3.5	5.7	5.7
50 PGGW-02	3.8	4.7	3.7	3.1	4.0	5.3

(Continued)

Table 4. Colonial bentgrass fairway trial, 2013 (continued).

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----				Spring Green-up <sup>2</sup> March 2016	Dollar Spot <sup>3</sup> June 2016
	2014-2016 Avg.	2014 Avg.	2015 Avg.	2016 Avg.		
51 PGGW-07	3.8	4.9	3.5	3.1	5.7	4.0
52 G. Sefton	3.8	4.0	3.7	3.6	5.7	8.0
53 Glory	3.8	4.5	3.3	3.6	6.0	5.3
54 Greenspeed	3.7	4.4	4.0	2.7	6.3	7.3
55 PGGW-04	3.6	4.0	3.7	3.2	5.7	6.3
56 Alister	3.3	3.6	3.0	3.4	6.0	6.7
57 SR 7150	3.0	3.5	2.8	2.8	4.7	7.0
58 PGGW-08	3.0	4.1	2.7	2.2	5.3	5.0
59 Golfstar	2.7	3.0	2.1	3.2	4.3	7.0
60 Exeter	2.3	2.3	1.9	2.6	4.3	6.3
61 PSG 7DB	2.2	2.6	1.8	2.2	5.0	5.7
LSD at 5% =	0.7	1.0	1.0	1.0	1.6	2.2

<sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

<sup>2</sup>Spring green-up rated on a 1 to 9 scale, where 9 = earliest spring green-up

<sup>3</sup>Dollar spot rated on a 1 to 9 scale, where 9 = best disease resistance

Table 5. Performance of creeping bentgrass cultivars and selections in a putting green trial established in September 2014 at North Brunswick, NJ. (Includes all entries of the 2014 National Turfgrass Evaluation Program (NTEP) Bentgrass Greens Test.)

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----		Dollar Spot <sup>2</sup> 2016 Avg.	Spring Green-up <sup>3</sup> March 2016	Brown Patch <sup>4</sup> Aug. 2016	Anthrac-nose <sup>5</sup> Aug. 2016	Genetic Color <sup>6</sup> Nov. 2016	Leaf Texture <sup>7</sup> Nov. 2016	Turf Density <sup>8</sup> Nov. 2016
	2015 Avg.	2016 Avg.							
1 L-93XD	7.3	7.1	6.0	8.3	7.7	9.0	4.7	8.0	8.0
2 777	6.9	6.2	4.6	7.3	7.0	9.0	4.7	7.7	7.7
3 Piranha	6.7	6.5	5.6	8.0	8.7	9.0	5.0	7.7	7.7
4 DLFPS-AP/3018	6.4	6.2	4.8	6.0	8.0	9.0	5.3	7.7	7.7
5 DLFPS-AP/3058	6.4	6.0	6.7	6.7	6.3	8.3	4.7	8.0	8.0
6 PST-ROPS	6.3	5.9	3.0	7.7	8.7	9.0	4.3	8.0	7.7
7 GDE	6.1	5.9	6.4	7.0	8.3	7.3	5.0	7.0	6.0
8 Luminary	6.1	6.1	6.7	5.7	9.0	9.0	6.0	6.3	6.3
9 DLFPS-AP/3056	6.0	5.7	5.4	6.0	7.7	8.0	5.7	7.7	7.3
10 Shark	6.0	5.7	4.2	6.3	8.7	9.0	4.7	7.3	7.0
11 Pure Select	5.9	5.8	4.1	3.3	8.0	9.0	4.3	7.3	6.7
12 V-8	5.8	5.7	6.5	5.0	7.7	7.3	5.0	7.0	8.0
13 Barracuda	5.7	5.8	7.1	7.0	9.0	8.7	4.3	7.7	7.3
14 Nightlife	5.0	4.3	4.8	3.7	6.7	5.0	8.7	6.0	5.3
15 Kingdom	5.0	4.4	5.8	3.7	6.3	3.3	8.3	6.0	3.0
16 DLFPS-AP/3059	4.7	4.5	6.2	4.7	8.3	6.7	4.7	6.7	6.0
17 Declaration	4.7	4.6	8.7	6.0	7.3	3.0	5.3	6.3	6.7
18 Armor	4.5	4.1	3.9	3.3	8.3	6.3	7.7	6.7	5.7
19 Penn A-1	4.1	4.1	7.1	4.0	6.7	3.0	6.0	6.0	4.7
20 Penncross	1.7	1.1	7.9	2.0	4.3	1.0	3.0	2.0	1.3
LSD at 5% =	0.6	0.7	1.3	1.4	2.2	1.7	0.8	1.2	1.1

(Continued)

Table 5. Creeping bentgrass putting green trial, 2014 (NTEP) (continued.)

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- <sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality
- <sup>2</sup>Dollar spot rated on a 1 to 9 scale, where 9 = best disease resistance; data is an average of three rating dates
- <sup>3</sup>Spring green-up rated on a 1 to 9 scale, where 9 = earliest spring green-up
- <sup>4</sup>Brown patch rated on a 1 to 9 scale, where 9 = best disease resistance
- <sup>5</sup>Anthraxose rated on a 1 to 9 scale, where 9 = best disease resistance
- <sup>6</sup>Genetic color rated on a 1 to 9 scale, where 9 = darkest green color
- <sup>7</sup>Leaf texture rated on a 1 to 9 scale, where 9 = finest leaf texture
- <sup>8</sup>Turf density rated on a 1 to 9 scale, where 9 = highest shoot density

Table 6. Performance of creeping and colonial bentgrass cultivars and selections in a fairway trial established in September 2014 at North Brunswick, NJ. (Includes all entries of the 2014 National Turfgrass Evaluation Program (NTEP) Bentgrass Fairway Test.)

Cultivar or Selection	Species	----- Turf Quality <sup>1</sup> -----		Spring Green-up <sup>2</sup> March 2016	Genetic Color <sup>3</sup> Nov. 2016	Leaf Texture <sup>4</sup> Nov. 2016	Turf Density <sup>5</sup> Nov. 2016
		2015-2016 Avg.	2016 Avg.				
1 Piranha	Creeping	7.8	8.1	4.7	5.7	8.0	9.0
2 L-93XD	Creeping	7.3	7.5	4.7	5.0	8.0	8.0
3 OO7	Creeping	6.9	7.0	4.0	5.7	7.0	7.3
4 Chinook	Creeping	6.7	7.3	4.3	5.0	7.0	7.7
5 V-8	Creeping	6.5	6.9	2.3	4.7	6.3	5.7
6 Barracuda	Creeping	6.4	6.5	4.3	5.3	6.3	6.7
7 Puritan	Colonial	6.4	6.8	8.0	3.0	8.0	7.3
8 Shark	Creeping	6.2	6.5	4.0	5.0	6.3	6.3
9 Luminary	Creeping	6.1	5.8	5.0	5.3	5.7	5.7
10 DLFPS-AT/3026	Colonial	6.0	6.2	7.0	2.3	8.3	7.0
11 Crystal BlueLinks	Creeping	5.5	5.6	3.0	6.3	5.0	6.0
12 Nightlife	Creeping	5.4	5.5	2.3	8.7	5.3	5.3
13 Declaration	Creeping	5.4	5.4	4.7	5.7	6.0	7.0
14 PST-OCV6	Creeping	5.3	5.3	4.0	5.3	4.3	4.3
15 Musket	Colonial	5.3	5.5	6.7	2.7	7.7	7.0
16 PST-ORBS	Creeping	5.2	5.4	4.0	6.3	5.7	4.7
17 Greentime	Colonial	4.7	4.8	6.0	2.0	7.3	6.0
18 Kingdom	Creeping	4.5	4.4	2.3	8.7	4.7	5.0
19 Armor	Creeping	4.4	4.5	2.3	8.0	5.7	4.3
20 Penncross	Creeping	2.8	2.6	2.7	4.0	3.0	3.3
LSD at 5% =							
		0.8	0.8	1.4	0.7	1.2	1.3

(Continued)

Table 6. Creeping and colonial bentgrass fairway trial, 2014 (NTEP) (continued).

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<sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

<sup>2</sup>Spring green-up rated on a 1 to 9 scale, where 9 = earliest spring green-up

<sup>3</sup>Genetic color rated on a 1 to 9 scale, where 9 = darkest green color

<sup>4</sup>Leaf texture rated on a 1 to 9 scale, where 9 = finest leaf texture

<sup>5</sup>Turf density rated on a 1 to 9 scale, where 9 = highest shoot density

Table 7. Performance of creeping bentgrass cultivars and selections in a putting green trial seeded in September 2014 at North Brunswick, NJ.

	Cultivar or Selection	-----Turf Quality <sup>1</sup> -----			Dollar Spot <sup>2</sup> 2016 Avg.
		2015- 2016 Avg.	2015 Avg.	2016 Avg.	
1	4759-7,8,10,12	6.8	7.0	6.6	7.2
2	4738-7-12	6.6	6.9	6.3	8.0
3	GSM Comp	6.5	6.6	6.4	7.3
4	4757-8-12	6.3	6.2	6.4	7.4
5	4740-1-6	6.2	6.5	5.9	7.8
6	UCE Comp	6.1	6.3	5.9	7.4
7	4739-7-12	6.0	6.1	6.0	8.0
8	LSC Comp	6.0	6.1	5.9	6.9
9	KAC Comp	5.9	5.6	6.2	7.5
10	PYR Comp	5.9	6.1	5.8	6.7
11	4733-7-9,11	5.9	5.8	6.0	8.2
12	4756-7-9,12	5.9	5.8	6.1	7.6
13	4760-1-6	5.9	5.7	6.1	7.9
14	4741-8,10,12	5.8	6.0	5.6	7.7
15	4749-7-10,12	5.8	5.9	5.6	7.8
16	PDM Comp	5.7	5.7	5.9	6.7
17	Piranha	5.7	6.0	5.4	6.9
18	TLP Comp	5.7	5.7	5.7	6.1
19	4726-1-4	5.6	5.6	5.6	7.3
20	4764-1-5	5.5	5.6	5.5	7.3
21	4767-2-6	5.5	5.7	5.3	6.4
22	Pin-Up	5.4	6.1	4.7	5.9
23	4779-1-6	5.4	5.5	5.3	5.9
24	FGL Comp	5.4	4.6	6.2	6.9
25	4787-4-6	5.3	5.8	4.9	5.8
26	4782-3-6	5.3	5.5	5.1	5.9
27	Luminary	5.3	5.7	5.0	6.4
28	PST-ROPS	5.1	5.9	4.4	3.8
29	Proclamation	5.0	5.9	4.2	6.1
30	Barracuda	5.0	5.3	4.7	6.3
31	Pure Select	5.0	5.6	4.5	4.9
32	4744-1-6	5.0	5.0	5.0	7.5
33	V-8	4.8	5.1	4.3	6.2
34	Memorial	4.8	4.9	4.6	8.3
35	Centercut 3	4.7	4.8	4.7	7.1

(Continued)

Table 7. Creeping bentgrass putting green trial, 2014 (continued).

	Cultivar or Selection	-----Turf Quality <sup>1</sup> -----			Dollar Spot <sup>2</sup> 2016 Avg.
		2015- 2016 Avg.	2015 Avg.	2016 Avg.	
36	Pin-Up 2	4.7	5.3	4.1	6.1
37	Shark	4.6	5.3	4.1	4.8
38	OO7	4.6	4.9	4.5	6.3
39	DSC Comp	4.6	4.7	4.6	6.5
40	AP-18	4.6	4.5	4.6	5.4
41	Declaration	4.5	4.9	4.0	7.6
42	Pure Distinction	4.5	5.2	3.7	3.5
43	Authority	4.4	4.8	3.9	6.3
44	A-1/A-4	4.2	4.7	3.7	5.3
45	Pureformance	4.2	5.2	3.2	2.7
46	Benchmark DSR	3.9	4.2	3.7	5.7
47	PST-0RBS	3.9	4.6	3.3	3.5
48	Independence	3.9	4.9	3.0	3.7
49	13M	3.9	4.0	3.8	7.8
50	King Pin	3.7	3.8	3.6	6.9
51	Crystal BlueLinks	3.5	3.9	3.1	6.8
52	PST-0CV6	3.4	4.0	2.8	3.2
53	PST-Syn-0CBX	3.4	4.2	2.7	3.6
54	T-1	3.4	3.8	2.9	4.8
55	Alpha	2.9	3.1	2.8	5.5
56	L-93	2.7	2.7	2.8	6.6
57	Southshore	2.4	2.7	2.1	5.2
58	Crenshaw	2.3	2.7	2.0	2.8
59	Penncross	2.1	2.2	1.9	6.5
	LSD at 5% =	0.7	0.9	0.8	1.3

<sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

<sup>2</sup> Dollar spot rated on a 1 to 9 scale, where 9 = best disease resistance; data is an average of four rating dates



Table 8. Performance of creeping and colonial bentgrass cultivars and selections in a fairway trial seeded in September 2014 at North Brunswick, NJ.

Cultivar or Selection	Species	-----Turf Quality <sup>1</sup> -----				Dollar Spot <sup>2</sup> 2016 Avg.
		2015-2016 Avg.	2015 Avg.	2016 Avg.		
1 WLC Comp	Colonial	6.6	6.2	7.0	5.7	
2 UCE Comp	Creeping	6.5	6.5	6.5	7.6	
3 WEC Comp	Colonial	6.4	5.8	7.1	7.0	
4 LSC Comp	Creeping	6.2	6.1	6.4	5.7	
5 KAC Comp	Creeping	6.2	5.8	6.6	7.0	
6 Piranha	Creeping	6.2	6.5	5.9	6.2	
7 GSM Comp	Creeping	6.1	5.8	6.5	6.2	
8 WMC Comp	Colonial	6.1	5.8	6.4	5.7	
9 PYR Comp	Creeping	6.0	5.9	6.2	5.6	
10 DSC Comp	Creeping	6.0	5.8	6.0	5.5	
11 FGL Comp	Creeping	5.9	5.5	6.4	6.8	
12 DML	Colonial	5.9	5.8	6.0	4.5	
13 Capri	Colonial	5.7	5.5	6.0	5.2	
14 PDM Comp	Creeping	5.7	5.7	5.7	5.7	
15 SR 7100	Colonial	5.6	3.8	7.5	3.8	
16 FT12	Colonial	5.6	5.5	5.7	6.2	
17 Barracuda	Creeping	5.5	5.8	5.3	5.0	
18 Musket	Colonial	5.4	5.5	5.5	5.9	
19 Declaration	Creeping	5.4	5.1	5.7	6.0	
20 TLP Comp	Creeping	5.4	5.4	5.4	5.8	

Table 8. Creeping and colonial bentgrass fairway trial, 2014 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup>			Dollar Spot <sup>2</sup> 2016 Avg.
		2015-2016 Avg.	2015 Avg.	2016 Avg.	
21 777	Creeping	5.4	5.7	5.0	4.0
22 Puritan	Colonial	5.3	5.7	5.0	4.4
23 Proclamation	Creeping	5.3	5.4	5.2	5.0
24 Pin-Up	Creeping	5.1	5.7	4.5	3.7
25 OO7	Creeping	5.1	5.5	4.7	4.2
26 Luminary	Creeping	4.8	5.2	4.5	4.2
27 Authority	Creeping	4.8	4.8	4.8	3.7
28 PST-Syn-0ERP	Creeping	4.7	4.7	4.6	4.2
29 PST-ROPS	Creeping	4.6	4.8	4.4	3.8
30 PST-Syn-9DR5	Colonial	4.5	4.5	4.6	4.5
31 13M	Creeping	4.5	4.7	4.4	6.0
32 Memorial	Creeping	4.5	4.6	4.5	5.3
33 Pin-Up 2	Creeping	4.5	5.1	4.0	4.1
34 PST-9FR10 Bulk	Colonial	4.5	4.1	4.8	4.0
35 Tiger 2	Colonial	4.4	4.8	4.0	3.8
36 Shark	Creeping	4.4	4.9	4.0	3.1
37 King Pin	Creeping	4.3	4.5	4.1	4.6
38 Pureformance	Creeping	4.3	5.1	3.4	2.5
39 PST-9HID Bulk	Colonial	4.1	4.1	4.2	4.2
40 V-8	Creeping	4.1	4.5	3.7	3.0
41 Glory	Colonial	4.1	4.0	4.2	4.3
42 T-1	Creeping	4.1	4.8	3.4	3.4
43 Pure Distinction	Creeping	4.1	4.4	3.8	1.8
44 Pure Select	Creeping	4.0	4.4	3.6	2.2
45 A-1/A-4	Creeping	4.0	4.1	3.9	3.2

(Continued)

Table 8. Creeping and colonial bentgrass fairway trial, 2014 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup>			Dollar Spot <sup>2</sup> 2016 Avg.
		2015-2016 Avg.	2015 Avg.	2016 Avg.	
46 SR 7150	Colonial	4.0	3.3	4.7	4.4
47 Benchmark DSR	Creeping	4.0	3.7	4.2	4.0
48 PST-Syn-9EFR	Colonial	3.9	3.6	4.3	5.4
49 Crystal BlueLinks	Creeping	3.9	4.2	3.6	4.6
50 Independence	Creeping	3.9	4.5	3.2	1.7
51 PST-Syn-0CBX	Creeping	3.8	3.7	3.8	3.2
52 PST-0RBS	Creeping	3.7	4.4	3.1	2.0
53 AP-18	Creeping	3.6	3.4	3.9	3.9
54 PST-0CV6	Creeping	3.6	4.5	2.7	2.1
55 L-93	Creeping	3.5	3.4	3.6	4.1
56 Alpha	Creeping	3.3	4.0	2.7	2.3
57 Crenshaw	Creeping	3.0	3.3	2.7	1.7
58 Alister	Colonial	2.9	2.5	3.5	4.0
59 Penn A-4	Creeping	2.7	2.8	2.6	2.9
60 Southshore	Creeping	2.6	2.9	2.3	2.4
61 Penncross	Creeping	2.6	2.8	2.5	2.9
LSD at 5% =		0.9	0.9	1.4	0.9

<sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

<sup>2</sup>Dollar spot rated on a 1 to 9 scale, where 9 = best disease resistance; data is an average of three rating dates

Table 9. Performance of creeping and colonial bentgrass cultivars and selections in a putting green trial seeded in September 2015 at North Brunswick, NJ.

Cultivar or Selection	Species	Turf Quality <sup>1</sup> 2016	Dollar Spot <sup>2</sup> 2016 Avg.	Turf Establishment <sup>3</sup> Oct. 2015
1 MMM Comp	Creeping	6.4	7.2	5.3
2 Piranha	Creeping	6.3	5.7	5.7
3 LNS	Creeping	6.2	5.8	5.0
4 MGC Comp	Creeping	6.1	4.2	5.7
5 MSP Comp	Creeping	6.0	6.0	4.3
6 Chinook	Creeping	6.0	6.7	5.3
7 CBP Comp	Creeping	6.0	5.3	3.7
8 ELC Comp	Colonial	5.9	8.5	3.0
9 PST-R0PS	Creeping	5.8	4.0	4.3
10 Pin Up	Creeping	5.6	4.3	6.3
11 PST-Syn-R0PR	Creeping	5.6	3.0	3.7
12 ECS Comp	Colonial	5.6	8.7	4.3
13 EDC Comp	Colonial	5.6	8.0	4.0
14 WFC Comp	Creeping	5.5	6.0	4.7
15 Barracuda	Creeping	5.4	4.3	6.0
16 GDE	Creeping	5.3	6.0	4.7
17 DDS Comp	Colonial	5.3	8.7	4.0
18 MDF Comp	Colonial	5.2	8.2	3.7
19 SHC Comp	Colonial	5.2	8.5	4.7
20 Shark	Creeping	5.1	4.0	6.3
21 Pure Distinction	Creeping	5.0	3.2	4.7
22 Centercut 2	Creeping	5.0	5.7	7.0
23 LSF Comp	Colonial	5.0	9.0	3.7
24 HLT Comp	Colonial	5.0	9.0	4.0
25 Luminary	Creeping	4.9	4.8	4.3
26 MFC Comp	Creeping	4.9	4.8	4.3
27 Pure Select	Creeping	4.8	3.3	4.7
28 PST-0CV6	Creeping	4.7	3.8	4.3
29 LFW Comp	Creeping	4.7	5.3	4.3
30 EBC Comp	Creeping	4.6	5.7	4.0
31 Centercut 3	Creeping	4.5	5.3	7.7
32 BPT Comp	Colonial	4.5	8.8	3.7
33 PST-0RBS	Creeping	4.3	3.5	4.0
34 Memorial	Creeping	4.3	6.3	7.3
35 Centercut	Creeping	4.0	6.3	6.0

(Continued)

Table 9. Creeping and colonial bentgrass putting green trial, 2015 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup> 2016	Dollar Spot <sup>2</sup> 2016 Avg.	Turf Establishment <sup>3</sup> Oct. 2015
36 13M	Creeping	3.9	6.0	6.3
37 Crystal BlueLinks	Creeping	3.8	3.7	6.0
38 Penn A1	Creeping	3.7	4.0	4.7
39 Kingpin	Creeping	3.5	5.5	6.0
LSD at 5% =		0.9	1.1	1.9

<sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

<sup>2</sup>Dollar spot rated on a 1 to 9 scale, where 9 = best disease resistance; data is an average of two rating dates

<sup>3</sup>Turf establishment rated on a 1 to 9 scale, where 9 = quickest establishment of turf canopy

Table 10. Performance of velvet bentgrass cultivars and selections in a putting green trial seeded in September 2015 at North Brunswick, NJ.

Cultivar or Selection	Turf Quality <sup>1</sup> 2016	Turf Establishment <sup>2</sup> Oct. 2015	Spring Green-up <sup>3</sup> March 2016	Bipolaris Leaf Spot <sup>4</sup> May 2016	Brown Patch <sup>5</sup> Aug. 2016	Copper Spot <sup>6</sup> Aug. 2016
1 LVP Comp	6.6	6.3	5.3	9.0	5.3	5.7
2 SFV Comp	6.2	6.0	6.3	9.0	6.3	4.3
3 EVP Comp	6.2	7.3	7.3	8.7	7.3	7.0
4 CCV Comp	6.1	7.3	7.0	9.0	6.0	6.0
5 WBV Comp	6.0	6.3	6.0	9.0	8.0	7.0
6 LCT Comp	5.7	7.0	7.3	8.0	6.0	7.3
7 EVU Comp	5.2	6.7	6.3	6.3	8.0	6.3
8 WSE Comp	4.4	7.0	5.7	4.0	7.7	6.7
9 Villa	3.2	8.3	7.7	3.0	7.0	7.3
10 PST-VR01	2.9	3.0	5.3	4.7	7.7	7.7
11 SR 7200	2.0	2.0	5.0	3.3	7.7	7.3
LSD at 5% =	1.0	1.3	1.2	1.9	1.7	1.2

<sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

<sup>2</sup>Turf establishment rated on a 1 to 9 scale, where 9 = quickest establishment of turf canopy

<sup>3</sup>Spring green-up rated on a 1 to 9 scale, where 9 = earliest spring green-up

<sup>4</sup>Bipolaris leaf spot rated on a 1 to 9 scale, where 9 = best disease resistance

<sup>5</sup>Brown patch spot rated on a 1 to 9 scale, where 9 = best disease resistance

<sup>6</sup>Copper spot rated on a 1 to 9 scale, where 9 = best disease resistance

Table 11. Performance of creeping and colonial bentgrass cultivars and selections in a fairway trial seeded in September 2015 at North Brunswick, NJ.

Cultivar or Selection	Species	Turf Quality <sup>1</sup> 2016	Turf Establishment <sup>2</sup> Sept. 2015	Turf Disease <sup>3</sup> 2016
<b>CREEPING BENTGRASS</b>				
1 LFW Comp	Creeping	6.6	5.3	6.0
2 MMM Comp	Creeping	6.4	6.0	6.8
3 Piranha	Creeping	6.4	6.0	5.8
4 LNS	Creeping	6.4	6.3	5.5
5 MSP Comp	Creeping	6.2	5.3	6.3
6 MGC Comp	Creeping	6.2	4.7	6.7
7 WFC Comp	Creeping	6.0	5.0	6.8
8 MFC Comp	Creeping	5.9	5.3	5.8
9 GDE	Creeping	5.9	5.7	6.2
10 Chinook	Creeping	5.8	5.3	6.0
11 CBP Comp	Creeping	5.3	4.3	5.3
12 EBC Comp	Creeping	4.7	4.3	5.8
13 Pin Up	Creeping	4.6	6.0	4.8
14 Barracuda	Creeping	4.6	5.7	5.5
15 PST-R0PS	Creeping	4.5	5.7	4.8
16 Pure Distinction	Creeping	4.3	7.3	4.3
17 Shark	Creeping	4.2	6.0	4.3
18 PST-0RBS	Creeping	3.9	5.0	3.8
19 Pure Select	Creeping	3.8	5.0	4.7
20 PST-0CV6	Creeping	3.8	6.3	3.3
21 Penn A1	Creeping	3.7	4.3	5.0
22 Crystal BlueLinks	Creeping	3.7	6.0	4.8
23 PST-Syn-R0PR	Creeping	3.6	3.7	4.3
24 Kingpin	Creeping	2.6	5.3	5.3
<b>COLONIAL BENTGRASS</b>				
1 EDC Comp	Colonial	6.5	5.3	6.2
2 ECS Comp	Colonial	6.5	5.7	4.7
3 MDF Comp	Colonial	6.1	4.7	7.4
4 HLT Comp	Colonial	6.0	5.7	6.1
5 DDS Comp	Colonial	5.9	6.0	6.2
6 BPT Comp	Colonial	5.8	4.7	6.4
7 SHC Comp	Colonial	5.8	5.3	5.5
8 DML	Colonial	5.6	7.3	4.3
9 Musket	Colonial	5.5	6.7	3.9
10 Heritage	Colonial	5.4	5.3	6.9

(Continued)

Table 11. Creeping and colonial bentgrass fairway trial, 2015 (continued).

Cultivar or Selection	Species	Turf Quality <sup>1</sup> 2016	Turf Establishment <sup>2</sup> Sept. 2015	Turf Disease <sup>3</sup> 2016
<b>COLONIAL BENTGRASS (continued)</b>				
11 ELC Comp	Colonial	5.3	3.7	7.5
12 LSF Comp	Colonial	5.3	4.3	4.8
13 Capri	Colonial	5.0	8.0	3.6
14 FT12	Colonial	4.8	6.7	5.7
15 Tiger 2	Colonial	3.4	6.7	4.0
16 Glory	Colonial	3.3	8.0	2.8
LSD at 5% =		1.1	1.8	—
Dollar spot (creeping bentgrass)				0.9
Brown patch (colonial bentgrass)				2.1

<sup>1</sup>Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

<sup>2</sup>Turf establishment rated on a 1 to 9 scale, where 9 = quickest establishment of turf canopy

<sup>3</sup>Turf disease rated on a 1 to 9 scale, where 9 = best disease resistance. Creeping bentgrasses were rated for dollar spot; data is an average of two rating dates. Colonial bentgrasses were rated for brown patch; data is an average of three rating dates



Table 12. Maintenance practices performed in 2016 on bentgrass trials at North Brunswick, NJ.

Table	Test	Fertility <sup>1</sup>	Mowing Height (inches)	Cultivation/Top Dress	Fungicides	Insecticides	Herbicides
1	2012 Greens	2.05 (N); 0.8 lb P <sub>2</sub> O <sub>5</sub> ; 0.8 lb K <sub>2</sub> O	0.110	May to Aug., Oct., Nov.– topdressed May, Aug.–Tricure AD (wetting agent) July–Bayonet aeration	April–Banner Maxx July–Daconil Ultrex	June–Provaunt (sod webworm) Aug.–Acelepryn (white grubs)	July–QuickSilver (moss)
2	2012 Velvet Greens	2.15 (N); 1.0 lb P <sub>2</sub> O <sub>5</sub> ; 0.97 lb K <sub>2</sub> O	0.110	May to Aug., Oct., Nov.– topdressed May–Tricure AD (wetting agent)	April–Banner Maxx	June–Provaunt (sod webworm) Aug.–Acelepryn (white grubs)	none
3	2013 Greens	3.35 (N); 1.1 lb P <sub>2</sub> O <sub>5</sub> ; 1.07 lb K <sub>2</sub> O	0.110	May to Nov.–topdressed June–Black Gypsum DG Aug.–Tricure AD (wetting agent) Aug., Sept.–Bayonet aeration	July, Aug.–Daconil Ultrex Oct.–Emerald	June–Provaunt (sod webworm)	July, Aug., Oct.– QuickSilver (moss)
4	2013 Fairway	3.1 (N); 4 fl oz Micrel Total 5-0-0; 0 lb P <sub>2</sub> O <sub>5</sub> ; 0.47lb K <sub>2</sub> O	0.375	May, Aug.–Tricure AD (wetting agent) Oct.–solid aeration	none	June–Provaunt (sod webworm)	none

(Continued)

Table 12. Bentgrass maintenance practices, 2016 (continued).

Table	Test	Fertility <sup>1</sup>	Mowing Height (inches)	Cultivation/Top Dress	Fungicides	Insecticides	Herbicides
5	2014 Greens (NTEP)	3.85 (N); 4 fl oz Micrel Total 5-0-0; 1.5 lb P <sub>2</sub> O <sub>5</sub> ; 1.37 lb K <sub>2</sub> O	0.110	May to Oct.–topdressed May, July, Aug.–Tricure AD (wetting agent) Sept.–Bayonet aeration	April–Banner Maxx Sept.–Daconil Ultrex Oct., Nov.–Emerald	June–Provaunt (sod webworm) Aug.–Acelepryn (white grubs)	none
6	2014 Fairway (NTEP)	2.19 (N); 4 fl oz Micrel Total 5-0-0; 0 lb P <sub>2</sub> O <sub>5</sub> ; 0.3 lb K <sub>2</sub> O	0.375	May–Tricure AD (wetting agent)	May–Emerald June–Daconil Ultrex + Affirm WDG July–Daconil Ultrex + Medallion SC; Torque + Signature	June–Provaunt (sod webworm) Aug.–Acelepryn (white grubs)	Oct.–Trimec Bentgrass Formula (broad-leaf weeds)
7	2014 Greens	4.15 (N); 4 fl oz Micrel Total 5-0-0; 1.2 lb P <sub>2</sub> O <sub>5</sub> ; 1.2 lb K <sub>2</sub> O	0.110	May to Nov.–topdressed April, Aug.–Tricure AD (wetting agent) May–Black Gypsum DG July–Bayonet aeration	July to Sept.–Daconil Ultrex Oct.–Emerald	June–Provaunt (sod webworm) Aug.–Acelepryn (white grubs)	July, Aug., Oct., Nov.–QuickSilver (moss)
8	2014 Fairway	2.39 (N); 8 fl oz Micrel Total 5-0-0; 0 lb P <sub>2</sub> O <sub>5</sub> ; 0.3 lb K <sub>2</sub> O	0.375	May–Tricure AD (wetting agent) Oct.–solid aeration	July–Daconil Ultrex; Emerald	June–Provaunt (sod webworm) Aug.–Acelepryn (white grubs)	Oct.–Trimec Bentgrass Formula (broad-leaf weeds)

(Continued)

Table 12. Bentgrass maintenance practices, 2016 (continued).

Table	Test	Fertility <sup>1</sup>	Mowing Height (inches)	Cultivation/Top Dress	Fungicides	Insecticides	Herbicides
9	2015 Greens	4.65 (N); 4 fl oz Micrel Total 5-0-0; 1.6 lb P <sub>2</sub> O <sub>5</sub> ; 1.85 lb K <sub>2</sub> O	0.110	May to Nov.–top dressed April–Tricure AD (wetting agent) June–Black Gypsum DG Sept.–Bayonet aeration	Nov.–Emerald	June–Provaunt (sod webworm) Aug.–Acelepryn (white grubs)	none
10	2015 Velvet	2.15 (N); 0.8 lb P <sub>2</sub> O <sub>5</sub> ; 0.77 lb K <sub>2</sub> O	0.110	May to Oct.–top dressed May, Aug.–Tricure AD (wetting agent) Aug.–Bayonet aeration	none	June–Provaunt (sod webworm) Aug.–Acelepryn (white grubs)	none
11	2015 Fairway	1.6 (N); 0 lb P <sub>2</sub> O <sub>5</sub> ; 0.3 lb K <sub>2</sub> O	0.375	May–Tricure AD (wetting agent)	Aug.–Emerald	June–Provaunt (sod webworm) Aug.–Acelepryn (white grubs)	Oct.–Trimec Bentgrass Formula (broadleaf weeds)

<sup>1</sup>Annual nitrogen applied (lb/1000 ft<sup>2</sup>). Additional fertilizers as noted (per 1000 ft<sup>2</sup>)