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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 2021 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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PERFORMANCE OF BENTGRASS CULTIVARS AND SELECTIONS IN NEW JERSEY TURF TRIALS, 2021

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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 including creeping bentgrass (*Agrostis palustris* Huds.; synonym = *A. stolonifera* L.), colonial bentgrass (*A. tenuis* L. or *A. capillaris L.*), and velvet bentgrass (*A. canina* L.). Additionally, highland or dryland bentgrass (*A. castellana Boiss.* & Reut.) can be options for turf in stressful areas but tend to be less attractive than the more common species when a high-quality turf is needed and therefore these species are less commonly utilized. Due to their aggressive growth habits 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 U.S. Colonial bentgrass responds best to a slightly higher height of cut, therefore it is 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 U.S., 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 that time, breeding efforts have markedly improved creeping bentgrasses to withstand the increasing demands of the game of golf including the need for better turf quality, darker green color, improved shoot density, improved traffic tolerance and recuperative ability, as well as increased disease and stress tolerances compared to older varieties. Creeping bentgrasses are susceptible to a number of pathogens and pests. Dollar spot, caused by the fungus *Clarireedia jacksonii (C. Salgado, L.A. Beirn, B.B. Clarke, & J.A.Crouch sp. nov.),* is one of the main disease problems of close-cut creeping bentgrass. However, they can also be susceptible to brown patch (*Rhizoctonia solani*), copper spot (*Gloeocercospora sorghi*), anthracnose (*Colletotrichum cereale*), and *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. Colonial bentgrasses have a finer leaf texture and a more upright and less aggressive spreading growth habit than creeping bentgrass. Colonial bentgrass is generally better adapted for fairway or tee use in the warmer summer climates of the northern U.S. Colonial bentgrasses perform best in New Jersey when mowed no lower than 3/8 of an inch. Compared to creeping bentgrass, colonial bentgrass typically has a brighter green color and better color retention during cool weather. Colonial bentgrasses generally have better dollar spot resistance and better wear tolerance than creeping bentgrass. However, colonial bentgrass is much more susceptible to brown patch disease (caused by the fungus *Rhizoctonia solani* Kuhn) and does not spread through stolons. While not lethal, the playability of golf courses may be affected if brown patch is not controlled on colonial bentgrass. Current breeding efforts include improving tolerance of colonial bentgrasses to this disease and improved quality under fairway conditions.

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

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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 therefore become problematic if not maintained properly. Years of mismanagement and the subsequent poor turf quality has given velvet bentgrass a bad name, but research has shown that when managed properly, velvet bentgrass can create a superior turf (Brilman and Meyer, 2000). Velvet bentgrass can also be susceptible to red thread (*Laetisaria fuciformis* (McAlpine) Burdsall) and copper spot (*Gloeocercospora sorghi* Bain & Edgerton ex Deighton) diseases, but generally has good resistance to dollar spot and brown patch diseases. Seedlings of velvet bentgrasses are susceptible to Pythium (*Pythium* spp.) seedling root rot during establishment.

During colder weather, velvet bentgrass will turn a dark purple color and 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 U.S., if proper cultural management inputs are implemented. Some of the major breeding objectives for velvet bentgrass include copper spot resistance, Pythium resistance, and 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 other 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 2017 (Tables 1 and 2), 2018 (Tables 3, 4, and 5), 2019 (Tables 6 and 7), and 2020 (Tables 8, 9, 10, 11, and 12). Trials were established on a modified Nixon loam. Plot size was 3 x 5 ft for all trials, except for trials that are part of the National Turfgrass Evaluation Program (Tables 8 and 9), which are planted to a 4 x 6 ft plot size. Plots were hand-seeded at a rate of approximately 1.0 lb/1000 ft^2. 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 13. 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. Most tests were irrigated to 65-75% ET replacement during the growing season 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 through 12), establishment (Tables 8 through 12), drought tolerance (Table 1) 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, 2, 7, and 9), brown patch (Tables 3, 4, 5, 6, 7, 8, 9, 10 and 12), and copper spot (Table 1). 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 7 are ranked according to their overall multi-year quality average. Tables 8 through 12 are ranked by the average turf quality for the 2021 growing season only. Throughout all 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, 6, 8, and 10), Match Play, Coho, Macdonald, Oakley, Spectrum, 007XL, 777, and the experimental selections GMM Comp, AP 36C, AP 23 M2, POR Comp, MCL Comp, COC Comp, FEM Comp, GHE Comp, VNP Comp, and PST-0HR all performed very well, while Penncross, SR 1119 were consistently among the poorest performers. At fairway height (Tables 7, 9, and 12), Spectrum, Coho, Oakley, Match Play, 007XL, Piper, and the experimental selections FDS Comp, MAG Comp, MCL Comp, COC Comp, and GHE Comp had excellent turf quality while some of the lowest scoring cultivars at fairway height were Penncross, A-4, V8, L-93.

Overall turf quality for velvet bentgrasses was evaluated in the 2017, 2018, and 2020 trials (Tables 2, 4 and 11) under greens height of cut. In those trials, experimental selections consistently performed at a higher level than named cultivars. Those selections that exhibited the highest turf quality were CMV Comp, LSV Comp, FDK Comp, VCE Comp, WWV Comp, WWL Comp, PPG-AC 102, and PPG-AC 103. These experimental selections outperformed named cultivars such as SR 7200, Villa, and Legendary that displayed poor quality in these trials.

As mentioned previously, colonial bentgrasses perform better at fairway cutting height and typically have poorer performance under putting green conditions. Nevertheless, in the 2017 putting green trial (Table 1), there were several colonial entries that performed favorably to many creeping bentgrasses, exhibiting excellent turf quality at greens height including Musket, EUC Comp, SLC Comp, and EFC Comp. Under fairway conditions however (Tables 5, 7, 9, and 12), experimental selections such as PST-9BP, PPG-AT 106, SLM Comp, WML Comp, ECT Comp, DMM Comp, and the cultivars Musket and Heritage were the best performing colonial bentgrasses, while Tiger 2, SR 7100, SR 7150, and Glory generally exhibited the poorest performance under fairway cutting heights when included in trials.

Dollar Spot Disease

Clarireedia jacksonii, the causal agent of this widespread turfgrass disease, causes silver-dollar shaped spots of dead turf which can converge causing larger damaged areas (Salgado-Salazar et al., 2018). 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 fungus' prevalence. Also becoming more prevalent is the pathogen's resistance to fungicides, particularly DMI fungicides (Smiley et al., 2005). Additionally, 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, 7, and 9) indicate that significant improvements in creeping bentgrass have been made. More recent cultivars such as Coho, Chinook, Spectrum, Oakley, and Piper offer strong tolerance to dollar spot that is comparable or surpassing that of older cultivars like Declaration and Memorial. Recent experimental entries such as DLF-AP 3084, GMM Comp, EF2 Comp, DLG Comp, MAG Comp, FDS Comp, and AGS Comp all show improved tolerance to this disease, while Penncross, Pure Distinction, Pure Select, PST-ORBS, AU Victory, Mackenzie, and SR 1119 were very susceptible to dollar spot disease.

Brown Patch Disease

Velvet bentgrass typically exhibits the greatest tolerance to brown patch disease (*Rhizoctonia solani*) 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 3, 4, 5, 6, 7, 8, 9, 10, and 12. In 2021, creeping bentgrasses displayed varying levels of acceptable tolerance to this disease. At greens height (Tables 3, 6, 8, and 10), significant differences among the creeping bentgrasses were observed, in which new experimental entries TFT Comp, SGT Comp, MCL Comp, COC Comp, MAG Comp, LES Comp, GES Comp, FMM Comp, GHE Comp, PST-R0DS19, PVF-PV-2, PSU-CBG1 and the cultivars Nintey-Six Two, Luminary, Coho, TourPro, Oakley, Barracuda and 007XL exhibited high brown patch tolerance while Focus, V8, T-1, Piranha, Cobra 2 and SR 1119 exhibited less than acceptable brown patch

disease levels compared to other creeping bentgrass cultivars. At fairway height (Tables 7, 9, and 12) nearly all creeping bentgrass entries exhibited acceptable brown patch tolerance, except for V8, Penncross, T-1, Armor, and PC2.0. Cultivars 007XL, Spectrum, Diplomacy, Oakley, and Coho, and the experimental selections PVF-PV-2, PST-0MRN, FEM Comp, and VNP Comp provided exemplary brown tolerance.

Over the past few years, a significant amount of research has been spent on improving brown patch resistance in colonial bentgrass. In the fairway trials (Tables 5, 7, 9, and 12) during the 2021 growing season, enhanced disease tolerance is evident. The cultivar Puritan, and the experimental selections MGE Comp, MEM Comp, WML Comp, CLS Comp, PCC Comp, ECT Comp, DDL Comp, and PST-9BP exhibited significantly improved brown patch resistance over older entries such as Capri, Musket, Glory, SR 7150 and SR 7100.

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Table 1. Performance of creeping and colonial bentgrass cultivars in a putting green trial established in September 2017 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2018-2021	Turf Quality[1] 2018	Turf Quality[1] 2019	Turf Quality[1] 2020	Turf Quality[1] 2021	Dollar Spot[2] 2021	Copper Spot[3] 2021	Drought Quality[4] Jul. 2021
	CREEPING BENTGRASS								
1	GMM Comp	7.3	7.7	7.3	7.8	6.5	7.0	7.8	7.3
2	MFC Comp	7.0	7.2	6.9	7.3	6.6	6.0	8.3	8.3
3	BEF Comp	7.0	7.6	6.9	7.0	6.4	5.7	5.7	8.0
4	DLG Comp	6.9	7.1	6.9	7.5	6.4	6.7	8.5	8.0
5	EGC Comp	6.9	7.9	7.1	7.1	5.5	5.5	6.0	7.7
6	Coho	6.8	7.1	7.6	6.7	5.9	7.7	6.0	8.3
7	EF2 Comp	6.6	7.3	6.7	6.7	5.9	7.0	8.2	6.0
8	Match Play	6.3	6.9	6.2	6.3	5.7	6.3	5.8	6.7
9	Chinook	6.0	6.4	6.1	6.2	5.5	6.5	5.8	6.3
10	LTNS Bent Blend 1	5.9	6.7	5.8	5.8	5.4	6.0	5.0	8.0
11	L-93XD	5.8	6.9	5.3	5.9	4.9	3.8	7.7	5.0
12	TourPro	5.7	6.8	5.6	5.5	4.9	5.5	7.7	5.0
13	Piranha	5.4	6.3	5.0	5.5	4.9	5.0	8.2	6.3
14	Pure Eclipse	5.1	6.7	4.7	4.5	4.5	3.5	5.7	6.0
15	All Pro Fwy Blend X	5.1	6.1	4.7	5.1	4.7	4.5	7.3	6.7
16	Luminary	5.1	6.2	4.8	4.4	4.9	5.3	5.7	6.3
17	Macdonald	4.9	6.0	4.5	4.7	4.3	5.2	6.3	6.0
18	CenterCut 3	4.7	5.4	4.7	4.6	4.2	4.5	6.5	5.0
19	777	4.7	5.7	3.9	4.8	4.5	3.5	5.3	6.3
20	Declaration	4.7	5.1	5.1	4.6	3.9	4.3	7.0	5.3

(Continued)

Table 1. Performance of creeping and colonial bentgrass cultivars in a putting green trial established in September 2017 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2018-2021	Turf Quality[1] 2018	Turf Quality[1] 2019	Turf Quality[1] 2020	Turf Quality[1] 2021	Dollar Spot[2] 2021	Copper Spot[3] 2021	Drought Quality[4] Jul. 2021
	CREEPING BENTGRASS (continued)								
21	007	4.6	5.8	4.2	4.6	4.0	4.2	7.7	5.3
22	Barracuda	4.6	5.3	4.2	4.7	4.3	4.5	6.3	5.0
23	CenterCut 2	4.5	4.9	4.3	4.9	3.9	4.3	5.2	6.7
24	RH 93	4.5	6.2	4.0	4.3	3.5	5.2	6.0	5.3
25	Proclamation	4.3	5.5	3.7	4.0	4.3	3.5	7.3	4.3
26	PC2.0	4.2	5.1	3.6	4.0	4.2	4.3	8.0	6.3
27	Pure Distinction	4.2	5.3	3.4	4.0	4.0	3.0	7.3	5.0
28	Shark	4.1	4.9	3.6	3.8	4.1	3.5	8.3	5.3
29	Flagstick	4.1	4.4	4.1	4.2	3.6	4.5	8.0	4.0
30	PST-0RBS	4.0	5.2	3.6	3.2	3.9	2.5	6.7	6.7
31	Memorial	3.9	4.0	4.2	4.1	3.4	6.7	5.3	3.7
32	CenterCut	3.9	4.5	4.1	3.7	3.3	5.0	7.0	3.3
33	Pure Select	3.9	4.9	3.3	3.4	3.7	2.0	8.2	4.7
34	CY-2	3.8	3.4	4.2	4.3	3.4	4.5	8.0	4.0
35	Focus	3.8	4.4	3.3	3.4	3.9	4.0	7.0	5.3
36	A-1	3.7	4.5	3.7	3.8	2.9	3.2	8.2	2.7
37	V8	3.7	4.0	3.5	3.6	3.5	3.5	6.7	4.3
38	Crystal BlueLinks	3.4	4.7	3.2	2.8	3.0	3.7	6.5	5.0
39	Kingpin	3.4	3.7	3.5	3.3	3.1	4.2	7.7	3.7
40	Tyee	3.2	3.6	2.8	3.1	3.0	3.7	7.7	5.0

(Continued)

Table 1. Performance of creeping and colonial bentgrass cultivars in a putting green trial established in September 2017 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2018-2021	Turf Quality[1] 2018	Turf Quality[1] 2019	Turf Quality[1] 2020	Turf Quality[1] 2021	Dollar Spot[2] 2021	Copper Spot[3] 2021	Drought Quality[4] Jul. 2021
	CREEPING BENTGRASS (continued)								
41	SR 1150	3.1	3.5	3.2	2.9	2.8	3.5	7.5	3.0
42	T-1	3.1	4.6	2.6	2.8	2.7	3.7	8.2	2.3
43	A-4	3.0	4.1	2.7	2.4	2.7	3.5	8.0	3.0
44	PST-0COL	3.0	4.1	4.2	2.0	1.7	4.0	8.5	4.7
45	Mackenzie	3.0	3.5	2.4	2.7	3.2	2.7	7.0	4.7
46	L-93	3.0	3.9	2.9	2.5	2.5	3.8	8.2	2.7
47	Alpha	2.9	3.9	2.7	2.3	2.7	3.2	7.3	4.0
48	Ninety-Six Two	2.9	4.0	2.4	2.2	2.9	3.3	7.8	3.7
49	Putter	2.8	3.6	2.6	2.3	2.6	3.3	8.3	3.3
50	Seaside II	2.7	2.8	2.6	2.7	2.8	4.0	7.7	3.7
51	SR 1119	2.5	3.2	2.4	1.9	2.4	2.8	6.8	3.7
52	Southshore	2.4	3.0	2.1	2.3	2.3	3.7	8.3	2.7
53	Penncross	2.0	2.2	1.9	1.5	2.3	2.8	7.5	3.3
	LSD at 5%=	0.4	0.7	0.7	0.8	0.9	1.2	2.9	2.1

(Continued)

Table 1. Performance of creeping and colonial bentgrass cultivars in a putting green trial established in September 2017 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2018-2021	Turf Quality[1] 2018	Turf Quality[1] 2019	Turf Quality[1] 2020	Turf Quality[1] 2021	Dollar Spot[2] 2021	Copper Spot[3] 2021	Drought Quality[4] Jul. 2021
	COLONIAL BENTGRASS								
1	EUC Comp	5.8	6.6	6.1	5.4	5.3	7.3	9.0	6.3
2	SLC Comp	5.7	6.6	5.9	5.2	5.1	7.7	9.0	5.7
3	EFC Comp	5.6	6.6	5.8	5.6	4.6	7.2	9.0	6.0
4	Musket	5.2	5.6	5.8	5.1	4.3	7.2	9.0	4.7
5	DGM Comp	5.0	5.1	5.7	5.0	4.3	7.7	9.0	6.0
6	LDC Comp	4.7	4.9	5.1	4.3	4.5	6.7	8.8	6.0
7	LLS Comp	4.5	5.5	4.6	4.4	3.5	6.3	8.8	5.3
8	Puritan	4.1	5.4	4.4	3.8	2.6	5.3	9.0	4.3
9	Capri	3.8	4.4	4.4	3.5	2.8	6.2	8.8	5.3
10	FT12	3.6	5.0	4.4	2.8	2.3	5.5	8.7	4.0
11	Tiger 2	2.3	3.2	2.5	1.9	1.7	4.7	9.0	2.3
12	Glory	1.8	3.2	1.7	1.4	1.1	3.8	9.0	3.0
	LSD at 5%=	0.8	0.7	0.7	1.2	1.2	1.6	NS	1.4

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

[2]Dollar Spot disease rated on a 1 to 9 scale, where 9 = best disease resistance. Data is an average of 2 rating dates

[3]Copper Spot disease rated on a 1 to 9 scale, where 9 = best disease resistance. Data is an average of 2 rating dates

[4]Drought quality rated on a 1 to 9 scale, where 9 = best turf quality under drought stress Drought quality assessed on July 18, after a period of minimal rain (<0.1") for 8 days with high temperatures averaging 87 degrees F

Table 2. Performance of velvet bentgrass cultivars and selections in a putting green trial seeded in September 2017 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2018-21	2018	2019	2020	2021	Spring Green Up[2] Apr. 2021	Dollar Spot[3] Jul. 2021
1	CMV Comp	6.2	6.8	6.2	5.8	6.2	6.3	6.3
2	LSV Comp	5.9	6.5	6.5	5.7	4.9	6.0	3.3
3	DEM Comp	5.8	7.0	6.5	5.4	4.2	4.0	4.3
4	DMS Comp	5.7	6.8	6.0	5.2	4.8	5.0	4.7
5	DMD Comp	5.7	6.5	5.7	5.8	4.8	5.3	4.0
6	MSV Comp	5.6	6.7	6.4	5.0	4.3	5.3	3.7
7	Vitagreen	4.8	5.4	4.6	4.5	4.8	5.3	5.3
8	Greenwich	4.1	5.4	3.6	3.7	3.8	4.7	5.3
9	Vesper	3.5	5.2	3.4	2.6	2.7	5.7	5.3
10	Legendary	3.2	4.2	3.2	2.9	2.5	3.7	3.7
11	Villa 2	2.5	2.8	2.5	2.3	2.5	4.7	5.3
12	Villa	2.0	2.2	1.8	1.7	2.3	4.3	4.7
13	SR 7200	1.7	2.1	1.8	1.7	1.4	3.3	5.7
	LSD at 5%=	0.7	0.5	1.0	0.9	1.3	1.5	1.7

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality
[2]Spring Green Up rated on a 1 to 9 scale, where 9 = earliest spring green up
[3]Dollar Spot disease rated on a 1 to 9 scale, where 9 = best disease resistance

Table 3. Performance of creeping bentgrass cultivars in a putting green trial established in September 2018 at North Brunswick, NJ.

		Turf Quality[1]				Brown Patch[2]
	Cultivar or Selection	2019-21	2019	2020	2021	2021
1	AP 36C	7.2	7.5	7.0	7.1	4.7
2	AP 23 M2	7.0	7.9	6.5	6.4	6.0
3	Macdonald	6.5	7.5	5.8	5.9	5.0
4	POR Comp	6.2	6.9	5.9	5.7	5.8
5	777	6.0	6.8	5.9	5.5	5.0
6	SGT Comp	5.8	7.0	5.6	5.0	6.3
7	AP 21 M2	5.8	6.0	5.7	5.7	5.7
8	TFT Comp	5.8	6.5	6.1	4.9	6.3
9	FSC Comp	5.8	6.4	5.9	5.2	5.8
10	TGT Comp	5.8	6.3	6.2	5.0	5.3
11	007	5.8	6.4	6.1	4.8	6.3
12	Tyee	5.8	5.9	5.8	5.5	5.8
13	RH 93	5.7	6.1	5.3	5.4	5.2
14	PPD Comp	5.6	6.8	6.0	4.0	5.7
15	Centercut 3	5.5	5.7	5.4	5.1	6.3
16	Luminary	5.4	5.8	5.5	4.9	6.5
17	Runner	5.4	6.4	4.5	5.6	5.7
18	SFT Comp	5.4	6.1	5.2	4.9	5.5
19	AP 23	5.3	5.6	5.2	5.2	6.2
20	GSH Comp	5.3	5.4	5.3	5.2	6.2
21	AGT Comp	5.2	6.0	5.8	3.9	6.2
22	PST-SYN-RODS	5.2	5.6	4.8	5.1	5.0
23	Barracuda	5.2	6.0	4.3	5.0	5.7
24	Cobra 2	5.2	5.9	4.8	4.9	5.2
25	AP 28	5.2	6.0	4.4	5.1	3.8
26	Match Play	5.1	5.8	5.6	4.3	5.2
27	Pure Select	5.1	5.0	5.3	5.0	6.3
28	Centercut 2	5.1	5.2	5.0	5.0	5.7
29	Chinook	5.1	6.0	5.0	4.3	6.0
30	Focus	5.1	5.6	4.8	5.0	5.7
31	Piranha	5.0	5.6	5.3	4.2	5.7
32	Pure Eclipse	4.9	6.2	5.1	3.7	6.2
33	Flagstick	4.9	5.3	5.0	4.5	6.3
34	Shark	4.8	5.4	4.6	4.4	5.2
35	CY-2	4.8	5.6	4.1	4.9	5.5

(Continued)

Table 3. Performance of creeping bentgrass cultivars in a putting green trial established in September 2018 at North Brunswick, NJ.

		Turf Quality[1]				Brown Patch[2]
	Cultivar or Selection	2019-21	2019	2020	2021	2021
36	TourPro	4.8	5.4	4.7	4.5	5.5
37	SR 1150	4.6	4.9	4.0	4.9	5.8
38	PST-SYN-OCD	4.5	5.1	4.1	4.1	5.8
39	Memorial	4.3	4.5	3.9	4.5	5.8
40	Proclamation	4.2	4.9	3.8	4.1	5.8
41	Mackenzie	4.2	4.4	3.7	4.6	5.5
42	Declaration	4.2	4.9	4.1	3.6	5.8
43	Memorial	4.1	4.2	4.3	4.0	5.8
44	Ninety-Six Two	4.1	4.7	3.9	3.7	6.7
45	Centercut	4.0	4.3	3.6	4.1	5.3
46	AU Victory	4.0	4.6	3.4	3.6	6.3
47	Kingpin	3.9	3.8	3.4	4.3	5.2
48	Pin Up	3.7	2.0	4.0	4.8	5.8
49	SR 1119	3.6	3.7	3.5	3.7	6.3
50	Penncross	2.8	2.3	2.6	3.4	5.7
	LSD at 5%=	1.1	1.0	1.3	1.6	1.2

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

[2]Brown Patch disease rated on a 1 to 9 scale, where 9 = best disease resistance. Data is an average of 2 rating dates

Table 4. Performance of velvet bentgrass cultivars and selections in a putting green trial seeded in August 2018 at North Brunswick, NJ.

		Turf Quality[1]				Spring Green Up[2]	Brown Patch[3]
	Cultivar or Selection	2019-21	2019	2020	2021	Apr. 2021	Jul. 2021
1	FDK Comp	5.7	6.2	5.9	5.0	5.3	3.7
2	VCE Comp	5.7	6.2	5.7	5.2	5.7	4.3
3	FDV Comp	5.4	6.4	5.3	4.5	4.7	3.7
4	DSM Comp	5.1	6.6	4.7	4.1	6.7	2.7
5	Legendary	2.9	3.9	2.4	2.3	3.7	4.7
6	Greenwich	2.7	4.5	2.1	1.6	2.7	4.7
7	Villa	2.6	4.2	1.7	1.9	4.0	6.0
	LSD at 5%=	0.5	0.8	0.8	0.8	1.8	2.6

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

[2]Spring Green Up rated on a 1 to 9 scale, where 9 = earliest turf green up

[3]Brown Patch disease rated on a 1 to 9 scale, where 9 = best disease resistance

Table 5. Performance of colonial bentgrass cultivars and selections in a fairway trial seeded in October 2018 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2019-21	Turf Quality[1] 2019	Turf Quality[1] 2020	Turf Quality[1] 2021	Brown Patch[2] Jul. 2021
1	SLM Comp	6.6	7.4	6.6	5.8	5.3
2	WML Comp	6.4	7.3	6.4	5.5	6.7
3	MEM Comp	6.2	7.1	6.4	5.2	5.7
4	MGE Comp	6.1	6.3	6.0	6.0	7.3
5	ECC Comp	6.0	6.5	5.8	5.6	3.7
6	FLS Comp	5.7	6.1	5.8	5.3	6.3
7	Musket	5.0	5.4	5.3	4.4	3.0
8	Puritan	4.8	5.5	4.7	4.1	5.7
9	Capri	4.4	5.2	4.7	3.5	4.3
10	Tiger 2	2.5	3.5	2.3	1.5	6.0
11	SR 7150	1.4	1.3	1.6	1.2	3.7
	LSD at 5%=	0.8	1.1	1.0	0.7	2.1

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

[2]Brown Patch disease rated on a 1 to 9 scale, where 9 = best disease resistance

Table 6. Performance of creeping bentgrass cultivars and selections in a putting green trial seeded in September 2019 at North Brunswick, NJ.

		Turf Quality[1]			Spring Green Up[2]	Brown Patch[3]
	Cultivar or Selection	2020-21	2020	2021	Apr. 2021	Jul. 2021
1	MCL Comp	7.4	7.6	7.2	6.0	8.3
2	COC Comp	7.2	7.4	7.0	5.7	8.3
3	PST-Syn-0HR	7.1	7.2	7.0	7.0	7.0
4	MAG Comp	7.1	7.4	6.9	7.3	8.3
5	LES Comp	7.1	7.7	6.5	5.7	8.3
6	GES Comp	6.9	7.5	6.3	4.7	8.3
7	Pure Eclipse	6.8	7.0	6.7	5.0	5.7
8	FDS Comp	6.8	7.0	6.6	7.0	6.0
9	777	6.6	7.3	5.9	5.7	5.0
10	Coho	6.6	7.1	6.1	6.3	8.3
11	AGS Comp	6.5	7.1	5.9	6.3	6.0
12	Pure Select	6.4	6.7	6.1	5.3	6.0
13	Match Play	6.4	6.6	6.1	6.0	7.0
14	Macdonald	6.3	6.6	6.1	7.3	7.0
15	AP 23	6.3	7.0	5.5	6.0	7.0
16	PST-R0DS19	6.3	6.2	6.4	5.7	8.0
17	Piranha	6.2	6.7	5.7	5.7	6.3
18	Pure Distinction	6.1	6.6	5.8	5.7	6.0
19	PST-Syn-0P9	6.1	6.0	6.2	3.7	6.7
20	Chinook	6.0	6.2	5.8	6.3	7.3
21	Predator Blend Mix	6.0	6.7	5.3	4.7	6.0
22	L-93XD	5.9	6.4	5.3	4.7	6.7
23	Luminary	5.8	5.9	5.5	5.7	6.0
24	Barracuda	5.7	6.5	4.9	4.0	6.3
25	PST-Syn-0CC	5.7	5.9	5.5	3.7	6.0
26	007	5.5	6.3	4.8	4.3	5.3
27	Kingdom	5.4	6.0	4.8	4.0	5.7
28	Runner	5.4	5.5	5.3	5.3	5.7
29	Tour Pro	5.4	6.1	4.6	4.7	7.3
30	Shark	5.3	6.1	4.5	3.7	5.0
31	PC2.0	4.5	5.4	3.6	3.0	4.3
32	Armor	4.5	5.3	3.7	1.3	3.7
33	Declaration	4.4	4.7	4.1	4.0	5.7
34	Ninety-Six Two	4.4	4.7	4.1	3.7	5.7
35	Flagstick	4.2	4.9	3.5	2.3	4.7

(Continued)

Table 6. Performance of creeping bentgrass cultivars and selections in a putting green trial seeded in September 2019 at North Brunswick, NJ.

		Turf Quality[1]			Spring Green Up[2]	Brown Patch[3]
	Cultivar or Selection	2020-21	2020	2021	Apr. 2021	Jul. 2021
36	Cobra 2	4.2	4.8	3.6	2.3	4.0
37	Focus	4.1	4.7	3.5	2.0	3.3
38	CY-2	4.1	4.5	3.6	3.0	5.0
39	Mackenzie	3.9	4.5	3.4	2.0	3.7
40	Memorial	3.7	3.8	3.5	3.3	5.0
41	T-1	3.6	4.2	3.0	1.7	2.7
42	Tyee	3.6	4.5	2.7	2.3	4.0
43	Kingpin	3.4	3.9	2.9	2.3	3.7
44	SR 1119	3.0	3.6	2.4	1.3	3.3
45	V8	2.6	3.3	2.0	1.7	3.3
46	Penncross	1.9	2.5	1.3	1.3	4.3
	LSD at 5%=	0.6	0.8	0.7	1.6	2.5

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality
[2]Spring Green Up rated on a 1 to 9 scale, where 9 = earliest spring green up
[3]Brown patch disease rated on a 1 to 9 scale, where 9 = best disease resistance

Table 7. Performance of creeping and colonial bentgrass cultivars and selections in a fairway trial seeded in September 2019 at North Brunswick, NJ.

		Turf Quality[1]			Brown Patch[2]	Dollar Spot[3]
	Cultivar or Selection	2020-21	2020	2021	Aug. 2021	2021
	CREEPING BENTGRASS					
1	FDS Comp	7.2	6.8	7.6	9.0	8.3
2	MAG Comp	7.1	7.0	7.3	9.0	8.3
3	GES Comp	7.0	7.2	6.9	9.0	7.1
4	LES Comp	7.0	6.8	7.1	9.0	7.8
5	AGS Comp	6.8	6.7	6.8	9.0	8.3
6	MCL Comp	6.7	6.8	6.6	9.0	7.2
7	Coho	6.6	6.5	6.8	9.0	8.3
8	COC Comp	6.6	6.4	6.8	9.0	7.7
9	MatchPlay	6.5	6.6	6.5	9.0	7.1
10	Piranha	6.3	6.5	6.1	9.0	7.4
11	Chinook	6.0	5.7	6.3	9.0	8.3
12	TourPro	6.0	6.1	5.8	9.0	7.7
13	Barracuda	5.9	6.2	5.6	9.0	7.8
14	PST-Syn-0HR	5.9	6.7	5.2	9.0	4.9
15	L-93XD	5.9	5.9	5.8	9.0	6.9
16	Luminary	5.7	6.1	5.2	9.0	6.7
17	All Pro Fwy Blend	5.7	6.1	5.2	9.0	6.6
18	Pure Eclipse	5.7	6.7	4.7	9.0	4.8
19	PST-R0DS19	5.6	6.2	4.9	9.0	6.1
20	AP 23	5.5	5.7	5.3	9.0	7.4
21	007	5.5	6.2	4.9	9.0	7.9
22	PST-Syn-0P9	5.5	5.7	5.1	9.0	5.1
23	Predator Blend Mix	5.4	5.7	5.0	9.0	6.8
24	Pure Select	5.3	5.8	4.8	9.0	5.3
25	PST-Syn-0CC	5.2	6.1	4.2	9.0	4.2
26	Pure Distinction	5.1	6.1	4.0	9.0	4.5
27	Kingdom	4.9	5.1	4.5	9.0	6.3
28	Focus	4.7	5.0	4.3	9.0	6.9
29	Armor	4.7	5.0	4.3	9.0	6.8
30	Declaration	4.6	5.1	4.2	9.0	7.9
31	Shark	4.5	5.0	4.0	9.0	5.3
32	777	4.4	4.8	4.0	9.0	6.0
33	Memorial	4.1	4.5	3.7	9.0	8.4
34	PC2.0	3.8	4.2	3.4	9.0	5.3
35	AU Victory	3.8	4.7	2.8	9.0	2.8

(Continued)

Table 7. Performance of creeping and colonial bentgrass cultivars and selections in a fairway trial seeded in September 2019 at North Brunswick, NJ.

		Turf Quality[1]			Brown Patch[2]	Dollar Spot[3]
	Cultivar or Selection	2020-21	2020	2021	Aug. 2021	2021
	CREEPING BENTGRASS (continued)					
36	Kingpin	3.6	3.9	3.3	9.0	8.3
37	T-1	3.2	3.7	2.7	9.0	5.9
38	Alpha	3.2	3.5	2.9	9.0	7.2
39	V8	2.7	2.9	2.6	9.0	6.4
40	L-93	2.6	2.9	2.4	9.0	7.2
41	Penncross	2.0	2.3	1.6	9.0	5.0
	LSD at 5%=	0.7	0.9	0.8	NS	1.3
	COLONIAL BENTGRASS					
1	PST-9BP	6.6	6.8	6.4	6.2	8.4
2	ECT Comp	6.4	6.3	6.6	7.0	8.6
3	PPG-AT 106	6.4	6.3	6.5	3.8	8.9
4	PCL Comp	6.3	6.3	6.4	6.5	8.8
5	Musket	5.8	5.7	6.0	3.5	8.8
6	CLS Comp	5.8	5.9	5.7	7.5	8.7
7	PCC Comp	5.8	5.7	5.8	7.5	8.7
8	Puritan	5.1	5.3	5.0	6.0	8.6
9	Capri	5.1	5.4	4.8	3.2	8.8
10	FT12	4.3	4.5	4.1	3.7	8.3
11	Tiger 2	3.8	3.9	3.7	4.0	8.4
	LSD at 5%=	0.7	0.7	1.0	2.0	NS

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

[2]Brown Patch disease rated on a 1 to 9 scale, where 9 = best disease resistance. Disease assessed once on creeping bentgrass; and an average of 2 rating dates on colonial bentgrasses

[3]Dollar Spot disease rated on a 1 to 9 scale, where 9 = best disease resistance. Data is an average of 4 rating dates for creeping bentgrasses, and an average of 3 ratings dates on colonial bentgrasses

Table 8. Performance of creeping bentgrass cultivars and selections in a putting green trial seeded in September 2020 at North Brunswick, NJ. All entries make up 2020 Bentgrass Putting Green NTEP Trial.

	Cultivar or Selection	Turf Quality[1] 2021	Turf Establishment[2] Oct. 2020	Brown Patch[3] Jul. 2021	Genetic Color[4] Nov. 2021	Turf Density[5] Nov. 2021	Leaf Texture[6] Nov. 2021
1	PST-0HR	7.9	4.7	8.0	8.7	8.3	9.0
2	Oakley	7.6	6.3	9.0	8.0	8.3	7.7
3	Spectrum	7.5	6.0	8.0	7.3	6.7	7.3
4	007XL	7.5	6.3	8.3	7.0	6.3	7.0
5	Piper	7.5	5.0	6.7	6.7	8.0	7.3
6	PVF-PV-2	7.4	4.3	8.7	8.0	7.7	7.3
7	Diplomacy	7.3	4.3	7.3	8.0	6.7	7.3
8	Piranha	6.5	5.7	5.3	6.7	5.3	5.3
9	DLFPS-AP-3084	6.2	4.3	7.7	7.0	6.7	7.0
10	CY-4	6.1	5.0	7.0	9.0	6.7	6.0
11	S1	6.0	6.3	8.0	7.3	5.0	5.7
12	L-93 XD	6.0	6.3	7.0	5.3	6.3	6.3
13	PSU-CBG2	5.6	2.7	7.7	6.0	7.7	8.3
14	PST-0DSF	5.6	4.7	7.0	2.0	4.3	5.3
15	Barracuda	5.2	6.0	7.7	7.0	5.0	5.7
16	PSU-CBG1	5.2	1.7	9.0	7.0	7.0	8.3
17	PSU-CBG3	4.4	1.7	7.7	5.7	6.3	8.0
18	Penn A-1	4.4	5.0	6.0	2.7	3.7	3.7
19	Declaration	4.4	6.3	7.3	4.0	3.3	3.7
20	Penncross	2.9	5.7	8.0	3.0	1.3	1.7
	LSD at 5%=	1.0	1.5	3.1	1.7	1.6	2.0

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality
[2]Turf Establishment rated on a 1 to 9 scale, where 9 = earliest turf canopy establishment
[3]Brown patch disease rated on a 1 to 9 scale, where 9 = best disease resistance
[4]Genetic color rated on a 1 to 9 scale, where 9 = greenest turf color
[5]Turf density rated on a 1 to 9 scale, where 9 = greatest turf density
[6]Leaf texture rated on a 1 to 9 scale, where 9 = most fine leaf texture

Table 9. Performance of creeping and colonial bentgrass cultivars and selections in a fairway trial seeded in September 2020 at North Brunswick, NJ. All entries make up 2020 Bentgrass Fairway NTEP Trial.

	Cultivar or Selection	Species	Turf Quality[1] 2021	Turf Establishment[2] Oct. 2020	Brown Patch[3] Aug. 2021	Dollar Spot[4] Sep. 2021	Genetic Color[5] Nov. 2021	Turf Density[6] Nov. 2021	Leaf Texture[7] Nov. 2021
1	Oakley	Creep	7.8	6.7	7.3	6.3	8.3	8.7	8.3
2	Spectrum	Creep	7.6	6.0	6.3	7.3	8.0	8.7	8.3
3	007XL	Creep	7.5	5.7	8.3	5.0	7.0	7.3	7.7
4	Piper	Creep	7.4	5.7	8.0	5.7	7.7	8.3	7.3
5	Diplomacy	Creep	7.1	4.7	9.0	5.3	6.7	7.0	6.7
6	Match Play	Creep	7.0	7.3	6.0	5.0	5.3	6.3	6.7
7	PVF-PV-2	Creep	6.9	4.0	8.7	5.7	6.3	7.3	6.3
8	DLF-AP-3084	Creep	6.8	4.7	7.3	6.0	7.3	7.7	6.3
9	PST-0MRN	Creep	6.8	5.3	8.7	3.0	6.3	7.7	7.0
10	TourPro	Creep	6.5	6.0	7.3	5.0	6.7	7.3	8.0
11	PST-0R2O	Creep	6.4	5.3	6.7	3.0	6.3	7.0	7.3
12	Piranha	Creep	6.1	5.3	6.7	4.0	7.0	6.0	5.7
13	Musket	Colonial	5.9	6.0	3.0	7.7	2.3	5.0	6.7
14	S1	Creep	5.8	6.7	8.3	3.7	4.7	5.3	5.3
15	Chinook	Creep	5.7	5.0	8.3	4.7	6.0	5.7	6.0

(Continued)

Table 9. Performance of creeping and colonial bentgrass cultivars and selections in a fairway trial seeded in September 2020 at North Brunswick, NJ. All entries make up 2020 Bentgrass Fairway NTEP Trial.

	Cultivar or Selection	Species	Turf Quality[1] 2021	Turf Establishment[2] Oct. 2020	Brown Patch[3] Aug. 2021	Dollar Spot[4] Sep. 2021	Genetic Color[5] Nov. 2021	Turf Density[6] Nov. 2021	Leaf Texture[7] Nov. 2021
16	Barracuda	Creep	5.6	5.0	7.0	4.3	6.0	4.7	5.7
17	Shark	Creep	5.6	6.3	7.0	3.0	5.3	5.7	5.3
18	PST-R0DS	Creep	5.4	4.3	5.3	5.0	5.3	6.0	7.0
19	Capri	Colonial	4.8	3.0	3.7	8.0	3.0	3.7	6.7
20	Penncross	Creep	3.4	6.7	4.3	3.7	3.0	1.0	1.0
	LSD at 5%=		0.7	1.7	2.7	1.6	2.1	1.9	1.8

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality
[2]Turf Establishment rated on a 1 to 9 scale, where 9 = earliest turf canopy establishment
[3]Brown patch disease rated on a 1 to 9 scale, where 9 = best disease resistance
[4]Dollar spot disease rated on a 1 to 9 scale, where 9 = best disease resistance
[5]Genetic color rated on a 1 to 9 scale, where 9 = greenest turf color
[6]Turf density rated on a 1 to 9 scale, where 9 = greatest turf density
[7]Leaf texture rated on a 1 to 9 scale, where 9 = most fine leaf texture

Table 10. Performance of creeping bentgrass cultivars and selections in a putting green trial seeded in September 2020 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2021	Turf Establishment[2] Oct. 2020	Brown Patch[3] Aug. 2021
1	FEM Comp	8.0	4.3	7.0
2	GHE Comp	7.8	4.0	7.7
3	VNP Comp	7.8	3.7	6.3
4	PST-OR20	7.5	5.0	5.3
5	Match Play	7.4	7.3	4.7
6	007XL	7.4	5.3	7.3
7	Oakley	7.4	4.7	6.7
8	Chinook	7.3	7.0	5.7
9	Spectrum	7.3	4.7	7.0
10	Coho	7.2	6.0	5.0
11	Pure Eclipse	7.2	5.7	7.0
12	PFL Comp	7.0	3.7	6.7
13	Macdonald	7.0	6.0	6.7
14	SMG Comp	7.0	2.3	6.0
15	Piranha	6.9	6.3	7.3
16	FMM Comp	6.9	3.3	7.7
17	PST-R0DS	6.9	4.0	5.7
18	L-93XD	6.9	6.7	6.0
19	Piper	6.9	3.7	6.0
20	AP23	6.8	7.0	5.0
21	Luminary	6.7	7.0	7.3
22	777	6.6	6.7	7.0
23	HSN Comp	6.6	3.3	6.7
24	PST-0MRN	6.5	4.0	5.0
25	PFM Comp	6.5	3.0	6.0
26	TourPro	6.4	5.7	6.0
27	Luminary	6.4	5.7	7.0
28	Barracuda	6.3	5.3	7.7
29	Shark	6.2	5.0	7.0
30	Pure Distinction	6.2	5.3	5.0
31	S1	6.2	6.3	5.0
32	DLFPS-AP-3084	6.2	4.7	5.7
33	LPD Comp	6.0	2.0	7.0
34	Pure Select	6.0	5.0	5.7
35	Proclamation	5.9	6.0	5.7

(Continued)

Table 10. Performance of creeping bentgrass cultivars and selections in a putting green trial seeded in September 2020 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2021	Turf Establishment[2] Oct. 2020	Brown Patch[3] Aug. 2021
36	007	5.9	5.7	6.7
37	Independence	5.6	3.7	4.7
38	PST-Syn-0R17E	5.4	3.0	4.3
39	Declaration	5.3	6.7	4.7
40	Focus	5.0	4.7	5.7
41	CenterCut 2	5.0	3.7	6.3
42	Runner	5.0	3.0	5.7
43	Flagstick	4.8	4.7	5.0
44	CenterCut 3	4.7	5.7	4.0
45	Armor	4.7	5.0	4.0
46	Ninety-Six Two	4.7	5.3	4.3
47	Memorial	4.6	6.3	4.3
48	CY-2	4.6	3.3	5.0
49	Cobra 2	4.6	4.7	2.7
50	Mackenzie	4.5	6.0	3.3
51	CenterCut	4.4	7.7	5.0
52	T-1	4.4	4.3	4.7
53	Kingpin	4.1	4.0	4.0
54	SR 1119	3.8	5.3	3.7
55	Tyee	3.7	5.3	4.7
56	V8	3.5	4.7	4.0
57	Alpha	3.4	6.0	4.0
58	Penncross	2.8	6.0	3.0
59	Penn A-4	2.7	1.3	3.3
	LSD at 5%=	1.0	1.6	2.7

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

[2]Turf establishment rated on a 1 to 9 scale, where 9 = earliest turf canopy establishment

[3]Brown Patch disease rated on a 1 to 9 scale, where 9 = best disease resistance

Table 11. Performance of velvet bentgrass cultivars and selections in a putting green trial seeded in September 2020 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2021	Turf Establishment[2] Oct 2020
1	WWV Comp	8.2	9.0
2	WWL Comp	7.5	8.7
3	PPG-AC 103	7.4	8.3
4	PPG-AC 102	7.4	8.7
5	VPL Comp	7.1	8.0
6	Vitagreen	6.7	9.0
7	Villa	6.0	9.0
8	Legendary	5.5	5.7
	LSD at 5%=	0.6	1.0

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

[2]Turf establishment rated on a 1 to 9 scale, where 9 = earliest turf canopy establishment

Table 12. Performance of creeping and colonial bentgrass cultivars and selections in a fairway trial seeded in September 2020 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2021	Turf Establishment[2] October 2020	Brown Patch[3] July 2021
		CREEPING BENTGRASS		
1	Spectrum	7.5	6.7	8.3
2	GHE Comp	7.1	5.0	7.3
3	Coho	6.9	7.0	8.3
4	Oakley	6.7	5.0	8.3
5	HSN Comp	6.7	5.0	8.0
6	Piranha	6.6	7.0	7.3
7	Chinook	6.6	7.7	6.7
8	FEM Comp	6.6	4.3	8.3
9	AP23	6.5	7.0	6.3
10	Piper	6.5	5.3	7.7
11	FMM Comp	6.3	4.7	8.0
12	Luminary	6.3	7.0	6.7
13	PST-0HR	6.2	5.0	7.7
14	VNP Comp	6.2	4.0	8.3
15	L-93XD	6.1	6.3	5.7
16	PFL Comp	6.1	4.0	7.7
17	PFM Comp	6.1	3.7	7.0
18	S1	6.1	6.7	7.3
19	Match Play	5.9	5.3	6.7
20	777	5.8	6.3	5.0
21	Pure Select	5.8	6.0	6.0
22	Shark	5.7	5.7	4.7
23	LPD Comp	5.7	4.0	6.3
24	Barracuda	5.6	6.0	7.0
25	Declaration	5.6	7.0	4.0
26	SMG Comp	5.5	3.7	8.0
27	PST-0DSF	5.2	5.7	6.3
28	007	5.2	6.0	5.0
29	Armor	4.5	5.3	3.7
30	PC2.0	4.5	6.0	3.7
31	Flagstick	4.5	5.0	5.0
32	Memorial	4.3	5.0	4.7
33	T-1	4.3	6.0	3.7
34	Alpha	3.7	6.3	4.3
35	V8	3.0	5.7	3.3

(Continued)

Table 12. Performance of creeping and colonial bentgrass cultivars and selections in a fairway trial seeded in September 2020 at North Brunswick, NJ.

	Cultivar or Selection	Turf Quality[1] 2021	Turf Establishment[2] October 2020	Brown Patch[3] July 2021
		CREEPING BENTGRASS (continued)		
36	Penncross	2.8	7.0	2.0
	LSD at 5%=	0.7	1.3	2.3
		COLONIAL BENTGRASS		
1	PPG-AT 106	6.7	5.7	3.7
2	PST-9BP	6.7	6.0	4.0
3	DMM Comp	6.5	4.7	6.0
4	DEM Comp	6.0	5.3	5.0
5	Heritage	5.9	7.0	4.7
6	DDL Comp	5.9	3.3	6.7
7	Musket	5.7	6.0	3.7
8	AT 12 M2 (3026)	5.4	5.3	3.0
9	FT12	5.2	5.0	3.0
10	UWL Comp	5.1	4.0	5.7
11	Capri	4.9	5.7	2.3
12	USD Comp	4.8	3.3	4.0
13	AT 18 B	4.8	5.7	1.3
14	DDM Comp	4.6	3.0	5.0
15	PSD Comp	4.6	3.7	5.3
16	Tiger 2	4.3	5.3	2.0
17	Puritan	4.3	4.3	3.0
18	Greentime	4.1	4.7	2.7
19	Glory	3.6	5.3	2.0
20	SR 7100	2.0	2.7	2.0
21	Golfstar	1.3	1.0	5.3
	LSD at 5%=	1.3	1.0	1.9

[1]Turf quality rated on a 1 to 9 scale, where 9 = best turf quality

[2]Turf establishment rated on a 1 to 9 scale, where 9 = earliest turf canopy establishment

[3]Brown Patch disease rated on a 1 to 9 scale, where 9 = best disease resistance

Table 13. Maintenance practices performed in 2021 bentgrass trials at North Brunswick, NJ.

Test (Table)	Fertility[1]	Mowing Ht (inches)	Cultivation/Top Dress	Fungicides	Insecticides	Herbicides
2017 Greens (Table 1)	3.025 N; 0.675b P_2O_5; 0.945 K_2O	0.110	May-Jul – Topdressed	May - Arena 50WDG	Jun - Provaunt (turf caterpillars)	None
			May-Jul - Tricure AD (wetting agent)	Jul - Fore 80WP	Jul - Acelepryn (turf caterpillars)	
				Aug - Formec 80 + Exteris Stressgard		
2017 Velvet Greens (Table 2)	3.025 N; 0.675b P_2O_5; 0.945 K_2O	0.110	May-Jul – Topdressed	May - Arena 50WDG	Jun - Provaunt (turf caterpillars)	None
			May-Jul - Tricure AD (wetting agent)	Jul - Fore 80WP	Jul - Acelepryn (turf caterpillars)	
2018 Greens (Table 3)	1.625 N; 0.075 lb P_2O_5; 0.344 K_2O	0.110	May-Oct – Topdressed	Jul - Fore 80WP + Subdue Maxx	Jul - Acelepryn (turf caterpillars)	Jun - Trimmit SC (Poa annua)
			Jun - Tricure AD (wetting agent)	Aug - Pegasus 6L + Insignia SC + Segway		
2018 Velvet Greens (Table 4)	1.425 N; 0.175 lb P_2O_5; 0.444 K_2O	0.110	May-Oct – Topdressed	Jul - Fore 80WP + Subdue Maxx	May, Jul - Acelepryn (turf caterpillars)	None
			May, Jun - Tricure AD (wetting agent)			
2018 Greens (Table 5)	1.525 N; 0.025 lb P_2O_5; 0.275 K_2O	0.375	Jun, Jul - Tricure AD (wetting agent)	Jul - Fore 80WP + Subdue Maxx	None	Jun - Trimmit SC (Poa annua)
						Aug - Acclaim Extra (post-crabgrass)
2019 Greens I (Table 6)	1.625 N; 0.175 lb P_2O_5; 0.444 K_2O	0.110	May-Oct – Topdressed	Jul - Fore 80WP	Jul - Acelepryn (turf caterpillars)	None
			May-Jul - Tricure AD (wetting agent)	Aug - Formec 80; Pegasus 6L + Insignia SC + Segway		

(Continued)

Table 13. Maintenance practices performed in 2021 bentgrass trials at North Brunswick, NJ.

Test (Table)	Fertility[1]	Mowing Ht (inches)	Cultivation/Top Dress	Fungicides	Insecticides	Herbicides
2019 Fairway (Table 7)	1.025 N; 0.025 lb P_2O_5; 0.294 K_2O	0.375	Jun, Jul - Tricure AD (wetting agent)	Jun, Jul - Segway	Jul - Acelepryn (turf caterpillars)	May - Lontrel (post-emerge)
			Jun - Lime	Aug - 26GT + Insignia SC		
				Sep - Secure + Insignia SC; Maxtima		
2020 NTEP Greens (Table 8)	4.1625 N; 0.7625 lb P_2O_5; 1.0315 K_2O; 4 fl. oz. Harrell's MAX Minors; 3 fl oz. Mg 4%; 2 fl oz. Sugar Cal 10%	0.110	Apr-Oct – Topdressed	May - Arena 50WDG	Jul - Acelepryn (turf caterpillars)	Jun, Jul - Trimmit SC (Poa annua)
			Jun, Jul - Tricure AD (wetting agent)	Aug - Segway	Sep - Bisect L (turf insects)	
			Mar, Aug - solid tine aeration	Sep - Secure + Insignia SC		
2020 NTEP Fairway (Table 9)	3.25 N; 0.3 lb P_2O_5; 0.569 K_2O; 2 fl. oz. Sugar Cal 10%	0.375	May, Jun - Tricure AD (wetting agent)	Jul - Segway; Daconil Ultrex	Jul - Acelepryn (turf caterpillars)	May, Jun - Trimmit SC (Poa annua)
			Jul, Aug - solid tine aeration	Aug - Segway		
				Sep - Maxtima		
2020 Greens I (Table 10)	4.1625 N; 0.7625 lb P_2O_5; 1.0315 K_2O; 4 fl. oz. Harrell's MAX Minors; 3 fl oz. Mg 4%; 2 fl oz. Sugar Cal 10%	0.110	Apr-Oct – Topdressed	May - Arena 50WDG	Jul - Acelepryn (turf caterpillars)	Jun, Jul - Trimmit SC (Poa annua)
			Mar, Aug - solid tine aeration	Aug - Segway		
			Jun, Jul - Tricure AD (wetting agent)	Sep - Secure + Insignia SC		

(Continued)

Table 13. Maintenance practices performed in 2021 bentgrass trials at North Brunswick, NJ.

Test (Table)	Fertility[1]	Mowing Ht (inches)	Cultivation/Top Dress	Fungicides	Insecticides	Herbicides
2020 Velvet Greens (Table 11)	3.8375 N; 0.3375 lb P_2O_5; 0.6065 K_2O; 2 fl. oz. Sugar Cal 10%	0.110	Apr-Oct – Topdressed	Jul, Aug - Segway	Jul - Acelepryn (turf caterpillars)	May, Jun - Trimmit SC (Poa annua)
			May-Jul - Tricure AD (wetting agent)			
2020 Fairway (Table 12)	2.35 N; 0.15 lb P_2O_5; 0.419 K_2O	0.375	May-Jul - Tricure AD (wetting agent)	Jul - Segway; PosterityXT + Pegasus 6L + Banol	Jul - Acelepryn (turf caterpillars)	May, Jun - Trimmit SC (Poa annua)
				Aug - Segway		Aug - Lontrel (post-emerge); Acclaim Extra (post-crab-grass)

[1]Annual nitrogen applied (lbs per 1000 ft^2). Additional fertilizers as noted (per 1000 ft^2).