

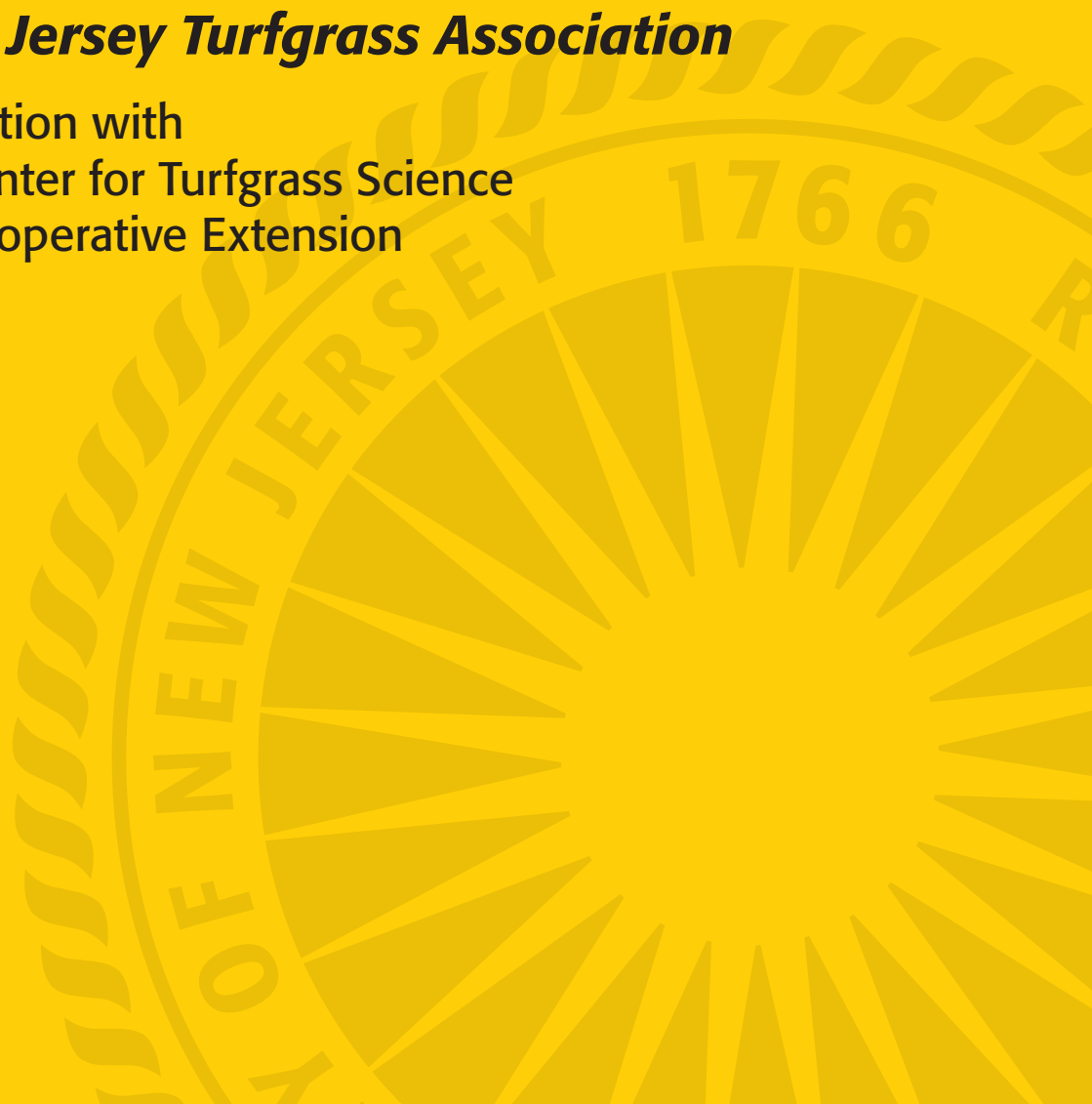
RUTGERS

New Jersey Agricultural
Experiment Station

2017 Turfgrass Proceedings

The New Jersey Turfgrass Association

In Cooperation with
Rutgers Center for Turfgrass Science
Rutgers Cooperative Extension



2017 RUTGERS TURFGRASS PROCEEDINGS

of the

GREEN EXPO Turf and Landscape Conference

December 5-7, 2017

Borgata Hotel

Atlantic City, New Jersey

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 2017 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.

Special thanks are given to those who have submitted papers for this proceedings, to the New Jersey Turfgrass Association for financial assistance, and to Barbara Fitzgerald and Anne Diglio for administrative and secretarial support.

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

PERFORMANCE OF PERENNIAL RYEGRASS CULTIVARS AND SELECTIONS IN NEW JERSEY TURF TRIALS, 2017

Phillip L. Vines, Ronald F. Bara, Dirk A. Smith, Melissa M. Mohr, Yuanshuo Qu,
Ryan M. Daddio, Austin L. Grimshaw, Trent M. Tate, Stacy A. Bonos, and William A. Meyer¹

Perennial ryegrass (*Lolium perenne* L.) is a bunch-type, cool-season perennial grass native to temperate regions of Asia, North Africa, and Europe (Beard, 1973; Terrell, 1968). The species has been introduced to all parts of the world and, with exception of Antarctica, is grown on every continent (Thorogood, 2003). Perennial ryegrass is a rapidly germinating species that grows in alkaline and acidic soils with a pH range of 5.1 to 8.4, but it thrives in moist, well-drained soils at a pH near 6.5 (Beard, 1973; Funk and Clarke, 1989; Thorogood, 2003). In mild climates, perennial ryegrass is managed as a permanent turfgrass in parks, golf fairways and roughs, athletic fields, racetracks, and general landscaping areas (Beard, 1973; Beard and Beard, 2005; Thorogood, 2003). In lower latitudes, the species is used to overseed warm-season turf during periods of winter dormancy (Beard and Beard, 2005; Thorogood, 2003; Turgeon, 2008). Perennial ryegrass is also grown in less-heavily managed areas such as roadsides (Beard and Beard, 2005).

Perennial ryegrass is susceptible to a number of fungal and Oomycete diseases (Bonos and Huff, 2013; Bonos et al., 2006; Thorogood, 2003). To date, disease-related breeding efforts of perennial ryegrass have primarily been directed toward improving resistance to gray leaf spot (caused by *Pyricularia grisea*), stem rust (*Puccinia graminis* subsp. *graminicola*), crown rust (*Puccinia coronata*), and dollar spot (*Clari Reedia homoeocarpa*, formerly known as *Sclerotinia homoeocarpa*) (Bonos and Huff, 2013; Bonos et al., 2006; Salgado-Salazar et al., 2018). Additional diseases affecting perennial ryegrass include anthracnose (*Colletotrichum cereale*), brown patch (*Rhizoctonia solani*), Pythium blight, and red thread

(*Laetisaria fuciformis*) (Bonos et al., 2006; Smiley et al., 2005).

The Rutgers University turfgrass breeding program at the New Jersey Agriculture Experiment Station (NJAES) is the largest breeding program for cool-season turfgrasses in the world (Honig, 2011). Thorogood (2003) referenced the NJAES-based program as the most effective perennial ryegrass breeding program in the United States. The program was started in 1961 and 'Manhattan', a landmark perennial ryegrass cultivar, was released a short time later (in 1967) (Funk et al., 1969; Funk and Meyer, 2001). By 2010, the turfgrass breeding program had flourished to release more than 400 turf cultivars (Honig, 2011).

For many years, the NJAES turfgrass breeding program was based on a relatively small sampling of the total perennial ryegrass germplasm worldwide (Thorogood, 2003). However, in 1996, turf breeders from the program began collecting diverse germplasm from various countries across Europe and Asia to diversify and improve the germplasm base of the species at the NJAES; more than 15,000 new germplasm sources have been collected as of 2010 (Bonos et al., 2004; Honig, 2011). Collected perennial ryegrass germplasm potentially harbors desirable traits that, once identified, can be introduced into elite NJAES perennial ryegrass germplasm via population improvement techniques (Bonos et al., 2004).

Objectives for perennial ryegrass breeding programs are dependent upon intended applications and locations of usage (Thorogood, 2003). In general, breeders select for improvements in turf appearance and growth habit, increased disease resistance,

¹Graduate Assistant, Laboratory Researcher II, Principal Laboratory Technician, Field Researcher IV, Graduate Assistant, Graduate Assistant, Laboratory Researcher IV, Field Researcher IV, Research Professor, and Research Professor, respectively, New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State University of New Jersey, New Brunswick, NJ 08901-8520.

higher grain yields, and enhanced tolerance to abiotic and environmental stresses (Bonos and Huff, 2013; Thorogood, 2003).

PROCEDURES

Five perennial ryegrass trials were seeded from 2014 to 2016 at the Rutgers Plant Science Research and Extension Farm in Adelphia, NJ. One trial was established in 2014 (Table 1), three trials were established in 2015 (Tables 2 to 4), and one trial was established in 2016 (Table 5). The trials were hand sown with 0.88 oz of seed into 3 x 5 ft plots (3.7 lb seed per 1000 ft²) and arranged in a randomized complete block design with three replications. A 6-inch unseeded border was left between plots to limit contamination.

Dimension (dithiopyr) was applied to all perennial ryegrass trials in April and June for control of crabgrass (*Digitaria* spp.). Fusilade (fluazifop-P-butyl), Topeka (dicamba, dimethylamine salt), and Weedar 64 (2,4-D) were applied to all trials in June for control of grassy and broadleaf weeds. Grubs were controlled with an application of Merit (imidacloprid) in June. Additionally, Tenacity (mesotrione) and Segway (cyazofamid) were applied to all trials in late summer for control of grassy weeds and *Pythium*, respectively.

The annual rate of nitrogen (N) and mowing height for each trial are presented in Table 6. Single fertilizer applications did not exceed 1.0 lb N per 1000 ft². The amount and timing of N applied to the turf varied to encourage diseases and other stresses. Trials were mowed regularly with reel mowers to maintain 1.5-inch height of cut. All trials were irrigated when necessary to avoid drought stress.

During the growing season, perennial ryegrass trials were evaluated monthly for visual turf quality (i.e., overall appearance, turf color, uniformity, density, mowing quality, reduced rate of vertical growth, leaf texture, and damage due to insects and diseases). In addition, dollar spot and gray leaf spot were rated when the diseases were present. Ratings were based on a 1 to 9 scale, where 9 represented the most desirable turf characteristics. All data were summarized and subjected to an analysis of variance. Means were separated using Fisher's protected least significant difference (LSD) mean separation test.

RESULTS AND DISCUSSION

Results for all trials are presented in Tables 1 to 5. Results in Tables 1 to 4 are ranked by overall turf quality average; entries in Tables 5 are ranked by turf quality in 2017. A high quality average is generally indicative of better disease resistance, a darker, bright green color, higher shoot density, uniformity, finer leaf texture, lower growth habit, improved mowing quality, and less damage due to insects.

Turf Quality

Perennial ryegrass has become a very popular species for home lawns, athletic fields, golf courses, and for overseeding purposes. Substantial improvements have been made to the overall turf quality of perennial ryegrass since the release of the first turf-type cultivars in the late 1960s (Huff, 1997). In the 2014 perennial ryegrass trial (Table 1), APR9709, PL5 Comp, Xcellerator, Seabisquit, and APR9707 had the highest turf quality, while PG6-14-R1, Double-Up GLS, and PST-3IP had the lowest turf quality. In the 2015 trial (Table 2), PPG-PR-315, PPG-PR-307-C, PPG-PR-344, PPG-PR-363, PPG-PR-372 had the highest quality, while PST-2TETS, PST-2M20, Academy III, and 3984 had the lowest turf quality. In the 2015 trial (Table 3), FP6 Comp, NP2, and Shield had the highest turf quality, while Replay, Goalkeeper II, Caddieshack II, Palmer III, and Sunrise had the lowest turf quality. In the second 2015 trial (Table 4), PPG-PR-319, PPG-PR-307-C, PPG-PR-315, PPG-PR-305-C, PPG-PR-344 had the highest turf quality, while PST-3IP, Presidio, and Divine had the lowest turf quality. In the third 2016 trial (Table 5), PPG-PR-243, Furlong, PST-2CPR-BS, and PST-2MAY had the highest turf quality, while Double-Up GLS, Royal Green, and LLP-473 had the lowest turf quality.

Dollar Spot

Dollar spot is a widespread turfgrass disease that causes silver-dollar shaped spots of dead turf (Smiley et al., 2005). On perennial ryegrass and other taller turfs, dollar spot infections may expand and coalesce, leading to larger areas of damaged turf. In the 2015 trials (Tables 3, 4), FP6 Comp, NP2, Shield, 022 Comp, PL5 Comp, PPG-PR-319, PPG-PR-307-C, PPG-PR-315, PPG-PR-305-C, PPG-PR-344, PPG-PR-326, and PST-2A12 were the highest performers, while Replay, Goalkeeper II, Caddieshack II, Palver

III, Sunrise, PST-3IP, Presidio, Divine, Cascadia, Prominent, and Play Fast were the lowest performers.

Gray Leaf Spot

Gray leaf spot is an important disease that can cause a leaf blight that kills perennial ryegrass seedlings. Leaves are usually distorted and twisted at the point of infection, forming a characteristic 'J-shaped' leaf blade. Gray leaf spot is prevalent during extended periods of high relative humidity and warm temperatures. In the 2016 trial (Table 5), PRC6 Comp, 023 BS, Benchmark, Black Pearl, New Sealand, and Prominent were the highest performers, while PST-2FLAT/2BFD, 8951, PST-2FLTE Bulk, Provost, PRC3 Comp, and PRC5 Comp were the lowest performers.

SUMMARY

Turf type perennial ryegrass cultivars are some of the most versatile grasses available on the market today. The high traffic tolerance, rapid establishment, and dark green color of these cultivars are extremely important traits that are in high demand in the turfgrass seed industry. Although considerable improvements have been made to perennial ryegrasses, increased genetically stable resistance to diseases such as crown rust is still needed. Additionally, increased heat and drought tolerance, cold hardiness, salinity tolerance, and the ability to survive under ice sheets for extended periods are also necessary.

ACKNOWLEDGMENTS

New Jersey Agricultural Experiment Station Publication No. E 12194-04-18. This work was conducted as a part of NJAES Project No. 12180, supported by New Agricultural Experiment Station, State and Hatch Act funds, the Rutgers Center for Turfgrass Science, and other grants and gifts from the United States Golf Association. Additional support was received by the New Jersey Turfgrass Association, the New Jersey Turfgrass Foundation, and the National Turfgrass Evaluation Program.

REFERENCES

Beard, J.B. 1973. Turfgrass: Science and Culture. Prentice Hall, Englewood Cliffs, NJ.

Beard, J.B., and H.J. Beard. 2005. Beard's Turfgrass Encyclopedia for Golf Courses, Grounds, Lawns, Sports Fields. Michigan State University Press.

Bonos, S.A., and D.R. Huff. 2013. Cool-season grasses: Biology and breeding. Pages 591-660 *in*: J. C. Stier, B. P. Horgan, and S. A. Bonos, eds., Turfgrass: Biology, Use, and Management. ASA, CSSA, and SSSA, Madison, WI.

Bonos, S.A., B.B. Clarke, and W.A. Meyer. 2006. Breeding for disease resistance in the major cool-season turfgrasses. Annual Review of Phytopathology 44:213-234.

Bonos, S.A., C. Kubik, B.B. Clarke, and W.A. Meyer. 2004. Breeding perennial ryegrass for resistance to gray leaf spot. Crop Science 44: 575-580.

Funk, C.R., and B.B. Clarke. 1989. Turfgrass breeding – with special reference to turf-type perennial ryegrass, tall fescue, and endophytes. Pages 3-10 *in*: H. Takotoh, ed., Proceedings of the 6th International Turfgrass Research Conference, Tokyo, Japan. 31 July-5 August.

Funk, C.R., and W.A. Meyer. 2001. 70 years of turfgrass improvement at the New Jersey Agricultural Experiment Station: The Garden State's Rutgers University has long been in the forefront of turfgrass development. USGA Green Section Record 39:19-23.

Funk, C.R., R.E. Engel, and P.M. Halisky. 1969. Registration of 'Manhattan' perennial ryegrass. Crop Science 9:679-680.

Honig, J.A. 2011. The use of molecular genetics tools to complement a traditional field based turfgrass breeding program. Doctoral dissertation, Rutgers, The State Univ. of New Jersey-New Brunswick.

Huff, D.R. 1997. RAPD characterization of heterogeneous perennial ryegrass cultivars. Crop. Sci. 37:557-564.

Salgado-Salazar, C., Beirn, L.A., Ismaiel, A., Boehm, M.J., Carbone, I., Putman, A.I., Tredway, L.P., Clarke, B.B., and Crouch, J.A. 2018. *Clarireedia*: A new fungal genus comprising four pathogenic species responsible for dollar spot of turfgrass. Fungal Biology. <https://doi.org/10.1016/j.funbio.2018.04.004>

Smiley, R.W., P.H. Dernoeden, and B.B. Clarke. 2005. Compendium of Turfgrass Diseases, 3rd. APS Press, St. Paul, MN.

Terrell, E.E. 1968. A taxonomic revision of the genus *Lolium*. Technical Bulletin No. 1392. United States Department of Agriculture, Washington, D.C.

Thorogood, D. 2003. Perennial ryegrass (*Lolium perenne* L.). Pages 75-106 *in*: M. D. Casler and R. R. Duncan, eds., Turfgrass Biology, Genetics, and Breeding. John Wiley and Sons, Hoboken, NJ.

Turgeon, A.J. 2008. Turfgrass management, 8th. Pearson Prentice Hall, Upper Saddle River, NJ

Table 1. Performance of Perennial ryegrass cultivars and selections in a turf trial seeded in September 2014 at Adelphia, NJ.

	Cultivar or Selection	-----Turf Quality ¹ -----			
		2015-2017 Avg.	2015 Avg.	2016 Avg.	2017 Avg.
1	APR9709	5.1	5.0	5.2	5.2
2	PL5 Comp	5.0	5.2	4.7	5.2
3	Xcellerator	5.0	4.9	5.0	5.0
4	Seabisquit	5.0	4.5	5.3	5.1
5	APR9707	4.9	4.8	5.2	4.9
6	RAD-PR84	4.8	4.9	4.8	4.8
7	021 Comp	4.8	4.4	4.8	5.2
8	APR9702	4.8	4.6	4.7	5.0
9	PG3-14-R2	4.8	4.8	4.6	5.0
10	PPG-PR 228	4.8	4.5	5.0	4.9
11	PG3-14-R10	4.8	4.8	4.7	4.9
12	PG3-14-R7	4.8	4.5	4.6	5.2
13	PG3-14-R4	4.7	4.7	4.9	4.7
14	NP3	4.7	4.6	4.9	4.7
15	PG3-14-R1	4.7	4.7	4.7	4.8
16	Grand Slam	4.7	4.5	4.9	4.7
17	Premium	4.7	4.6	4.6	4.8
18	CP-68	4.7	4.3	5.0	4.6
19	TB-C13-R8	4.7	4.8	4.7	4.5
20	PG3-14-R9	4.7	4.3	5.0	4.7
21	NP2	4.6	4.8	4.6	4.5
22	PST-2LTD	4.6	4.9	4.7	4.3
23	PPG-PR 229	4.6	4.5	4.5	4.9
24	Evolution	4.6	5.0	4.5	4.4
25	Rinovo	4.6	4.8	4.4	4.6
26	PST-Syn-2SUR4	4.6	4.3	4.7	4.8
27	PST-2BDT	4.6	5.0	4.5	4.3
28	NP1	4.6	4.0	4.9	4.8
29	Salinas II	4.6	4.8	4.5	4.4
30	APR9703	4.5	4.5	4.6	4.6
31	PG3-14-R6	4.5	4.5	4.7	4.5
32	CT-7	4.5	4.4	4.6	4.7
33	PPG-PR 270	4.5	4.8	4.6	4.3
34	RAD-PR86	4.5	4.9	4.7	4.0
35	APR9708	4.5	4.4	4.6	4.5

(Continued)

Table 1. Perennial ryegrass turf trial, 2014 (continued).

	Cultivar or Selection	-----Turf Quality ¹ -----			
		2015-2017 Avg.	2015 Avg.	2016 Avg.	2017 Avg.
36	PPG-PR 231	4.5	4.6	4.4	4.4
37	Stellar 3GL	4.5	4.5	4.6	4.4
38	PPG-PR 232	4.5	4.6	4.5	4.4
39	Benchmark	4.5	4.3	4.4	4.8
40	Gray Hawk	4.5	4.6	4.6	4.1
41	PPG-PR 301	4.4	4.6	4.4	4.3
42	Syn-2FOX-13	4.4	4.7	4.2	4.4
43	PST-2SURV	4.4	4.6	4.6	4.1
44	PPG-PR 300	4.4	4.9	4.1	4.3
45	HE 231 63432-14	4.4	4.6	4.4	4.2
46	Silver Sun	4.4	4.2	4.3	4.6
47	PST-2SHRP	4.4	4.7	4.4	4.2
48	RAD-PR79	4.4	5.0	4.3	3.9
49	PST-2A12	4.4	4.1	4.3	4.7
50	Expedite	4.4	4.7	4.1	4.3
51	Molalla	4.4	4.5	4.4	4.2
52	PPG-PR 289	4.4	4.5	4.4	4.2
53	PPG-PR 234	4.3	4.5	4.1	4.4
54	PG3-14-R8	4.3	4.3	4.6	4.1
55	Tailgater	4.3	4.1	4.2	4.5
56	PPG-PR 271	4.3	4.4	4.2	4.2
57	APR9701	4.3	4.4	4.6	3.9
58	PPG-PR 268	4.3	4.1	4.3	4.5
59	PST-2PDA	4.3	4.2	4.6	4.1
60	PPG-PR 233	4.3	4.3	4.1	4.3
61	Fastball RGL	4.2	4.1	4.1	4.6
62	PPG-PR 238	4.2	4.1	4.5	4.1
63	Top Gun II	4.2	4.1	4.1	4.4
64	PST-2DR9	4.2	4.4	4.2	4.0
65	PST-2TFC	4.2	4.3	4.3	4.0
66	PG3-14-R5	4.2	4.0	4.4	4.2
67	Pangea	4.1	4.6	4.0	3.8
68	Pizzazz II	4.1	4.2	4.0	4.2
69	Sox Fan	4.1	3.8	4.2	4.3
70	PPG-PR 230	4.1	4.3	4.2	3.8

(Continued)

Table 1. Perennial ryegrass turf trial, 2014 (continued).

	Cultivar or Selection	-----Turf Quality ¹ -----			
		2015-2017 Avg.	2015 Avg.	2016 Avg.	2017 Avg.
71	Amazing A+	4.1	4.0	4.1	4.1
72	Home Run	4.1	4.0	4.1	4.2
73	Pistol	4.1	4.2	4.2	3.9
74	Pacific Gem	4.1	4.1	4.1	4.0
75	Dominator	4.1	4.3	4.1	3.9
76	Monterey 4	4.1	4.1	4.1	4.0
77	Apple SGL	4.0	3.9	4.0	4.2
78	Green Supreme	4.0	4.0	4.0	4.1
79	APR9712	4.0	3.9	4.0	4.1
80	Panther GLS	4.0	4.4	3.8	3.8
81	PUS Comp	4.0	3.6	4.1	4.3
82	Accent II	4.0	4.0	4.0	4.0
83	PST-Syn-2MAS	4.0	4.5	3.9	3.6
84	TB-43-2-R6	4.0	4.1	4.0	3.8
85	Ruckus	3.9	4.2	3.7	3.9
86	MSP 4011	3.9	4.1	4.1	3.7
87	Manhattan 5 GLR	3.9	4.0	4.1	3.7
88	SMP Comp	3.9	4.0	4.0	3.8
89	APR2291	3.9	4.7	3.5	3.5
90	Quicksilver	3.9	4.0	3.7	4.0
91	APR9710	3.9	4.1	3.7	3.8
92	Exacta II	3.9	4.0	4.0	3.7
93	PPG-PR 282	3.9	4.0	3.7	4.0
94	Protégé GLR	3.9	4.0	3.9	3.7
95	La Quinta	3.9	3.8	3.9	3.9
96	Estelle	3.9	4.3	4.0	3.3
97	PG3-14-R3	3.9	4.3	3.7	3.6
98	GT24	3.8	3.9	3.8	3.9
99	PST-2RDY	3.8	3.6	3.9	4.0
100	Gray Fox	3.8	3.9	3.7	4.0
101	Salinas II	3.8	4.0	3.7	3.8
102	GO-14-PRG-EE	3.8	4.2	3.9	3.3
103	APR9711	3.8	3.9	3.4	4.1
104	Secretariat II	3.8	4.1	3.6	3.7
105	PST-2REB	3.8	3.5	4.0	3.9

(Continued)

Table 1. Perennial ryegrass turf trial, 2014 (continued).

	Cultivar or Selection	-----Turf Quality ¹ -----			
		2015-2017 Avg.	2015 Avg.	2016 Avg.	2017 Avg.
106	Ringles	3.8	4.1	3.9	3.4
107	Panther H2O	3.8	4.2	3.5	3.6
108	Manhattan 6 GLR	3.8	4.3	3.5	3.5
109	PPG-PR 283	3.8	4.2	3.7	3.4
110	PPG-PR 237	3.8	4.0	3.6	3.6
111	Arctic Green	3.7	4.1	3.7	3.5
112	Royal Green	3.7	3.5	3.8	3.9
113	Defender	3.7	3.6	4.0	3.6
114	Charismatic II	3.7	3.5	3.9	3.8
115	Soprano	3.7	4.2	3.6	3.4
116	Sunrise	3.7	4.0	3.5	3.6
117	Brightstar SLT	3.7	3.8	3.9	3.4
118	PST-2MAX	3.7	3.8	3.8	3.4
119	Divine	3.7	3.7	3.8	3.6
120	Saltinas	3.7	3.5	3.6	3.9
121	GO-14-PRG-LOW	3.7	3.9	3.7	3.4
122	Green Emperor	3.6	3.9	3.4	3.5
123	Silver Dollar	3.6	3.6	3.7	3.5
124	PG6-14-R2	3.6	3.5	3.5	3.8
125	Palmer III	3.6	3.8	3.5	3.4
126	PG6-14-R3	3.5	3.6	3.5	3.5
127	PPG-PR 272	3.5	3.4	3.4	3.8
128	MSP 4020	3.5	3.9	3.6	3.1
129	Cascadia	3.5	3.8	3.3	3.3
130	PG6-14-R7	3.5	3.6	3.2	3.5
131	APR9705	3.4	3.8	3.4	3.1
132	Revenge GLX	3.4	3.5	3.5	3.3
133	PG6-14-R4	3.4	3.5	3.3	3.5
134	APR2190	3.4	3.3	3.5	3.5
135	APR9706	3.4	3.6	3.4	3.2
136	Sun	3.4	3.6	3.5	3.2
137	PS4	3.4	3.6	3.4	3.3
138	APR2105	3.4	3.6	3.6	3.0
139	PPG-PR 269	3.4	3.8	3.6	2.8
140	APR9704	3.3	3.6	3.2	3.3

(Continued)

Table 1. Perennial ryegrass turf trial, 2014 (continued).

Cultivar or Selection	-----Turf Quality ¹ -----			
	2015-2017 Avg.	2015 Avg.	2016 Avg.	2017 Avg.
141 APR2116	3.3	3.7	3.3	3.0
142 PG6-14-R8	3.3	3.4	3.2	3.4
143 PPG-PR 236	3.3	3.5	3.0	3.5
144 JS501	3.3	3.7	3.4	2.7
145 PG6-14-R5	3.2	3.5	3.2	3.0
146 Replay GLY	3.2	3.5	3.1	2.9
147 PST-2M20	3.1	3.8	2.9	2.8
148 PG6-14-R6	3.0	3.1	2.9	3.0
149 PST-3IP	2.6	3.3	2.7	1.9
150 Double Up GLS	2.6	3.2	2.4	2.2
151 PG6-14-R1	2.5	2.7	2.2	2.5
LSD at 5% =	0.7	0.6	0.8	0.9

¹9 = best turf quality

Table 2. Performance of perennial ryegrass cultivars and selections in a turf trial seeded in September 2015 at Adelphia, NJ.

Cultivar or Selection	-----Turf Quality ¹ -----		
	2016-2017 Avg.	2016 Avg.	2017 Avg.
1 PPG-PR 315	5.4	5.5	5.3
2 PPG-PR 307-C	5.4	5.2	5.5
3 PPG-PR 344	5.3	5.0	5.6
4 PPG-PR 363	5.2	5.1	5.3
5 PPG-PR 372	5.2	5.3	5.1
6 Peridot	5.0	5.0	5.0
7 PPG-PR 349	5.0	5.1	4.8
8 PPG-PR 360	4.9	5.1	4.7
9 NAI-02BS1	4.9	4.5	5.3
10 PPG-PR 306-S	4.9	5.1	4.6
11 PPG-PR 343	4.8	5.0	4.5
12 PPG-PR 353	4.8	4.3	5.2
13 PPG-PR 307-S	4.8	4.6	4.9
14 PPG-PR 352	4.8	4.9	4.7
15 PPG-PR 329	4.7	4.7	4.6
16 Metolius	4.7	4.9	4.4
17 PST-Syn-2FLAT	4.6	4.9	4.3
18 PPG-PR 335	4.6	4.4	4.7
19 PPG-PR 371	4.6	4.8	4.4
20 PST-2A12	4.6	4.5	4.7
21 PPG-PR 348	4.5	4.6	4.4
22 PPG-PR 331	4.5	4.6	4.3
23 Grandslam GLD	4.5	4.7	4.2
24 Estelle	4.4	4.5	4.4
25 PPG-PR 338	4.4	4.6	4.2
26 PST-2LTD	4.4	4.7	4.1
27 PPG-PR 310	4.4	4.6	4.1
28 PPG-PR 318	4.4	4.8	4.0
29 PST-2BDT	4.4	4.5	4.2
30 PPG-PR 309	4.4	4.4	4.3
31 PPG-PR 317	4.4	4.6	4.1
32 Shield	4.3	4.6	4.1
33 PPG-PR 306-C	4.3	4.3	4.3
34 PST-Syn-2EGAD	4.3	4.3	4.3
35 PPG-PR 339	4.3	4.6	4.0

(Continued)

Table 2. Perennial ryegrass turf trial, 2015 (continued).

Cultivar or Selection	-----Turf Quality ¹ -----		
	2016-2017 Avg.	2016 Avg.	2017 Avg.
36 Gray Hawk	4.3	4.1	4.4
37 PST-Syn-2GTD	4.2	4.4	4.1
38 PPG-PR 320	4.2	4.4	4.0
39 PPG-PR 328	4.2	4.4	4.0
40 NAI-8CP68	4.2	4.2	4.2
41 Apple SGL	4.2	4.7	3.6
42 PPG-PR 240	4.2	4.7	3.6
43 PST-2CITM	4.2	4.4	3.9
44 PST-2REB	4.1	4.2	4.1
45 Silver Sun	4.1	4.1	4.1
46 PPG-PR 243	4.1	4.5	3.6
47 PST-2PDA	4.0	3.9	4.2
48 PPG-PR 326	4.0	4.0	4.0
49 3997	4.0	4.2	3.9
50 PPG-PR 342	4.0	4.1	3.9
51 PST-2A2	4.0	4.6	3.4
52 PPG-PR 241	4.0	4.2	3.7
53 Rinovo	4.0	4.2	3.8
54 PPG-PR 229	4.0	4.5	3.4
55 GO-142E	3.9	4.2	3.7
56 NAI-ST432-15	3.9	4.1	3.7
57 NAI-PL2S-15	3.9	4.0	3.9
58 PST-2SURV	3.9	4.2	3.6
59 RKS	3.9	4.4	3.4
60 3976	3.9	4.1	3.7
61 4017	3.9	4.0	3.9
62 Molalla	3.9	3.9	3.8
63 PPG-PR 319	3.9	4.4	3.3
64 Manhattan 6 GLR	3.8	4.0	3.6
65 PPG-PR 350	3.8	4.2	3.3
66 Stellar 3GL	3.8	4.0	3.6
67 GO-143E	3.7	4.0	3.4
68 Double Time GLS	3.7	3.7	3.6
69 PPG-PR 242	3.6	3.8	3.5
70 4030A	3.6	3.8	3.5

(Continued)

Table 2. Perennial ryegrass turf trial, 2015 (continued).

Cultivar or Selection	-----Turf Quality ¹ -----		
	2016-2017 Avg.	2016 Avg.	2017 Avg.
71 GO-144E	3.6	3.9	3.4
72 NAI-PR10-15	3.6	3.6	3.6
73 GO-141E	3.6	4.1	3.1
74 Panther H2O	3.5	3.5	3.5
75 Ringles	3.5	3.7	3.3
76 Home Run	3.5	4.0	3.0
77 Fastball RGL	3.5	4.0	3.0
78 Manhattan 5 GLR	3.5	3.4	3.6
79 PST-2TFC	3.5	3.7	3.2
80 GO-AD	3.5	3.3	3.6
81 Palmer III	3.5	4.0	2.9
82 Sun	3.4	3.5	3.3
83 Pennant H2O	3.4	3.7	3.1
84 Gray Fox	3.4	3.7	3.0
85 4029	3.4	3.3	3.4
86 4031	3.3	3.5	3.1
87 Brightstar SLT	3.2	3.3	3.2
88 Flash II	3.2	3.4	3.1
89 New Sealand	3.2	3.5	2.9
90 Black Cat II	3.2	3.1	3.2
91 NAI-CP-68	3.2	3.3	3.0
92 PST-2SHRP	3.2	3.7	2.6
93 Silver Dollar	3.1	3.4	2.9
94 NAI-6CP68	3.1	3.2	3.0
95 NAI-ALSS-15	3.1	3.0	3.1
96 Double Time	3.1	3.0	3.1
97 Double Up GLS	3.1	3.0	3.1
98 3998	2.8	2.7	2.9
99 Confetti III	2.8	3.1	2.5
100 3984	2.7	2.9	2.4
101 Academy III	2.6	2.8	2.3
102 PST-2M20	2.3	2.5	2.1
103 PST-2TETS	1.2	1.3	1.1
LSD at 5%=	0.9	0.8	1.2

¹9 = best turf quality

Table 3. Performance of perennial ryegrass cultivars and selections in a turf trial seeded in September 2015 at Adelphia, NJ.

Cultivar or Selection	-----Turf Quality ¹ -----		-----Dollar Spot ² -----			
	2016-2017 Avg.	2016 Avg.	2017 Avg.	2017 Avg.		
		High Fertility ³ 19 July 2017	Low Fertility ⁴ 19 July 2017	18 Aug. 2017 Avg.		
1 FP6 Comp	6.7	6.9	6.5	6.3	6.0	6.2
2 NP2	6.5	6.9	6.1	5.0	4.0	4.5
3 Shield	6.4	6.7	6.2	7.0	7.0	7.0
4 022 Comp	5.9	6.4	5.4	5.0	4.3	4.7
5 PL5 Comp	5.8	6.3	5.3	6.0	5.3	5.7
6 NP3	5.8	6.6	5.1	4.0	2.0	3.0
7 02BS1 Comp	5.8	6.1	5.4	5.0	4.0	4.5
8 Overdrive 5G	5.8	6.4	5.1	4.3	4.0	4.2
9 FP3 Comp	5.7	6.0	5.5	5.3	4.3	4.8
10 UF3 Comp	5.7	5.8	5.6	6.0	4.3	5.2
11 021 Comp	5.7	6.3	5.1	4.7	4.7	4.7
12 02BS2 Comp	5.7	6.3	5.2	4.7	4.3	4.5
13 FP1 Comp	5.7	6.0	5.4	5.3	3.3	4.3
14 023 Progeny Comp	5.7	6.3	5.1	4.3	3.3	3.8
15 FP4 Comp	5.6	6.1	5.1	5.7	4.0	4.8
16 NP1	5.6	5.9	5.3	4.7	3.3	4.0
17 FP2 Comp	5.6	6.2	4.9	3.7	2.3	3.0
18 UF4 Comp	5.5	5.9	5.2	5.0	4.0	4.5
19 23	5.5	6.3	4.7	4.7	3.3	4.0
20 UF1 Comp	5.5	5.5	5.5	6.0	6.3	6.2
21 PUS Comp	5.5	6.0	4.9	4.0	4.0	4.0
22 FP5 Comp	5.4	5.5	5.3	5.7	4.0	4.8
23 02BS3 Progeny Comp	5.4	5.9	4.8	4.3	3.3	3.8
24 Umpqua	5.3	5.7	4.9	5.3	2.3	3.8
25 JR-123 (CP2)	5.2	5.6	4.9	5.7	4.3	4.3

(Continued)

Table 3. Perennial ryegrass turf trial, 2015 (continued).

Cultivar or Selection	-----Turf Quality ¹ -----		-----Dollar Spot ² -----			
	2016-2017 Avg.	2016 Avg.	2017 Avg.	High Fertility ³ 19 July 2017	Low Fertility ⁴ 19 July 2017	18 Aug. 2017 Avg.
26 Ruckus	5.2	5.6	4.7	5.3	4.0	4.0
27 USR Comp	5.2	5.7	4.6	5.0	4.0	2.7
28 UF2 Comp	5.1	5.4	4.9	6.0	5.0	3.0
29 Amazing A+	5.1	5.8	4.3	6.3	5.3	3.0
30 Green Supreme	4.8	5.5	4.1	4.7	3.7	3.0
31 Revenge GLX	4.1	4.7	3.6	4.7	4.3	2.7
32 Haven	3.9	4.5	3.2	5.7	5.3	2.7
33 Nexus XD	3.5	3.7	3.2	6.0	5.0	3.7
34 Monterey 4	3.4	3.6	3.2	5.3	5.7	4.0
35 Nexus XR	3.3	3.5	3.2	5.0	5.0	3.3
36 Sunrise	3.0	3.4	2.7	5.3	4.7	3.3
37 Palmer III	2.8	2.9	2.7	5.3	3.3	3.0
38 Caddieshack II	2.8	3.1	2.5	4.7	4.3	1.7
39 Goalkeeper II	2.6	2.6	2.6	6.0	4.3	2.3
40 Replay	2.4	2.8	2.0	5.7	4.0	2.3
LSD at 5% =	0.7	0.8	0.8	1.6	1.2	1.4

¹9 = best turf quality

²9 = least disease

³9 = high fertility; an additional split application of 1 lb nitrogen per 1000 ft² was applied

⁴9 = low fertility; an additional split application of 1 lb nitrogen per 1000 ft² was not applied

Table 4. Performance of perennial ryegrass cultivars and selections in a turf trial seeded in September 2015 at Adelphia, NJ.

Cultivar or Selection	-----Turf Quality ¹ -----		-----Dollar Spot ² -----			
	2016-2017 Avg.	2016 Avg.	2017 Avg.	7 July 2017	20 July 2017	15 Aug. 2017 Avg.
1 PPG-PR 319	5.4	5.7	5.1	8.3	7.3	6.3
2 PPG-PR 307-C	5.3	5.6	5.1	7.0	6.3	5.0
3 PPG-PR 315	5.3	5.6	4.9	8.3	7.3	6.7
4 Shield	5.2	5.3	5.2	8.0	6.3	5.3
5 PPG-PR 344	5.2	5.2	5.2	8.3	7.0	6.3
6 PPG-PR 326	5.1	5.7	4.5	6.3	5.3	3.7
7 PST-2A12	5.1	5.5	4.7	8.0	7.3	6.0
8 PST-Syn-2FXA	5.1	5.3	4.9	9.0	7.7	7.3
9 PPG-PR 318	5.0	5.2	4.9	7.7	6.7	5.0
10 PPG-PR 310	5.0	5.6	4.4	8.3	7.0	6.3
11 PPG-PR 317	5.0	5.4	4.6	6.7	5.7	4.7
12 02BS1	4.9	5.0	4.8	7.3	6.0	4.7
13 PPG-PR 320	4.7	5.2	4.2	7.3	6.0	5.0
14 PPG-PR 241	4.7	5.1	4.3	8.0	7.0	6.3
15 PPG-PR 307-S	4.7	5.2	4.2	8.0	7.7	6.3
16 PPG-PR 352	4.7	5.2	4.1	7.7	6.3	5.3
17 Provost	4.6	4.9	4.3	7.0	5.7	5.0
18 Intense	4.6	4.7	4.5	8.0	6.7	5.7
19 PPG-PR 338	4.6	5.1	4.1	6.7	7.0	5.0
20 Premium	4.5	4.9	4.1	7.0	5.7	3.7
21 Spark	4.5	4.8	4.2	8.7	7.3	7.3
22 PPG-PR 339	4.5	4.9	4.1	8.7	7.0	6.3
23 PPG-PR 306-C	4.5	5.1	3.8	7.0	5.7	4.3
24 PPG-PR 335	4.5	5.1	3.9	7.7	6.0	4.7
25 PST-Syn-2FOXY	4.5	5.0	3.9	6.3	5.3	4.3

(Continued)

Table 4. Perennial ryegrass turf trial, 2015 (continued).

Cultivar or Selection	-----Turf Quality ¹ -----			-----Dollar Spot ² -----		
	2016-2017 Avg.	2016 Avg.	2017 Avg.	7 July 2017	20 July 2017	15 Aug. 2017 Avg.
26 PPG-PR 243	4.4	4.5	4.4	7.3	6.7	5.0
27 PPG-PR 306-S	4.4	5.0	3.8	6.7	5.3	3.7
28 PPG-PR 309	4.4	4.7	4.1	7.7	6.7	5.7
29 Evolution	4.4	4.7	4.1	7.0	6.0	4.0
30 PPG-PR 348	4.3	4.4	4.2	7.3	6.7	5.7
31 PST-2PDA	4.3	4.7	3.9	7.7	6.3	4.7
32 Benchmark	4.3	4.6	4.0	7.7	6.3	5.0
33 Peridot	4.3	4.6	4.0	6.7	6.0	4.0
34 PPG-PR 329	4.3	4.8	3.8	7.7	6.3	4.7
35 Stellar 3GL	4.3	4.8	3.7	7.3	6.7	6.0
36 PPG-PR 350	4.2	4.5	3.9	8.3	7.0	7.0
37 PST-2SURV	4.2	4.2	4.3	7.3	7.0	5.7
38 Manhattan 6 GLR	4.2	4.9	3.5	6.0	5.3	3.0
39 Vision	4.2	4.6	3.8	8.7	7.3	6.3
40 PPG-PR 229	4.2	4.6	3.7	8.3	6.7	6.0
41 CP-68	4.1	3.9	4.4	6.7	6.0	4.3
42 PPG-PR 328	4.1	4.4	3.9	7.7	7.0	4.7
43 Gray Hawk	4.1	4.6	3.6	7.7	6.3	5.0
44 PPG-PR 240	4.1	4.4	3.8	6.7	6.3	4.3
45 PPG-PR 353	4.1	4.3	3.9	7.3	6.3	5.0
46 LCP-186	4.0	4.0	4.1	7.7	6.7	5.0
47 Primary	4.0	4.0	3.9	7.7	6.3	5.7
48 PST-2REB	4.0	4.3	3.7	6.0	5.0	3.0
49 PPG-PR 349	4.0	4.3	3.6	7.3	6.0	5.7
50 PST-2LTD	3.9	3.8	4.1	7.7	6.7	5.3

(Continued)

Table 4. Perennial ryegrass turf trial, 2015 (continued).

Cultivar or Selection	-----Turf Quality ¹ -----		-----Dollar Spot ² -----				
	2016-2017 Avg.	2016 Avg.	2017 Avg.	7 July 2017	20 July 2017	15 Aug. 2017 Avg.	
51 PPG-PR 331	3.8	4.2	3.4	8.0	6.3	4.0	6.1
52 PPG-PR 343	3.8	4.2	3.4	6.0	5.7	4.0	5.2
53 PPG-PR 363	3.8	4.2	3.4	6.7	5.7	3.7	5.3
54 Pistol	3.8	3.7	3.9	7.3	6.3	5.0	6.2
55 Sox Fan	3.8	3.8	3.8	5.7	5.7	3.3	4.9
56 PST-2TFC	3.8	3.8	3.7	7.3	6.0	5.3	6.2
57 Manhattan 5 GLR	3.7	3.9	3.6	6.0	5.3	4.3	5.2
58 PST-2BDT	3.6	4.1	3.1	7.3	6.0	5.0	6.1
59 Tailgater	3.6	3.7	3.5	7.3	5.3	4.7	5.8
60 Defender	3.6	3.8	3.4	7.0	6.3	5.0	6.1
61 Gray Fox	3.6	3.5	3.7	8.7	7.0	6.7	7.4
62 PPG-PR 342	3.6	4.0	3.2	6.0	5.0	3.3	4.8
63 Silver Sun	3.5	3.7	3.3	8.0	7.0	6.3	7.1
64 PPG-PR 242	3.5	4.0	2.9	6.3	5.7	4.7	5.6
65 PST-2DR9	3.5	3.6	3.4	8.0	7.0	5.7	6.9
66 Estelle	3.4	3.4	3.5	8.3	6.7	6.0	7.0
67 Salinas II	3.3	3.0	3.7	8.7	7.3	6.0	7.3
68 Silver Dollar	3.3	3.2	3.4	7.7	6.0	4.3	6.0
69 PST-Syn-2MAS	3.3	3.5	3.0	6.3	5.0	3.0	4.8
70 Molalla	3.1	3.4	2.8	5.3	4.3	3.7	4.4
71 Citation Fore	3.1	2.8	3.3	7.7	6.7	6.0	6.8
72 Dominator	3.1	3.4	2.7	8.3	6.7	6.0	7.0
73 PST-2RDY	3.0	3.2	2.8	5.0	4.0	2.7	3.9
74 PST-2SHRP	2.9	3.1	2.8	7.3	5.7	5.3	6.1
75 Play Fast	2.9	2.7	3.0	7.3	6.0	4.7	6.0

(Continued)

Table 4. Perennial ryegrass turf trial, 2015 (continued).

Cultivar or Selection	-----Turf Quality ¹ -----			-----Dollar Spot ² -----		
	2016-2017 Avg.	2016 Avg.	2017 Avg.	7 July 2017	20 July 2017	15 Aug. 2017 Avg.
76 Prominent	2.8	2.9	2.7	7.7	6.3	6.0
77 Cascadia	2.8	2.8	2.7	8.0	6.3	5.7
78 Divine	2.6	2.2	3.0	8.3	6.7	6.3
79 Presidio	2.5	2.5	2.4	7.0	6.3	5.3
80 PST-3IP	2.1	2.4	1.8	7.0	5.7	3.3
LSD at 5% =	0.9	0.9	1.1	2.4	2.0	2.5

¹9 = best turf quality

²9 = least disease

Table 5. Performance of perennial ryegrass cultivars and selections in a turf trial seeded in August 2016 at Adelphia, NJ.

Cultivar or Selection	Turf Quality ¹ 2017 Avg.	Gray Leaf Spot ² 15 Sept. 2017
1 PPG-PR 243	6.5	7.0
2 Furlong	6.3	3.3
3 PST-2CPR-BS	6.3	6.7
4 PST-2MAY	6.3	6.7
5 PPG-PR 301	6.2	4.7
6 PST-SYN-2DML	6.2	8.7
7 PPG-PR 229	6.2	3.0
8 8951	6.2	2.0
9 LLP-836	6.1	6.3
10 Xcellerator	6.1	2.7
11 PRC2 Comp	6.0	3.3
12 PRC4 Comp	6.0	8.0
13 FCW	6.0	3.3
14 8851	6.0	4.7
15 PRC5 Comp	6.0	2.3
16 PRC6 Comp	6.0	9.0
17 Grand Slam GLD	6.0	3.3
18 Blackstone	6.0	7.3
19 Intense	5.9	5.3
20 PPG-PR 338	5.8	3.7
21 Gray Wolf	5.8	2.7
22 Metolius	5.8	3.7
23 PRC3 Comp	5.8	2.3
24 PST-2FLAT/2BFD	5.8	2.0
25 PPG-PR 342	5.8	5.0
26 PPG-PR372	5.8	5.7
27 023 BS	5.7	9.0
28 Provost	5.7	2.3
29 PPG-PR 304	5.7	5.7
30 PPG-PR 368	5.7	4.7
31 Spark	5.7	6.3
32 PPG-PR 309	5.7	5.7
33 PST-2FOXY-16	5.6	7.0
34 PST-SYN-2DRG	5.6	6.3
35 PST-2GTD	5.6	5.3

(Continued)

Table 5. Perennial ryegrass turf trial, 2016 (continued).

Cultivar or Selection	Turf Quality ¹ 2017 Avg.	Gray Leaf Spot ² 15 Sept. 2017
36 LLP-123	5.6	7.7
37 UHS Comp	5.6	4.3
38 Premium	5.5	4.7
39 PPG-PR 310	5.5	7.3
40 PST-2A2	5.5	5.0
41 PST-2A12	5.5	8.3
42 PPG-PR 376	5.5	8.3
43 SPV Comp	5.5	4.0
44 PST-2FLTE Bulk	5.5	2.3
45 Premium	5.4	3.7
46 RAD-PR73R-Q	5.4	3.0
47 21	5.3	4.3
48 Benchmark	5.3	9.0
49 Stellar 3GL	5.3	7.3
50 Gray Hawk	5.3	6.3
51 PST-2MKD	5.3	8.0
52 PST-2REB	5.3	8.7
53 PST-SYN-2E6	5.3	8.7
54 Fastball RGL	5.3	8.0
55 Apple SGL	5.2	8.0
56 PST-2EGAD	5.2	7.3
57 Ruckus	5.2	7.7
58 LLP-172	5.1	8.0
59 Expedite	5.1	8.3
60 Homerun	5.1	8.3
61 LLP-912	5.1	8.0
62 Aspire	5.1	8.7
63 Uno	5.0	7.3
64 PPG-PR 426	5.0	7.3
65 Vision	5.0	7.7
66 LLP-747	5.0	8.3
67 UEV Comp	5.0	8.3
68 LLP-944	4.9	7.7
69 Pistol	4.9	7.7
70 PST-2BET	4.9	8.3
71 PST-SYN-2MR	4.8	8.3
72 Panther GLS	4.7	7.0
73 LLP-174	4.7	3.7
74 LLP-838	4.7	4.3
75 LLP-911	4.7	6.3

(Continued)

Table 5. Perennial ryegrass turf trial, 2016 (continued).

Cultivar or Selection	Turf Quality ¹ 2017 Avg.	Gray Leaf Spot ² 15 Sept. 2017
76 PST-2BD1 Bulk	4.7	2.7
77 Sun	4.7	5.7
78 Green Emperor	4.7	7.3
79 Silver Sun	4.7	7.7
80 LLP-536	4.6	3.0
81 Big League	4.6	6.3
82 LLP-943	4.5	3.7
83 Rinovo	4.5	8.0
84 Black Pearl	4.5	9.0
85 Molalla	4.5	8.7
86 Silver Dollar	4.4	6.7
87 LTNS PRG Blend 2	4.4	5.7
88 LTNS PRG Blend 1	4.3	8.3
89 Salinas II	4.3	8.7
90 LLP-837	4.3	7.7
91 MSP 4017	4.3	7.7
92 New Sealand	4.3	9.0
93 Presidio	4.2	5.3
94 Cascadia	4.2	5.7
95 Palmer III	4.2	5.3
96 Double Time	4.1	7.7
97 LLP-157	4.1	8.7
98 Panther H2O	4.1	8.0
99 LLP-1017	4.1	8.7
100 LLP-888	4.0	8.3
101 Arctic Green	4.0	5.0
102 Prominent	4.0	9.0
103 Penant H2O	3.9	8.3
104 Divine	3.7	7.0
105 PST-2STOL	3.7	5.3
106 LLP-169	3.7	4.0
107 Charger II	3.6	5.7
108 LLP-475	3.6	6.3
109 MSP 4044	3.3	7.7
110 Playfast	3.3	7.3
111 Prelude IV	3.2	8.7
112 Double Time GLS	3.2	2.7
113 LLP-473	3.1	2.7
114 Royal Green	2.9	3.7
115 Double Up GLS	1.1	3.7

(Continued)

Table 5. Perennial ryegrass turf trial, 2016 (continued).

Cultivar or Selection	Turf Quality ¹ 2017 Avg.	Gray Leaf Spot ² 15 Sept. 2017
LSD at 5% =	0.8	2.5

¹9 = best turf quality

²9 = least disease

Table 6. Yearly nitrogen (N) applied and mowing height (Ht) on perennial ryegrass tests established at Adelphia, NJ.

	2015		2016		2017	
	N ¹	Ht ²	N	Ht	N	Ht
Table 1 (2014).....	3.07	1.5	2.0	1.5	2.5	1.5
Table 2 (2015).....	–	1.5	3.0	1.5	3.0	1.5
Table 3 (2015 Gray Leaf Spot I)	1.75	1.5	2.0	1.5	2.5 HF ³ /1.5 LF ⁴	1.5
Table 4 (2015 Gray Leaf Spot II)	2.25	1.5	2.7	1.5	3.0	1.5
Table 5 (2016).....	–	–	–	1.5	3.5	1.5

¹Annual N applied (lb per 1000 ft²)

²Mowing height in inches

³NF = high fertility; an additional split application of 1 lb N per 1000 ft² was applied

⁴LF = low fertility; an additional split application of 1 lb N per 1000 ft² was not applied