

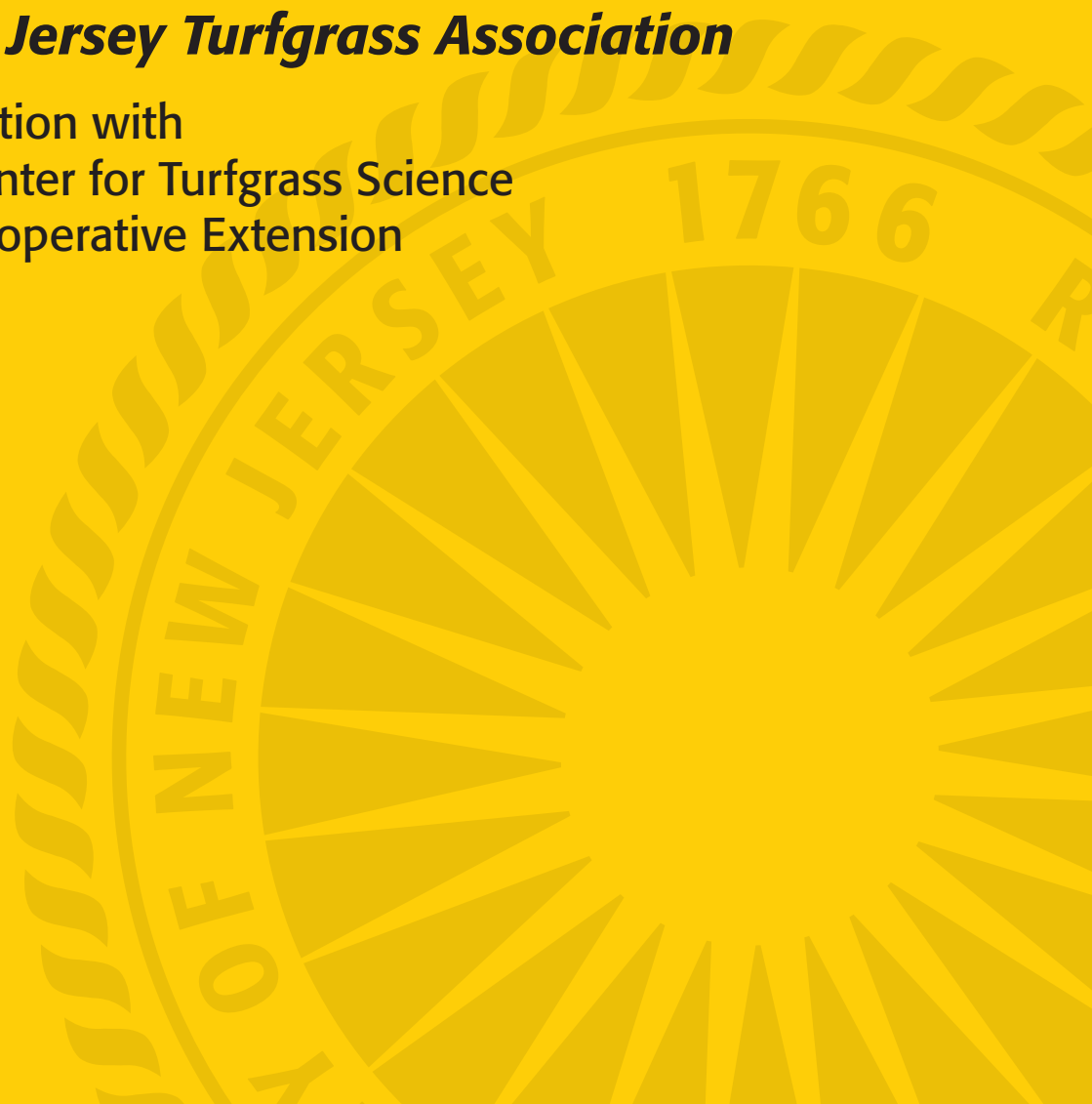
# RUTGERS

New Jersey Agricultural  
Experiment Station

## **2013 Turfgrass Proceedings**

***The New Jersey Turfgrass Association***

In Cooperation with  
Rutgers Center for Turfgrass Science  
Rutgers Cooperative Extension



# **2013 RUTGERS TURFGRASS PROCEEDINGS**

of the

## **GREEN EXPO Turf and Landscape Conference**

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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 2013 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, Anne Diglio, and Ann Jenkins 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

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Perennial ryegrass (*Lolium perenne* L.) is a cool-season, bunch type grass that performs well in a wide variety of soil conditions but thrives in dark, rich soils with a pH between 5 and 8 in regions with mild climates (Paterson, 2002; USDA, 2002). Perennial ryegrass is an important turfgrass because of its ability to germinate quickly, creating an attractive leafy appearance in a short period. It is often used in the southern United States for overseeding dormant lawns, athletic fields, and golf courses. Perennial ryegrass is economically important because it allows for athletic play year-round in areas where warm season turfgrasses go dormant in the winter months. This species is attractive for this purpose because it germinates quickly, provides a playing surface during cold weather, and dies out in the summer, making way for warm-season grasses to take over.

Perennial ryegrass can also be used as a permanent grass in temperate climates. This species prefers to be planted in full sun but will tolerate low levels of shading. It is often found in mixtures with slower germinating grasses such as Kentucky bluegrass (*Poa pratensis* L.) and the fine fescues (*Festuca* spp.) to help prevent soil erosion during lawn establishment and to increase the traffic tolerance of the turf stand. In mixtures, perennial ryegrass is extremely competitive, and if a high percentage is used, the turf stand will eventually be dominated by this species (Murphy and Mohr, 2002).

In 1967, the first turf-type perennial ryegrass, 'Manhattan', became commercially available, followed by the release of 'Pennfine' in 1970. Today, many more cultivars have been developed. These cultivars are readily available to turf managers for use in sports fields as well as home lawns. New cultivars

have been improved upon to have increased general stress tolerance, insect and disease resistance, improved mowing quality, dark green color, more uniform leaf texture, as well as higher shoot density (Murphy and Park, 2004). The development of improved perennial ryegrass cultivars continues at the New Jersey Agricultural Experiment Station as well as at other research facilities.

The center of origin for perennial ryegrass includes Europe, North Africa, and parts of Asia. International collection trips are always underway in an effort to acquire new sources of germplasm. Perennial ryegrass collections have the potential to contain new desirable traits that can then be used to breed the next generation of improved perennial ryegrass cultivars.

Perennial ryegrass is susceptible to an array of diseases such as crown rust (*Puccinia coronata*), stem rust (*Puccinia graminis*), red thread (*Laetisaria fuciformis*), grey leaf spot (*Magnaporthe grisea*), and dollar spot (*Sclerotinia homoeocarpa*). Crown rust first appears as a yellow flecking on infected leaf blades followed by raised pustules that break through the epidermis of the blade to release spores (Smiley et al., 2005). Stem rust is also an important disease of perennial ryegrass and can cause serious problems in seed production fields. Red thread forms pinkish to red hyphae that grow out of infected leaf tips in humid environments. Dollar spot can also be found in perennial ryegrass populations if the weather is hot and humid. Dollar spot hyphae are easily identifiable as a cobweb-like mycelium. Grey leaf spot is an important disease of new perennial ryegrass turf stands and of old stands with poor air circulation. This disease can be identified by the twisting and distortion of leaves

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at the point of infection or by round, tan spots with a dark border on the leaf blade (Smiley et al., 2005). Breeding efforts are currently underway to improve resistance to all of these pathogens.

Perennial ryegrasses naturally contain symbiotic fungi, known as endophytes, that live intercellularly within the leaf, sheath, and stem tissues. The presence of this endophyte (*Neotyphodium* sp.) can convey biotic and abiotic stress tolerance in many perennial ryegrasses (van Zijl de Jong et al., 2008). The utilization of ryegrass cultivars containing endophytes can reduce damage from above ground feeding insects, such as billbugs, sod webworm, and chinch bugs, due to the production of toxic alkaloids by the endophytic fungi (Ahmad et al., 1986; Funk et al., 1994). Endophytes are an important tool for turfgrass breeders as a biological control agent in an environment where pesticide regulations are eminent and sustainable turfgrass management is becoming more popular. The endophyte is transferred via seed to offspring, thus seed must be stored under cool dry conditions post-harvest to retain this beneficial fungus. Turfgrass breeders and researchers are continuing to research the beneficial role of endophytes in turfgrasses.

At Rutgers University we continue to use cycles of selection in single-plot progeny, mowed turf trials to breed perennial ryegrasses with improved resistance to pathogens that cause diseases such as gray leaf spot, rust, dollar spot, and red thread. Breeding for tolerance to abiotic stresses such as salinity (at both mature and seedling stages) and drought is underway. The main objective of the perennial ryegrass breeding program is to improve the frequency of traits that will lead to the production of new superior genotypes that are attractive, high yielding, disease tolerant, and tolerant to abiotic stresses.

## PROCEDURES

Two perennial ryegrass trials were established in 2010 (Tables 1 and 2), one trial was established in 2011 (Table 3), and two trials were established in 2012 (Tables 4 and 5). All trials were seeded at Adelphia, NJ (Tables 1 to 5). Three trials (Tables 3 to 5) were hand sown with 0.88 oz of seed into 3 x 5 ft plots (3.7 lb seed per 1000 ft<sup>2</sup>). The two remaining trials (Tables 1 and 2), seeded at a rate of 1.42 oz of seed into 4 x

6 ft plots (3.7 lb seed per 1000 ft<sup>2</sup>), include entries in the National Perennial Ryegrass Test, sponsored by the National Turfgrass Evaluation Program (NTEP).

All trials were arranged in a randomized complete block design with three replications, and plots had a 6-inch unseeded border to limit contamination. A spring (April) application of Dimension (dithiopyr) was used to control crabgrass in all trials. An application of Merit (imidacloprid) was made to all trials in June to control grubs. Banvel (dicamba) and 2,4-D were applied in October to the 2010 trial (Table 2) and the 2012 trial (Table 4) to control broadleaf weeds.

The annual rate of nitrogen (N) and mowing height for each trial is presented in Table 6. Single applications of fertilizer did not exceed 1.0 lb N per 1000 ft<sup>2</sup>. 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 a 1.5-inch height of cut. All trials were irrigated when necessary to avoid drought stress.

All trials were rated throughout the growing season for visual turf quality (i.e., overall appearance, turf color, uniformity, density, mowing quality, reduced rate of vertical growth, leaf texture, and freedom from insect and disease damage). Other ratings, such as spring green-up and the prevalence of stem rust, dollar spot, and gray leaf spot, were rated when significant differences were evident. Most ratings were based on a 1 to 9 scale, with 9 representing the best turf characteristic. Percent cover ratings were based on a 0 to 100 scale where 100 represents complete ground cover. Plots were evaluated by a number of turfgrass specialists to reduce the impact of personal bias for particular 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. All trials are ranked based on their overall turf quality average. 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. Table 4 includes

entries from the National Perennial Ryegrass Gray Leaf Spot Trial sponsored by NTEP, and entries are ranked based on highest gray leaf spot resistance.

### **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 1960s (Huff, 1997). Newer varieties and promising experimental selections such as Pangea GLR, Banfield, Bandalore, and Thrive possess a darker green color, a more uniform appearance, increased density, lower growth habit, cleaner mowing, and a better tolerance to diseases and insects. Brightstar SLT, Pinnacle, and Linn had lower quality ratings.

### **Genetic Color**

Contrary to other areas of the world, dark green turfgrasses are typically more appealing to the American populace when compared to lighter green varieties. Breeding for darker green verdure in perennial ryegrass varieties is one focus of the Rutgers turfgrass breeding program. Although genetic color of the cultivar is taken into account when assessing the overall quality rating, individual measures of the depth of genetic green color for each cultivar was also performed (Table 2). Entries with the darkest green color were Pangea GLR, ISG-36, and Prominent; those with the lightest green color were Linn, Pinnacle, and Brightstar SLT.

### **Grey Leaf Spot**

Gray leaf spot is an important disease that can cause a leaf blight that kills perennial ryegrass seedlings. Leaf blades are usually distorted and twisted at the point of infection. Gray leaf spot is prevalent during extended periods of high relative humidity and warm temperatures. In the gray leaf spot trial (Table 4), Karma, JR-178, and CT6 Comp were top performers, while PSG 08-12 Lp, PSG 4 DSPP2, and Brightstar SLT were the lowest performers.

### **Dollar Spot**

Dollar Spot is a fungal disease of perennial ryegrass and many other cool season turfgrasses. While the name of this disease is derived from the

small, silver dollar-size spots that form readily on bentgrasses mown at putting green height, it also occurs on a variety of other turfgrass species. Symptoms of dollar spot on perennial ryegrass include large (1 to 3 inch), straw-colored patches in the turf which coalesce into much larger areas as disease severity increases. The disease is generally most severe under low levels of fertilization during periods of warm days and cool nights coupled with high humidity (Smiley et al., 2005). Cultivars and selections such as ISG-36, PST-204D, PST-224 Wicked, and A-35 showed good resistance to dollar spot while Manhattan 6 Replay, and Sienna appeared to be quite susceptible (Tables 1 and 3).

### **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 deep green color of these cultivars are extremely important traits that are in high demand in the turf grass 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**

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### **REFERENCES**

Ahmad, S., J. M. Johnson-Cicalese, W. K. Dickson, and C. R. Funk. 1986. Endophyte-enhanced resistance in perennial ryegrass to the bluegrass billbug, *Sphenophorus parvulus*. *Entomologia Experimentalis et Applicata* 41:3-10.

- Funk, C. R., F. C. Belanger, and J. A. Murphy. 1994. Role of endophytes in grasses used for turf and soil conservation. Pages 201-209 *in*: C. W. Bacon and J. F. White Jr., eds., *Biotechnology of Endophytic Fungi of Grasses*. CRC Press, Boca Raton, FL.
- Huff, D. R. 1997. RAPD characterization of heterogeneous perennial ryegrass cultivars. *Crop. Sci.* 37:557-564.
- Murphy, J. A., and B. S. Park. 2004. Perennial ryegrass varieties for New Jersey sports fields. Rutgers Cooperative Extension New Jersey Agricultural Experiment Station FS546.
- Murphy, J. A., and M. Mohr. 2002. Perennial ryegrass varieties for New Jersey. Rutgers Cooperative Extension, New Jersey Agricultural Experiment Station FS989.
- Paterson, J. S. 2002. Perennial Ryegrass Plant Fact Sheet. USDA, NRCS, National Plant Data Center, Baton Rouge, LA. 2 pages.
- Smiley, R. W., P. H. Dernoeden, and B. B. Clarke. 2005. *Compendium of Turfgrass Diseases*, 3rd. APS Press, St. Paul, MN.
- USDA. 2002. Plant Fact Sheet, Perennial Ryegrass. United States Department of Agriculture Natural Resource Conservation Service.
- van Zijll de Jong, E., M. P. Dobrowolski, N. R. Bannan, A. V. Stewart, K. F. Smith, G. C. Spangenberg, and J. W. Forster. 2008. Genetic Diversity of the Perennial Ryegrass Fungal Endophyte *Neotyphodium lolii*. *Crop Sci.* 48:1487-1501.

Table 1. Performance of perennial ryegrass cultivars and selections in a national turf trial established in July 2010 at Adelphia, NJ. (Includes entries of the National Perennial Ryegrass Test sponsored by NTEP.)

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----			Spring Green-up <sup>2</sup> April 2013	Dollar Spot <sup>3</sup> July 2013	Stem Rust <sup>3</sup> Oct. 2013
	2012-2013 Avg.	2012 Avg.	2013 Avg.			
1 SR 4650	6.2	6.8	5.6	6.0	4.7	6.7
2 Pangea GLR	6.2	6.7	5.6	6.0	3.3	8.0
3 Karma	6.1	6.5	5.7	5.7	5.7	7.0
4 Octane	6.1	6.7	5.4	6.0	2.7	7.7
5 Evolution	6.0	6.3	5.7	6.3	4.0	8.3
6 Bandalore	5.9	5.9	5.8	6.0	3.7	6.0
7 Sideways	5.8	5.8	5.8	6.7	3.3	8.0
8 PPG-PR 134	5.8	6.2	5.4	6.3	3.7	7.3
9 APR 2445	5.8	5.8	5.8	7.0	4.3	5.0
10 JR-178	5.8	6.4	5.1	5.7	3.0	6.0
11 PPG-PR 136	5.7	6.1	5.3	6.0	4.7	6.3
12 Rio Vista	5.7	6.0	5.4	6.0	3.0	7.3
13 Wicked	5.7	5.6	5.8	6.7	6.3	3.7
14 PPG-PR 164	5.7	5.9	5.5	6.3	2.0	7.3
15 CL 11601	5.7	6.4	4.9	6.7	3.3	7.7
16 Pizzazz 2 GLR	5.7	6.1	5.2	6.3	2.3	8.3
17 PPG-PR 142	5.6	5.9	5.4	5.3	4.0	5.3
18 CL 307	5.6	6.2	5.0	6.3	2.3	6.7
19 PPG-PR 138	5.6	6.1	5.1	5.7	3.0	6.7
20 IS-PR 409	5.6	5.9	5.3	6.0	3.0	4.7
21 PPG-PR 165	5.6	6.1	5.1	6.0	2.7	6.0
22 Provost	5.6	6.0	5.1	6.0	2.7	5.3
23 Aspire	5.6	5.7	5.4	6.0	3.7	7.3
24 Thrive	5.5	6.2	4.8	5.7	2.3	5.0
25 PPG-PR 121	5.5	6.2	4.8	6.0	1.7	5.7
26 Banfield	5.5	5.6	5.4	5.7	3.7	5.0
27 Bonneville	5.5	6.1	4.9	6.7	2.7	7.0
28 PPG-PR 133	5.4	5.9	4.9	5.7	3.7	7.0
29 PST-2BNS	5.4	5.5	5.2	6.3	4.7	2.3
30 Monsieur	5.4	6.1	4.6	6.0	2.0	5.7
31 Rinovo	5.3	5.7	5.0	6.3	2.3	5.3
32 Diligent	5.3	5.5	5.2	6.7	4.0	6.7
33 DLF LGD-3022	5.3	5.4	5.2	6.3	4.0	6.3
34 Premium	5.3	6.0	4.6	5.7	2.7	6.3
35 Stamina	5.2	5.6	4.9	5.7	3.7	3.3

(Continued)

Table 1. Perennial ryegrass national turf trial, 2010, NTEP (continued).

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----			Spring Green-up <sup>2</sup> April 2013	Dollar Spot <sup>3</sup> July 2013	Stem Rust <sup>3</sup> Oct. 2013
	2012-2013 Avg.	2012 Avg.	2013 Avg.			
36 PPG-PR 128	5.2	5.6	4.8	6.3	2.3	5.3
37 PPG-PR 135	5.2	5.6	4.7	5.7	3.0	5.3
38 Pacific Gem	5.1	4.9	5.2	6.3	4.7	4.7
39 PSRX 4CAGL	5.1	5.2	4.9	6.7	2.3	3.0
40 Palmer V	5.1	5.6	4.5	6.0	1.7	4.3
41 Pillar	5.0	5.5	4.5	5.7	2.0	5.7
42 GO-PR60	4.9	4.7	5.1	6.0	3.7	4.7
43 Fiesta 4	4.9	5.3	4.4	6.0	2.0	4.0
44 PRX-4GM1	4.9	5.1	4.7	5.3	3.0	3.3
45 PPG-PR 140	4.8	5.4	4.3	5.7	2.7	4.7
46 Sox Fan	4.8	5.3	4.3	6.7	2.0	4.0
47 DLF LGD-3026	4.8	5.2	4.5	5.3	2.3	4.7
48 2NJK	4.8	4.6	4.9	6.0	4.7	6.3
49 APR 2036	4.7	4.7	4.8	6.3	2.7	3.0
50 RAD-PR55R	4.7	4.1	5.3	6.3	5.3	4.0
51 LTP-RAE	4.7	5.1	4.2	5.3	2.0	6.0
52 Manhattan 6	4.6	5.3	3.8	6.3	1.0	4.3
53 CS-PR66	4.5	4.3	4.7	6.0	3.3	3.3
54 Haven	4.5	4.6	4.4	6.7	3.0	3.3
55 PST-204D	4.4	3.9	4.9	6.3	6.3	4.7
56 PST-2NKM	4.4	4.7	4.2	6.0	3.3	4.3
57 Hancock	4.4	4.1	4.6	5.3	3.7	3.7
58 SR 4660ST	4.4	4.4	4.3	6.0	3.0	4.0
59 Uno	4.4	4.5	4.2	6.0	2.0	1.7
60 PST-2K9	4.3	4.2	4.5	5.7	3.7	4.0
61 PST-2DR9	4.3	4.1	4.5	6.0	5.0	5.7
62 BAR Lp 10969	4.3	3.9	4.6	6.0	4.0	3.7
63 PST-2ACR	4.3	4.1	4.4	6.0	5.7	6.0
64 BAR Lp 10970	4.2	3.8	4.6	5.3	5.0	2.3
65 Dominator	4.1	4.2	4.0	4.7	3.3	4.3
66 BAR Lp 10972	4.0	3.2	4.8	4.3	6.7	2.0
67 Playoff 2	4.0	3.6	4.3	5.7	4.0	5.7
68 ISG-36	4.0	3.9	4.1	5.0	6.0	4.7
69 PST-2TQL	3.9	3.4	4.4	5.7	5.0	3.7
70 Mach I	3.9	3.6	4.1	5.3	2.7	3.3

(Continued)



Table 1. Perennial ryegrass national turf trial, 2010, NTEP (continued).

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----			Spring Green-up <sup>2</sup> April 2013	Dollar Spot <sup>3</sup> July 2013	Stem Rust <sup>3</sup> Oct. 2013
	2012- 2013 Avg.	2012 Avg.	2013 Avg.			
71 Prominent	3.9	3.3	4.4	6.0	5.7	3.7
72 A-35	3.7	3.6	3.9	5.7	6.7	2.7
73 Pick 4DFHM	3.7	3.9	3.5	5.3	2.3	2.3
74 ISG-30	3.6	3.3	3.9	5.3	5.3	3.0
75 Sienna	3.6	3.6	3.5	5.3	1.3	3.3
76 APR 2320	3.6	2.9	4.2	4.7	5.3	4.7
77 GO-G37	3.6	3.1	4.0	6.0	5.3	3.7
78 Tetradark	3.5	2.8	4.3	5.3	7.0	2.0
79 Insight	3.5	3.4	3.6	5.3	2.3	2.7
80 RAD-PR62	3.5	3.1	3.9	4.7	5.0	2.0
81 Allante	3.4	3.4	3.3	4.0	1.3	2.0
82 ISG-31	3.3	3.1	3.6	5.7	5.7	3.3
83 JR-192	3.2	2.7	3.8	4.7	4.3	1.7
84 Brightstar SLT	3.2	2.8	3.5	6.3	4.7	1.7
85 GO-DHS	3.0	2.6	3.5	5.7	4.3	1.7
86 BAR Lp 7608	2.9	2.4	3.3	6.7	4.7	1.3
87 Pinnacle	2.0	1.7	2.4	8.3	4.7	1.0
88 Linn	1.0	1.0	1.0	8.7	3.0	3.7
LSD at 5% =	0.7	0.8	0.8	1.1	1.6	1.7

<sup>1</sup>9 = best turf quality

<sup>2</sup>9 = earliest spring green-up

<sup>3</sup>9 = least disease

Table 2. Performance of perennial ryegrass cultivars and selections in a national turf trial established in September 2010 at Adelphia, NJ. (Includes all entries in the National Perennial Ryegrass Test sponsored by NTEP.)

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----				Spring Green-up <sup>2</sup> April 2013	Genetic Color <sup>3</sup> Oct. 2013
	2011-2013 Avg.	2011 Avg.	2012 Avg.	2013 Avg.		
1 Pangea GLR	6.5	7.2	6.2	6.1	7.3	8.7
2 Banfield	6.5	7.2	5.9	6.2	5.7	7.7
3 Bandalore	6.4	6.9	6.0	6.4	7.0	7.0
4 Thrive	6.2	7.6	5.2	5.8	6.3	7.7
5 APR 2445	6.1	6.7	5.8	5.9	7.0	7.7
6 Karma	6.1	7.4	5.4	5.6	5.3	6.0
7 Wicked	6.1	6.7	5.9	5.8	6.7	6.3
8 PPG-PR 164	6.1	7.4	5.1	5.8	5.7	6.7
9 GO-PR60	6.0	7.0	5.7	5.5	6.7	7.3
10 Evolution	6.0	6.7	5.7	5.6	4.7	8.0
11 IS-PR 409	6.0	7.0	5.2	5.7	5.7	7.0
12 Rio Vista	5.9	6.7	5.6	5.4	6.3	7.3
13 Rinovo	5.9	7.1	4.9	5.7	6.3	7.0
14 PPG-PR 136	5.9	6.9	5.3	5.5	5.3	8.0
15 PPG-PR 121	5.8	6.9	5.2	5.4	5.7	7.0
16 Fiesta 4	5.8	6.4	5.3	5.7	6.3	8.0
17 PPG-PR 165	5.7	6.7	5.1	5.4	4.7	6.0
18 SR 4650	5.7	7.0	4.7	5.4	5.3	7.0
19 RAD-PR55R	5.7	6.6	5.3	5.2	6.3	8.0
20 Dominator	5.7	6.1	5.5	5.4	6.7	7.3
21 PST-2BNS	5.7	6.4	5.0	5.6	6.0	6.0
22 BAR Lp 10970	5.7	6.1	5.5	5.4	6.3	5.3
23 Diligent	5.6	6.6	5.2	5.1	5.7	6.7
24 PST-2K9	5.6	5.9	5.4	5.6	6.0	6.0
25 APR 2320	5.6	6.3	5.2	5.4	6.0	7.3
26 Aspire	5.6	6.2	5.0	5.5	6.3	7.0
27 JR-178	5.6	6.7	4.8	5.2	4.3	7.0
28 Sideways	5.5	6.2	5.1	5.3	4.0	6.7
29 PPG-PR 134	5.5	6.4	4.6	5.5	5.7	7.3
30 PPG-PR 133	5.5	6.3	5.0	5.2	6.0	6.3
31 CS-PR66	5.5	6.4	4.9	5.2	5.7	7.0
32 Octane	5.5	6.1	4.9	5.5	5.3	6.7
33 Pizzazz 2 GLR	5.5	6.3	4.7	5.4	5.7	6.7
34 Uno	5.5	5.9	4.7	5.8	6.3	7.7
35 Mach I	5.5	6.3	5.1	5.0	6.3	7.7

(Continued)

Table 2. Perennial ryegrass turf trial, 2010, NTEP (continued).

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----				Spring Green-up <sup>2</sup> April 2013	Genetic Color <sup>3</sup> Oct. 2013
	2011-2013 Avg.	2011 Avg.	2012 Avg.	2013 Avg.		
36 CL 307	5.4	6.5	4.9	5.0	6.7	7.3
37 PSRX 4CAGL	5.4	6.2	4.9	5.3	6.0	7.3
38 LTP-RAE	5.4	6.5	5.0	4.8	5.0	7.0
39 APR 2036	5.4	6.3	4.4	5.5	5.7	6.0
40 BAR Lp 10969	5.4	5.4	5.3	5.4	7.0	6.0
41 Palmer V	5.4	5.6	4.8	5.8	6.3	7.3
42 Stamina	5.4	6.4	4.8	4.9	5.0	5.7
43 PST-204D	5.3	5.3	5.3	5.4	6.3	7.3
44 PST-2TQL	5.3	5.1	5.4	5.5	6.0	6.3
45 Premium	5.3	6.1	4.7	5.2	5.7	7.0
46 SR 4660ST	5.3	5.7	4.8	5.3	5.3	5.7
47 PRX-4GM1	5.2	6.1	4.8	4.9	5.7	6.7
48 PPG-PR 138	5.2	6.2	4.4	5.1	3.7	8.0
49 BAR Lp 10972	5.2	5.1	5.6	4.9	6.7	6.7
50 Hancock	5.2	6.1	5.1	4.4	5.3	8.0
51 A-35	5.2	5.5	5.6	4.4	5.3	8.7
52 PST-2NKM	5.2	5.2	5.1	5.2	6.0	6.3
53 DLF LGD-3022	5.1	5.7	5.0	4.8	4.3	5.7
54 Monsieur	5.1	6.0	4.3	5.1	6.7	6.0
55 Sox Fan	5.1	5.7	4.6	5.0	6.0	6.7
56 PST-2DR9	5.1	5.1	5.1	5.1	6.0	7.7
57 RAD-PR62	5.1	5.7	4.6	4.8	5.7	6.7
58 2NJK	5.1	5.6	4.7	4.8	5.7	7.0
59 Manhattan 6	5.0	6.0	4.4	4.7	6.0	7.7
60 GO-G37	5.0	5.4	5.2	4.5	6.3	8.7
61 Haven	5.0	5.3	4.7	5.0	6.3	6.0
62 Tetradark	5.0	4.8	5.0	5.2	7.3	7.7
63 PST-2ACR	5.0	4.8	5.3	4.9	6.7	6.7
64 CL 11601	4.9	5.6	4.4	4.8	6.0	5.3
65 PPG-PR 135	4.9	5.8	4.1	4.9	4.7	7.0
66 Pacific Gem	4.9	5.4	4.7	4.7	5.0	7.3
67 DLF LGD-3026	4.9	5.9	4.6	4.3	5.3	7.7
68 Provost	4.9	5.8	4.3	4.5	4.0	7.0
69 PPG-PR 142	4.9	5.8	4.3	4.5	4.0	7.3
70 Sienna	4.9	6.6	3.7	4.3	4.7	6.3

(Continued)

Table 2. Perennial ryegrass turf trial, 2010, NTEP (continued).

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----				Spring Green-up <sup>2</sup> April 2013	Genetic Color <sup>3</sup> Oct. 2013
	2011-2013 Avg.	2011 Avg.	2012 Avg.	2013 Avg.		
71 PPG-PR 128	4.9	5.4	4.5	4.7	5.7	6.3
72 ISG-36	4.9	5.3	5.2	4.1	5.3	9.0
73 ISG-30	4.8	5.3	4.9	4.3	6.0	8.7
74 Bonneville	4.8	5.4	4.5	4.6	6.3	6.3
75 JR-192	4.7	5.6	4.1	4.4	4.0	6.0
76 ISG-31	4.7	4.7	5.0	4.4	6.0	8.3
77 Pillar	4.7	5.7	4.1	4.3	4.7	6.0
78 Insight	4.6	6.2	3.2	4.4	6.3	5.7
79 Prominent	4.6	4.9	4.8	4.1	5.3	8.7
80 Playoff 2	4.5	4.6	4.5	4.4	5.0	5.3
81 Allante	4.5	6.1	3.4	4.1	4.7	5.3
82 GO-DHS	4.5	4.4	5.0	4.1	6.7	8.7
83 PPG-PR 140	4.4	5.2	3.7	4.3	3.7	5.7
84 Pick 4DFHM	4.3	4.7	4.0	4.3	6.0	6.0
85 Brightstar SLT	4.2	4.5	4.0	4.2	6.7	5.0
86 BAR Lp 7608	3.9	4.0	4.1	3.6	6.3	4.0
87 Pinnacle	3.0	2.9	3.1	3.0	9.0	1.7
88 Linn	1.0	1.0	1.1	1.0	9.0	1.0
LSD at 5% =	0.6	0.8	0.8	0.8	1.7	1.2

<sup>1</sup>9 = best turf quality

<sup>2</sup>9 = earliest spring green-up

<sup>3</sup>9 = darkest green color

Table 3. Performance of perennial ryegrass cultivars and selections in a turf trial established in September 2011 at Adelphia, NJ.

	Cultivar or Selection	-----Turf Quality <sup>1</sup> -----			Dollar Spot <sup>2</sup> July 2013
		2012-2013 Avg.	2012 Avg.	2013 Avg.	
1	PPG-PR 171	6.4	7.4	5.4	4.3
2	Radiance	5.9	6.5	5.4	5.3
3	PPG-PR 167	5.9	6.8	5.1	3.7
4	APR 2510	5.9	6.2	5.6	4.7
5	APR 2508	5.8	6.2	5.5	4.0
6	APR 2520	5.8	6.1	5.4	6.7
7	Apple GL	5.7	6.2	5.2	4.3
8	PPG-PR 169	5.7	6.2	5.2	4.0
9	APR 2524	5.7	6.3	5.1	5.0
10	APR 2516	5.7	6.2	5.1	4.0
11	APR 2515	5.7	5.9	5.4	7.7
12	PPG-PR 170	5.6	5.9	5.4	3.7
13	Pershing	5.6	6.1	5.2	5.7
14	APR 2514	5.6	5.6	5.6	5.7
15	APR 2523	5.6	6.0	5.2	4.7
16	RAD-PR 69	5.6	5.9	5.2	5.7
17	APR 2521	5.6	6.0	5.1	5.7
18	APR 2522	5.5	5.9	5.1	5.0
19	Zoom	5.5	6.1	4.9	4.0
20	PPG-PR 164	5.5	5.7	5.3	3.7
21	PPG-PR 172	5.5	6.1	4.9	4.7
22	Seville 3	5.5	5.7	5.3	6.0
23	Uno	5.5	5.5	5.4	4.7
24	APR 2518	5.5	5.8	5.1	5.7
25	21-11 PR PC	5.4	5.6	5.2	6.7
26	Palmer V	5.4	5.6	5.2	5.0
27	Exacta II	5.4	5.8	4.9	5.0
28	PST-NKM	5.4	5.3	5.4	5.0
29	CL307	5.3	5.8	4.8	3.7
30	PST-Syn-2TFC	5.3	5.6	5.1	5.7
31	RAD-PR 76	5.3	5.2	5.4	6.0
32	Pacific Gem	5.3	5.7	4.9	7.0
33	Evolution	5.3	5.1	5.5	6.3
34	RAD-PR 53	5.3	5.8	4.8	4.7
35	Rinovo	5.3	6.1	4.5	2.7

(Continued)

Table 3. Perennial ryegrass turf trial, 2011 (continued).

	Cultivar or Selection	-----Turf Quality <sup>1</sup> -----			Dollar Spot <sup>2</sup> July 2013
		2012-2013 Avg.	2012 Avg.	2013 Avg.	
36	PST-Syn-2YLD	5.3	5.4	5.1	6.7
37	APR 2291	5.3	5.7	4.9	5.3
38	PPG-PR 166	5.3	5.8	4.7	4.0
39	SR 4220	5.3	5.3	5.2	5.7
40	PS9	5.2	6.1	4.3	4.0
41	PST-2NJK	5.2	5.3	5.1	6.7
42	Silver Dollar	5.2	5.5	4.9	6.3
43	69-11-2	5.2	5.1	5.2	6.0
44	1G Squared	5.1	5.6	4.6	5.0
45	APR 2519	5.1	5.6	4.6	4.3
46	Pennant III	5.1	5.5	4.7	3.7
47	FSR Comp	5.1	5.7	4.5	3.3
48	Palmer IV	5.1	5.4	4.8	5.7
49	Homerun	5.1	5.2	5.0	5.7
50	Frontier	5.0	4.9	5.2	7.3
51	APR 2517	5.0	5.6	4.5	4.0
52	PSG 4SLD34	5.0	5.2	4.8	4.0
53	Prelude GLS	5.0	5.7	4.3	4.0
54	APR 2507	5.0	5.1	4.8	6.7
55	Radiant II	5.0	5.6	4.3	5.7
56	Manhattan 6	5.0	5.1	4.8	4.7
57	Harrier	4.9	5.3	4.5	4.0
58	PSG STD3	4.9	5.0	4.9	4.3
59	08 FTM SESL	4.9	5.2	4.7	5.7
60	Hawkeye 2	4.9	4.8	5.1	6.3
61	MSP 3935	4.9	5.5	4.3	4.0
62	PPG-PR 117	4.9	5.1	4.7	5.0
63	Revenge GLX	4.9	5.1	4.7	4.7
64	69-11-3	4.9	4.8	4.9	4.3
65	Secretariat II	4.9	5.4	4.3	4.7
66	APR 2509	4.9	5.0	4.7	6.0
67	APR 2512	4.9	5.5	4.2	4.3
68	Fiesta 4	4.9	5.1	4.6	5.7
69	Soprano	4.9	5.0	4.7	4.3
70	PST-204D	4.9	5.0	4.7	6.0

(Continued)

Table 3. Perennial ryegrass turf trial, 2011 (continued).

	Cultivar or Selection	-----Turf Quality <sup>1</sup> -----			Dollar Spot <sup>2</sup> July 2013
		2012-2013 Avg.	2012 Avg.	2013 Avg.	
71	SR 4550	4.9	5.1	4.6	5.3
72	21-10 Lp	4.8	5.0	4.7	5.0
73	PPG-PR 119	4.8	5.0	4.6	4.3
74	Notable	4.8	5.2	4.4	4.7
75	69-11-4	4.8	4.7	4.9	7.7
76	PSG 4SLGS	4.8	5.2	4.4	3.0
77	Charismatic II	4.8	5.1	4.4	4.7
78	PST-2BNS	4.8	4.7	4.9	5.3
79	PSG 4PNCKH	4.8	4.7	4.8	4.7
80	PST-21N4	4.8	4.4	5.1	7.7
81	Accent II	4.8	4.8	4.7	5.7
82	APR 2513	4.7	4.7	4.8	6.0
83	Defender	4.7	5.2	4.2	5.0
84	69-11 Bulk	4.7	4.8	4.7	5.3
85	Headstart 2	4.7	4.8	4.6	5.0
86	Citation Fore	4.7	5.1	4.3	4.0
87	FTM White C1-07	4.7	4.8	4.6	4.3
88	SR 4600	4.7	4.8	4.6	5.0
89	Line Drive GLS	4.7	5.0	4.3	4.7
90	Manhattan 5 GLR	4.7	4.9	4.4	5.0
91	APR 2116	4.7	4.6	4.7	7.3
92	SUM Comp	4.7	5.4	3.9	4.3
93	PSG 4JPR	4.6	4.6	4.7	5.3
94	PPG-PR 163	4.6	5.1	4.2	4.0
95	PST-224	4.6	4.8	4.4	7.7
96	69-1-11	4.6	4.7	4.5	5.7
97	20-10 Lp	4.6	4.6	4.6	6.3
98	PSG 4SLD29	4.6	4.6	4.6	3.3
99	Mighty	4.6	4.8	4.3	5.0
100	69-11-6	4.6	4.2	4.9	6.7
101	Stanton	4.6	4.6	4.5	5.0
102	20-11 Lp	4.6	4.6	4.5	5.3
103	SR 4420	4.6	5.0	4.1	4.3
104	Repell GLS	4.5	4.8	4.2	5.7
105	PST-2CITM	4.5	4.2	4.8	7.0

(Continued)

Table 3. Perennial ryegrass turf trial, 2011 (continued).

	Cultivar or Selection	-----Turf Quality <sup>1</sup> -----			Dollar Spot <sup>2</sup> July 2013
		2012-2013 Avg.	2012 Avg.	2013 Avg.	
106	MMW	4.5	4.9	4.1	4.3
107	Charismatic	4.5	4.4	4.6	5.3
108	PST-2RDY	4.5	4.6	4.4	5.3
109	69-11-5	4.5	4.7	4.3	4.7
110	Palmer III	4.5	5.0	4.0	5.7
111	FTM Blue C2-09	4.5	4.6	4.4	5.0
112	APR 2511	4.4	4.9	3.9	6.3
113	Pentium	4.4	4.3	4.4	7.3
114	FTM White C2-09	4.4	4.5	4.2	4.7
115	APR 2105	4.3	4.6	4.0	4.7
116	Calypso III	4.3	4.2	4.3	5.0
117	PSG 4STLCZ	4.3	4.5	4.0	4.7
118	PST-3IP	4.2	3.8	4.7	7.3
119	STR 4TPCS	4.2	4.3	4.2	5.3
120	Calypso II	4.2	4.4	4.0	4.7
121	Applaud II	4.2	4.3	4.1	5.3
122	Affirmed	4.2	4.4	4.0	5.0
123	Panther GLS	4.2	4.3	4.0	5.7
124	Estelle	4.2	3.8	4.5	7.7
125	Replay	4.1	4.0	4.2	2.7
126	PSG 4DSLFL	4.1	3.7	4.5	6.7
127	Churchill	4.1	4.1	4.0	4.7
128	Pennant II	4.1	4.1	4.0	5.0
129	Inspire	4.1	4.5	3.6	4.7
130	FTM White C4-10	4.1	4.2	3.9	4.0
131	PSG 4DS894	4.1	4.3	3.8	3.7
132	PST-2DR9	4.0	3.7	4.3	6.0
133	08-14 Lp	4.0	4.0	3.9	6.3
134	PST-2GSB	4.0	3.8	4.1	5.3
135	08-16 Lp	4.0	3.8	4.1	6.0
136	Penguin 2	4.0	4.2	3.7	4.3
137	PSG 4SRUP	3.9	4.0	3.9	3.7
138	PSG 4SLD57	3.9	3.7	4.1	5.7
139	Top Gun II	3.9	3.9	3.8	4.3
140	Racer 2	3.8	4.4	3.3	3.3

(Continued)



Table 3. Perennial ryegrass turf trial, 2011 (continued).

Cultivar or Selection	-----Turf Quality <sup>1</sup> -----			Dollar Spot <sup>2</sup> July 2013
	2012-2013 Avg.	2012 Avg.	2013 Avg.	
141 Integra II	3.8	3.5	4.1	7.0
142 PST-2K9	3.8	3.7	3.9	7.0
143 PSG 4DSL B	3.8	3.3	4.2	6.7
144 Artic Green	3.8	4.0	3.5	4.0
145 Goal Keeper II	3.7	3.8	3.6	6.7
146 PSG 4DSPP2	3.7	3.9	3.5	3.7
147 Quebec	3.7	3.9	3.5	3.7
148 La Quinta	3.7	3.8	3.6	3.7
149 Caddieshack II	3.7	3.8	3.5	4.7
150 Accent	3.6	3.8	3.4	5.3
151 PST-2MPX	3.6	3.6	3.7	6.7
152 Hawkeye	3.5	3.4	3.6	5.3
153 Night Sky	3.4	3.4	3.5	5.3
154 MSP 3934	3.4	3.3	3.4	3.7
155 Top Gun	3.3	3.4	3.3	3.7
LSD at 5% =	0.9	1.3	0.8	2.1

<sup>1</sup>9 = best turf quality

<sup>2</sup>9 = least disease

Table 4. Performance of perennial ryegrass cultivars and selections in a turf trial established in August 2012 at Adelphia, NJ. (Includes entries of the National Perennial Ryegrass Gray Leaf Spot Trial sponsored by NTEP.)

Cultivar or Selection	Turf Quality <sup>1</sup> 2013 Avg.	-----Grey Leaf Spot <sup>2</sup> -----				2012 Avg.	Cover <sup>3</sup> (%) Oct. 2012
		Aug. 2012	Aug. 2012	Sept. 2012			
1 Karma	6.8	8.7	7.7	7.0	7.8	91.7	
2 CT6 comp	6.3	8.3	7.3	6.3	7.3	86.7	
3 APR 2244	5.8	5.7	5.3	3.7	4.9	83.0	
4 JR-178	5.7	7.7	7.0	5.7	6.8	81.7	
5 CT1 comp	5.7	7.3	6.0	4.0	5.8	76.7	
6 APR 2514	5.6	6.0	6.3	5.0	5.8	75.0	
7 PPG-PR-134	5.6	7.0	6.7	5.0	6.2	75.0	
8 PPG-PR-164	5.6	6.7	6.3	5.0	6.0	80.0	
9 PR 523	5.6	6.3	6.0	4.7	5.7	73.3	
10 CT2 comp	5.6	7.0	6.7	5.0	6.2	81.7	
11 CT7 comp	5.5	7.3	6.0	5.0	6.1	85.0	
12 CL 11601	5.5	6.7	6.0	5.0	5.9	88.3	
13 CT4 BS	5.4	6.3	5.7	4.7	5.6	76.7	
14 Dasher 3	5.4	7.0	6.3	4.3	5.9	63.3	
15 PPG-PR-140	5.2	6.7	6.0	4.0	5.6	73.3	
16 Z-3401	5.2	6.3	5.3	4.3	5.3	83.3	
17 APR 2472	5.2	6.3	6.0	4.7	5.7	70.0	
18 APR 2486	5.1	7.3	7.3	6.0	6.9	83.3	
19 PSG 4 JPF8-5	5.1	7.7	7.0	4.3	6.3	78.3	
20 FE2 BS	5.1	6.3	5.3	3.7	5.1	66.7	
21 PPG-PR-172	5.1	7.3	6.3	4.3	6.0	71.7	
22 PPG-PR-133	5.1	5.7	5.3	3.3	4.8	68.3	
23 PR 533	5.1	6.3	5.0	4.0	5.1	70.0	
24 PPG-PR-142	4.9	6.7	5.7	3.7	5.3	55.0	
25 New Arrival GLR	4.9	5.3	4.7	3.3	4.4	68.3	
26 APR 2524	4.9	5.3	5.3	4.0	4.9	65.0	
27 PST-2FIND	4.9	4.7	3.7	3.0	3.8	66.7	
28 CT3 comp	4.8	6.7	5.0	2.7	4.8	68.3	
29 CT5 comp	4.8	5.7	5.0	3.3	4.7	68.3	
30 PR 519	4.8	5.7	5.0	3.7	4.8	66.7	
31 PR 541	4.7	6.3	4.7	3.0	4.7	68.3	
32 APR 2242	4.7	5.3	4.3	3.7	4.4	56.7	
33 Diligent	4.7	5.3	4.3	3.7	4.4	68.3	
34 APR 2519	4.6	5.3	4.7	3.7	4.6	66.7	
35 Monsieur	4.6	5.3	4.7	3.0	4.3	68.3	

(Continued)

Table 4. Perennial ryegrass gray leaf spot trial, 2012, NTEP (continued).

Cultivar or Selection	Turf Quality <sup>1</sup> 2013 Avg.	-----Grey Leaf Spot <sup>2</sup> -----				2012 Avg.	Cover <sup>3</sup> (%) Oct. 2012
		Aug. 2012	Aug. 2012	Sept. 2012			
36 CL 307	4.6	6.0	5.0	3.7	4.9	73.3	
37 APR 2520	4.6	4.7	4.7	3.3	4.2	68.3	
38 PSG 4 JPF8-2	4.6	7.3	6.0	5.0	6.1	75.0	
39 PR 535	4.5	6.3	5.3	4.0	5.2	70.0	
40 Pangea GLR	4.5	6.0	5.3	3.7	5.0	65.0	
41 APR 2455	4.5	4.7	4.0	2.3	3.7	63.3	
42 APR 2563	4.5	6.7	6.0	3.7	5.4	63.3	
43 PSG 4 JPF8-4	4.5	7.7	7.0	4.7	6.4	73.3	
44 PR 531	4.4	6.3	4.7	2.7	4.6	65.0	
45 APR 2560	4.4	6.0	6.3	5.3	5.9	71.7	
46 Allstar 3	4.4	5.0	4.3	3.0	4.1	58.3	
47 APR 2474	4.3	5.7	5.3	3.7	4.9	70.0	
48 Manhattan 6	4.3	5.7	5.3	3.3	4.8	68.3	
49 PPG-PR-167	4.3	6.7	5.7	2.7	5.0	60.0	
50 Banfield	4.3	6.0	5.3	3.3	4.9	60.0	
51 APR 2484	4.3	6.3	5.7	4.3	5.4	68.3	
52 Exacta II GLSR	4.3	5.0	4.7	3.7	4.4	66.7	
53 PST-2NKMS	4.3	6.0	5.0	3.7	4.9	63.3	
54 APR 2479	4.2	5.7	4.3	3.3	4.4	55.0	
55 PSG 4JPR	4.2	6.7	5.0	3.3	5.0	65.0	
56 Bandalore	4.2	5.3	4.3	2.7	4.1	65.0	
57 Stamina	4.2	6.0	5.0	3.3	4.8	65.0	
58 APR 2465	4.1	5.7	5.3	4.7	5.2	71.7	
59 APR 2170	4.1	5.7	5.0	3.3	4.7	68.3	
60 APR 2165	4.1	5.7	5.0	3.7	4.8	65.0	
61 PPG-PR-132	4.1	6.0	5.0	3.3	4.8	66.7	
62 MMW	4.1	5.3	4.0	2.7	4.0	58.3	
63 Haven	4.0	6.0	4.0	3.3	4.4	68.3	
64 PSG 4 JPF8-1	4.0	6.7	6.0	3.3	5.3	70.0	
65 APR 2522	4.0	5.7	5.0	2.0	4.2	48.3	
66 PST-2NKM	3.9	5.0	4.0	2.7	3.9	51.7	
67 PPG-PR-131	3.9	4.7	3.3	1.7	3.2	58.3	
68 PSG 4 SLGS	3.9	4.3	3.3	2.0	3.2	53.3	
69 Derby Xtreme	3.9	5.7	4.0	2.3	4.0	55.0	
70 Apple GL	3.9	5.0	4.0	2.7	3.9	55.0	

(Continued)

Table 4. Perennial ryegrass gray leaf spot trial, 2012, NTEP (continued).

Cultivar or Selection	Turf Quality <sup>1</sup> 2013 Avg.	-----Grey Leaf Spot <sup>2</sup> -----				2012 Avg.	Cover <sup>3</sup> (%) Oct. 2012
		Aug. 2012	Aug. 2012	Sept. 2012			
71 APR 2471	3.9	5.3	5.7	3.3	4.8	55.0	
72 APR 2234	3.8	4.7	4.0	2.7	3.8	46.7	
73 APR 2168	3.8	6.0	4.7	2.3	4.3	46.7	
74 APR 2523	3.8	6.0	5.0	3.3	4.8	55.0	
75 Rinovo	3.8	4.3	3.7	2.3	3.4	60.0	
76 APR 2552	3.8	6.0	5.3	3.3	4.9	65.0	
77 APR 2445	3.8	4.0	3.7	2.7	3.4	45.0	
78 Manhattan 5GLR	3.8	6.0	5.3	4.0	5.1	68.3	
79 Aspire	3.8	6.3	5.3	3.7	5.1	66.7	
80 PR 551	3.8	5.0	3.7	1.3	3.3	46.7	
81 APR 2521	3.8	5.3	4.7	2.3	4.1	53.3	
82 PPG-PR-171	3.8	4.3	3.3	2.3	3.3	45.0	
83 APR 2510	3.7	5.3	4.7	3.0	4.3	45.0	
84 APR 2166	3.7	4.7	3.7	3.0	3.8	50.0	
85 PST-2NJK	3.7	5.0	3.7	1.7	3.4	55.0	
86 Fiesta 4	3.7	5.3	4.7	2.7	4.2	48.3	
87 Thrive	3.7	5.7	4.3	2.3	4.1	53.3	
88 APR 2456	3.7	5.3	4.7	4.3	4.8	60.0	
89 APR 2475	3.6	7.0	5.3	4.0	5.4	60.0	
90 PR 554	3.6	5.0	3.7	1.7	3.4	51.7	
91 PST-2BNS	3.5	4.3	3.3	1.7	3.1	50.0	
92 Hawkeye 2	3.5	5.3	4.7	2.7	4.2	51.7	
93 PR 537	3.5	4.7	3.0	1.7	3.1	48.3	
94 APR 2518	3.5	4.3	3.3	2.0	3.2	51.7	
95 PSG 20-10 Lp	3.5	5.3	4.0	2.3	3.9	58.3	
96 PR 549	3.5	4.3	2.7	1.3	2.8	45.0	
97 APR 2541	3.5	4.3	3.3	2.7	3.4	46.7	
98 APR 2145	3.5	3.7	2.7	1.7	2.7	55.0	
99 PSG 4 JPF8-3	3.5	5.7	4.7	2.7	4.3	53.3	
100 PR 547	3.5	5.3	4.3	2.0	3.9	50.0	
101 APR 2224	3.4	4.3	2.7	2.0	3.0	53.3	
102 APR 2227	3.4	4.7	3.3	2.0	3.3	45.0	
103 PST-2CITM	3.4	5.7	4.0	2.3	4.0	48.3	
104 APR 2559	3.4	4.7	4.0	2.7	3.8	45.0	
105 APR 2478	3.3	4.7	4.0	2.0	3.6	41.7	

(Continued)

Table 4. Perennial ryegrass gray leaf spot trial, 2012, NTEP (continued).

Cultivar or Selection	Turf Quality <sup>1</sup> 2013 Avg.	-----Grey Leaf Spot <sup>2</sup> -----				2012 Avg.	Cover <sup>3</sup> (%) Oct. 2012
		Aug. 2012	Aug. 2012	Sept. 2012			
106 SR 4600	3.3	5.3	4.0	2.3	3.9	46.7	
107 Revenge GLX	3.3	4.7	4.3	2.3	3.8	50.0	
108 APR 2508	3.3	5.0	4.0	1.7	3.6	35.0	
109 Charismatic II GLSR	3.3	4.0	3.3	2.3	3.2	46.7	
110 APR 2540	3.2	6.0	5.3	3.0	4.8	56.7	
111 APR 2453	3.2	4.0	3.7	2.0	3.2	40.0	
112 APR 2161	3.2	3.7	2.7	2.0	2.8	50.0	
113 APR 2221	3.2	6.3	5.0	2.3	4.6	40.0	
114 APR 2545	3.2	5.0	5.0	2.3	4.1	31.7	
115 PPG-PR-170	3.2	6.3	4.0	2.0	4.1	45.0	
116 PR 529	3.1	3.7	2.7	2.0	2.8	50.0	
117 APR 2477	3.1	5.0	3.7	2.0	3.6	38.3	
118 APR 2217	3.0	4.3	3.7	2.0	3.3	46.7	
119 APR 2554	3.0	4.3	3.7	2.0	3.3	46.7	
120 Pacific Gem	3.0	3.7	2.7	1.7	2.7	36.7	
121 Harrier	3.0	5.0	3.7	2.3	3.7	48.3	
122 Integra II	3.0	3.7	2.7	1.3	2.6	48.3	
123 APR 2261	3.0	5.7	3.7	1.0	3.4	35.0	
124 APR 2509	3.0	5.0	4.0	2.7	3.9	33.3	
125 PSG 4 DSL5F	3.0	5.0	4.3	2.0	3.8	46.7	
126 Zoom	2.9	4.0	2.7	1.0	2.6	20.0	
127 APR 2450	2.8	3.7	3.0	1.7	2.8	30.0	
128 APR 2127	2.8	4.0	3.0	1.3	2.8	31.7	
129 APR 2483	2.8	5.0	3.3	1.3	3.2	35.0	
130 PR 527	2.8	4.3	2.7	1.3	2.8	33.3	
131 APR 2467	2.7	5.0	3.7	1.3	3.3	35.0	
132 Amazing GS	2.7	5.3	3.3	1.3	3.3	30.0	
133 Gray Fox	2.7	2.7	2.0	1.3	2.0	31.7	
134 Calypso 3	2.6	3.3	2.3	1.3	2.3	28.3	
135 APR 2512	2.6	5.0	3.3	1.0	3.1	35.0	
136 APR 2558	2.6	3.7	3.3	2.0	3.0	41.7	
137 APR 2153	2.6	4.7	4.0	2.3	3.7	26.7	
138 Keystone 2	2.6	3.3	2.7	1.3	2.4	30.0	
139 Regal 5	2.6	3.7	1.7	1.0	2.1	15.0	
140 APR 2461	2.5	5.3	3.3	2.0	3.6	30.0	

(Continued)

Table 4. Perennial ryegrass gray leaf spot trial, 2012, NTEP (continued).

Cultivar or Selection	Turf Quality <sup>1</sup> 2013 Avg.	-----Grey Leaf Spot <sup>2</sup> -----				2012 Avg.	Cover <sup>3</sup> (%) Oct. 2012
		Aug. 2012	Aug. 2012	Sept. 2012			
141 PSG 21-10 Lp	2.5	3.0	2.3	1.7	2.3	33.3	
142 Secretariat II GLSR	2.5	4.0	3.0	1.7	2.9	31.7	
143 Silver Dollar	2.5	3.0	1.7	1.0	1.9	23.3	
144 PPG-PR-166	2.5	3.0	1.3	1.0	1.8	23.3	
145 APR 2458	2.4	4.0	3.3	1.7	3.0	28.3	
146 APR 2555	2.4	4.0	2.7	1.7	2.8	35.0	
147 APR 2459	2.4	3.3	2.0	1.0	2.1	26.7	
148 APR 2259	2.3	3.0	2.0	1.3	2.1	36.7	
149 PST-2USD-07	2.3	3.3	2.7	1.3	2.4	21.0	
150 APR 2184	2.3	3.7	2.7	1.0	2.4	20.0	
151 Monterey 4	2.2	3.0	1.7	1.3	2.0	16.7	
152 PPG-PR-169	2.2	4.7	3.3	1.3	3.1	25.0	
153 PSG SLD729-4	2.2	2.7	2.0	1.3	2.0	20.3	
154 PSG 4 SLD334	2.2	4.3	3.0	1.0	2.8	26.7	
155 APR 2548	2.1	4.0	3.3	1.0	2.8	25.0	
156 PSG SLD334-3	2.1	4.3	3.0	1.3	2.9	11.7	
157 PPG-PR-168	2.1	4.3	2.3	1.0	2.6	20.0	
158 Buena Vista	2.1	3.7	2.0	1.0	2.2	20.0	
159 Estelle	2.1	2.7	1.7	1.0	1.8	16.7	
160 PSG SLD334-4	2.1	3.0	3.0	1.3	2.4	18.7	
161 PSG SLD334-5	2.1	3.3	2.7	1.3	2.4	13.7	
162 PSG SLD334-7	2.1	3.7	2.0	1.0	2.2	23.3	
163 PST-2RDY	2.0	3.3	2.3	1.3	2.3	23.7	
164 PSG 4 DSL5B	2.0	4.3	3.7	2.0	3.3	35.0	
165 PSG PNCKD2	2.0	4.5	3.0	1.5	3.0	17.5	
166 PST-2ED1 Bulk	2.0	4.3	2.3	1.3	2.7	18.3	
167 PSG SLD257-3	2.0	4.0	3.3	1.7	3.0	21.0	
168 APR 2466	1.9	3.3	2.7	1.0	2.3	13.7	
169 PSG SLD334-2	1.9	3.3	2.3	1.3	2.3	16.7	
170 PSG 4SLD729	1.9	3.0	2.3	1.0	2.1	10.3	
171 APR 2544	1.8	2.7	1.7	1.0	1.8	19.3	
172 PSG PNCKD4	1.8	3.0	2.3	1.0	2.1	17.0	
173 PSG SLD334-6	1.8	4.3	2.7	1.3	2.8	15.0	
174 PST-2ESP Bulk	1.8	1.3	1.0	1.0	1.1	11.7	
175 PST-Syn-224L	1.8	3.0	1.3	1.0	1.8	11.7	

(Continued)

Table 4. Perennial ryegrass gray leaf spot trial, 2012, NTEP (continued).

Cultivar or Selection	Turf Quality <sup>1</sup> 2013 Avg.	-----Grey Leaf Spot <sup>2</sup> -----				2012 Avg.	Cover <sup>3</sup> (%) Oct. 2012
		Aug. 2012	Aug. 2012	Sept. 2012			
176 PSG 4 PNCKH	1.8	3.5	2.5	1.0	2.3	12.5	
177 PSG PNCKD6	1.8	3.5	1.5	1.0	2.0	7.5	
178 Palmer IV	1.7	3.0	1.7	1.0	1.9	9.3	
179 PST-2ETS Bulk	1.7	2.3	1.0	1.0	1.4	11.0	
180 PSG SLD334-1	1.7	2.7	1.3	1.0	1.7	15.0	
181 CS1	1.6	2.7	1.0	1.0	1.6	1.3	
182 Hancock	1.6	3.7	1.3	1.0	2.0	6.7	
183 PST-2H20	1.5	2.0	1.0	1.0	1.3	2.7	
184 Goalkeeper II	1.5	3.7	1.7	1.0	2.1	9.3	
185 Citation Fore	1.5	2.3	1.7	1.0	1.7	6.0	
186 PR 525	1.5	2.0	1.0	1.0	1.3	3.7	
187 PSG DS894-4	1.5	1.7	1.0	1.0	1.2	6.0	
188 Nexus XR	1.5	1.7	1.0	1.0	1.2	2.7	
189 Accent II	1.4	2.0	2.0	1.3	1.8	4.0	
190 PSG SLD729-3	1.4	2.0	1.7	1.0	1.6	1.3	
191 PSG 08-16-Lp	1.4	1.7	1.0	1.0	1.2	4.3	
192 Replay	1.3	3.0	1.7	1.3	2.0	2.3	
193 Marbella	1.3	1.7	1.3	1.0	1.3	4.7	
194 Gator 3	1.3	2.3	1.0	1.0	1.4	2.7	
195 Nexus XD	1.3	3.3	1.7	1.0	2.0	5.0	
196 PSG SLD257-5	1.3	3.7	2.7	1.0	2.4	9.3	
197 PSG 4 SLD257	1.3	3.3	1.7	1.0	2.0	10.3	
198 PR 544	1.3	3.7	1.7	1.0	2.1	3.0	
199 PSG DS894	1.2	2.3	2.0	1.0	1.8	2.3	
200 PSG SLD257-2	1.2	2.7	1.3	1.0	1.7	3.0	
201 JS 501	1.2	2.0	1.0	1.0	1.3	2.3	
202 Top Gun II	1.2	2.0	1.0	1.0	1.3	5.7	
203 La Quinta	1.2	2.0	1.3	1.0	1.4	2.3	
204 APR2517	1.2	3.0	1.7	1.0	1.9	2.0	
205 PSG SLD729-6	1.2	2.0	1.3	1.0	1.4	1.0	
206 PSG SLD257-4	1.2	2.3	1.3	1.0	1.6	5.3	
207 PSG 4 DS894-2	1.2	3.0	2.0	1.0	2.0	2.3	
208 Top Hat 2	1.2	1.7	1.0	1.0	1.2	1.7	
209 PSG SLD729-2	1.2	1.7	1.0	1.0	1.2	2.0	
210 PSG SLD729-1	1.1	1.3	1.0	1.0	1.1	1.0	

(Continued)

Table 4. Perennial ryegrass gray leaf spot trial, 2012, NTEP (continued).

Cultivar or Selection	Turf Quality <sup>1</sup> 2013 Avg.	-----Grey Leaf Spot <sup>2</sup> -----				2012 Avg.	Cover <sup>3</sup> (%) Oct. 2012
		Aug. 2012	Aug. 2012	Sept. 2012			
211 APR 2320	1.1	2.7	1.0	1.0	1.6	1.3	
212 Eliminator	1.1	2.0	1.0	1.0	1.3	2.0	
213 PSG 4 DSPP2-5	1.1	2.0	1.0	1.0	1.3	1.0	
214 PSG 4 DSPP2-2	1.0	2.0	1.3	1.0	1.4	1.3	
215 PSG 4 DSPP2	1.0	1.0	1.0	1.0	1.0	1.0	
216 PSG 08-14 Lp	1.0	1.3	1.0	1.0	1.1	1.0	
217 PSG SLD257-1	1.0	2.3	1.0	1.0	1.4	1.7	
218 PSG 4 DS894-3	1.0	2.3	1.0	1.0	1.4	2.0	
219 PSG 4 DS894-1	1.0	1.7	1.0	1.0	1.2	1.0	
220 Caddieshake II	1.0	2.0	1.0	1.0	1.3	1.3	
221 PSG 4 DSPP2-3	1.0	1.7	1.0	1.0	1.2	1.0	
222 PSG 4 STD3	1.0	1.3	1.3	1.0	1.2	1.0	
223 PSG 4 SRUP	1.0	1.3	1.0	1.0	1.1	1.7	
224 PSG 4 DSPP2-4	1.0	1.0	1.0	1.0	1.0	1.7	
225 PSG 4 DSPP2-6	1.0	1.3	1.0	1.0	1.1	1.0	
226 PSG 4 DSPP2-1	1.0	1.7	1.0	1.0	1.2	1.0	
227 PSG SLD729-5	1.0	2.0	1.0	1.0	1.3	2.0	
228 PSG 08-12 Lp	1.0	1.0	1.0	1.0	1.0	1.7	
229 PSG 4 DS894-6	1.0	2.0	1.0	1.0	1.3	1.3	
230 PSG 4 DS894-5	1.0	1.3	1.0	1.0	1.1	1.0	
231 Brightstar SLT	1.0	1.3	1.0	1.0	1.1	1.7	
232 Panther GLS	1.0	1.7	1.0	1.0	1.2	1.0	
LSD at 5% =	1.0	1.8	1.8	1.4	1.4	15.8	

<sup>1</sup>9 = best turf quality

<sup>2</sup>9 = least disease

<sup>3</sup>100 = full turf cover



Table 5. Performance of perennial ryegrass cultivars and selections in a turf trial seeded in September 2012 at Adelphia, NJ.

Cultivar or Selection	Turf Quality <sup>1</sup> 2013 Avg.
1 PST-Syn-2A2	6.6
2 FE5 comp	6.5
3 Palace	6.5
4 FE6 comp	6.4
5 PR 509	6.4
6 PST-Syn-2SUP	6.3
7 PPG-PR-138	6.2
8 PR 519	6.2
9 PR 523	6.2
10 Thrive	6.2
11 Pangea GLR	6.1
12 Amazing GS	6.0
13 PR 473 M2	6.0
14 PR 527	6.0
15 1037-12K	6.0
16 PPG-PR 197	6.0
17 PST-Syn-2LEW	6.0
18 WH1037	6.0
19 FE7 comp	6.0
20 PPG-PR 171	6.0
21 PR 551	6.0
22 PR 477	5.9
23 PR 490	5.9
24 PR 497 M2	5.9
25 Karma	5.9
26 PPG-PR 134	5.9
27 PR 541	5.9
28 Bandalore	5.8
29 FE4 comp	5.8
30 Wicked	5.8
31 08-1 LpRS-6	5.8
32 PPG-PR 140	5.8
33 PPG-PR 133	5.8
34 08-1 LpRS-5	5.7
35 FE3 comp	5.7

(Continued)

Table 5. Perennial ryegrass turf trial, 2012 (continued).

Cultivar or Selection		Turf Quality <sup>1</sup> 2013 Avg.
36	PPG-PR 164	5.7
37	PPG-PR 196	5.7
38	PPG-PR-121	5.7
39	PR 554	5.7
40	Seville 3	5.7
41	SR4650	5.7
42	APR 2291	5.7
43	PR 547	5.7
44	PST-2MRCO bulk	5.7
45	PR 533	5.6
46	PST-Syn-2FOX	5.6
47	08-1 LpRS-16	5.6
48	CT6 comp	5.6
49	Sideways	5.6
50	PR 472 M2	5.6
51	PR 499	5.6
52	Stamina	5.6
53	CT5 comp	5.5
54	Lp 09-12-1	5.5
55	PPG-PR 194	5.5
56	PR 475	5.5
57	CT7 comp	5.5
58	PR 537	5.5
59	PR 549	5.5
60	08-1 LpRS-7	5.5
61	Home Run	5.5
62	Radiance	5.5
63	PR 531	5.4
64	Primary	5.4
65	APR 2225	5.4
66	4DTWA	5.4
67	PR 462 M2	5.4
68	JR-178	5.4
69	Monsieur	5.4
70	PPG-PR 193	5.3
71	PPG-PR 195	5.3
72	PR 529	5.3
73	PSG 4MSH	5.3
74	Palmer V	5.3
75	PS9	5.3

(Continued)

Table 5. Perennial ryegrass turf trial, 2012 (continued).

Cultivar or Selection		Turf Quality <sup>1</sup> 2013 Avg.
76	PST-Syn-2LMD	5.3
77	Lp 09-12-16	5.3
78	Nexus XR	5.2
79	PR 525	5.2
80	Sienna	5.2
81	Exacta II GLSR	5.2
82	PST-Syn-2SHRP	5.2
83	PR 535	5.2
84	PR 544	5.2
85	Repell GLS	5.2
86	Zoom	5.2
87	CT2 comp	5.1
88	Lp 09-12-2	5.1
89	PR 470 M2	5.1
90	22-09	5.1
91	PPG-PR 172	5.1
92	20-10 Lp	5.1
93	CT3 comp	5.1
94	FETC comp	5.1
95	CT1 comp	5.0
96	Express II	5.0
97	Manhattan 6	5.0
98	PST-Syn-2PAN	5.0
99	CL 11601	5.0
100	PR 468 M2	5.0
101	PR 474	5.0
102	PST-Syn-2PDA	5.0
103	Insight	4.9
104	MOO 17A	4.9
105	MSP#3956	4.9
106	Nexus XD	4.9
107	Silver Dollar	4.9
108	4SLGS-2	4.9
109	Haven	4.9
110	PST-Syn-2ERO	4.9
111	Line Drive GLS	4.8
112	Palmer IV	4.8
113	PST-2BDE bulk	4.8
114	PST-2CITM	4.8
115	57-12	4.8

(Continued)

Table 5. Perennial ryegrass turf trial, 2012 (continued).

Cultivar or Selection		Turf Quality <sup>1</sup> 2013 Avg.
116	Apple GL	4.8
117	Charismatic II GLSR	4.8
118	Hawkeye 2	4.8
119	Panther GLS	4.8
120	Pennant III	4.8
121	Presido	4.8
122	Buena Vista	4.8
123	Fiesta 4	4.8
124	Lp 09-12-14	4.7
125	Lp 09-12-26	4.7
126	Secretariat II GLSR	4.7
127	PST-2MDT	4.7
128	PST-2PUK bulk	4.7
129	Revenge GLX	4.7
130	Soprano	4.7
131	Keystone 2	4.7
132	Mighty	4.7
133	Night sky	4.7
134	PPG-PR 168	4.7
135	PST-Syn-2DAP	4.7
136	08-1 LpRS-17	4.6
137	CSI	4.6
138	PR 467 M2	4.6
139	07-13	4.5
140	Lp 09-12-13	4.5
141	Misc-12K	4.5
142	Monterey 4	4.5
143	SR 4600	4.5
144	PSG DFHM	4.5
145	08-16 Lp	4.5
146	20-09	4.5
147	Harrier	4.5
148	21-10 Lp	4.4
149	21-11	4.4
150	Confetti III	4.4
151	DSL5B2	4.4
152	Palmer III	4.4
153	Manhattan 5 GLR	4.4
154	20-11	4.3
155	Allstar 3	4.3

(Continued)

Table 5. Perennial ryegrass turf trial, 2012 (continued).

Cultivar or Selection		Turf Quality <sup>1</sup> 2013 Avg.
156	Lp 09-12-22	4.3
157	Lp 09-12-6	4.3
158	Lp 09-12-3	4.2
159	Lp 09-12-7	4.2
160	SR 4420	4.2
161	Pennant II	4.2
162	Double Time GLS	4.1
163	Lp 09-12-23	4.1
164	Artic Green	4.0
165	Penn APR 2116	4.0
166	Penn APR 2105	4.0
167	DS894J	3.9
168	Accent II	3.9
169	Lp 09-12-18	3.9
170	07-12	3.8
171	JS 501	3.7
172	M46Z-12K	3.7
173	Replay	3.7
174	Black Cat II	3.6
175	DSF13D	3.6
176	Academy III	3.6
177	08-12 Lp	3.4
178	Divine	3.4
179	DSL5B1	3.3
180	Penn APR 2190	3.3
181	DSB2	3.0
182	DSF13E	3.0
183	PST-Syn-2RBA	2.9
184	Lp 09-12-21	2.9
185	MSP#3934	2.8
186	Goal Keeper II	2.8
187	LaQuinta	2.6
188	Top Gun II	2.5
189	Double Time	2.4
190	Caddieshack II	2.3
191	Olano	2.2
LSD at 5% =		0.7

<sup>1</sup>9 = best turf quality

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

	2011		2012		2013	
	N <sup>1</sup>	Ht <sup>2</sup>	N	Ht	N	Ht
Table 1 (2010 NTEP).....	3.00	1.5	3.00	1.5	2.50	1.5
Table 2 (2010 NTEP).....	3.25	1.5	3.00	1.5	3.00	1.5
Table 3 (2011).....			3.00	1.5	2.25	1.5
Table 4 (2012 National Grey Leaf Spot) .....					2.50	1.5
Table 5 (2012).....					2.75	1.5

<sup>1</sup>Annual N applied (lb/1000 ft<sup>2</sup>)

<sup>2</sup>Mowing height in inches