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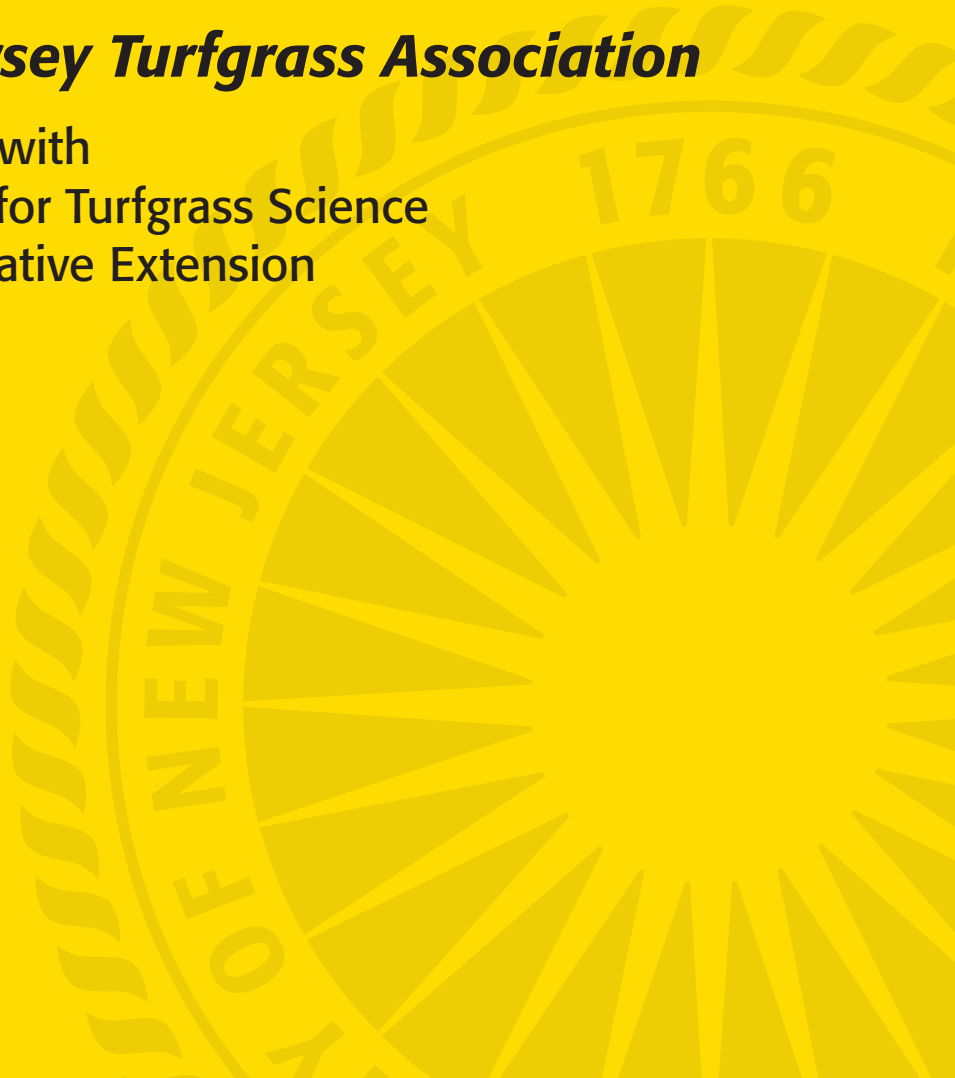

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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State 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 2009 New Jersey Turfgrass Expo. Publication of these lectures provides a readily available source of information covering a wide range of topics and includes technical and popular presentations of importance to the turfgrass industry.

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

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

PERFORMANCE OF 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 that have a pH between 5 and 8 (Peterson, 2002). However, optimum growth is achieved in well-drained, moderately fertile soils with a pH of 6.5 to 6.7 (Murphy and Mohr, 2002). Perennial ryegrass is best known for rapid establishment. Due to this trait, the turfgrass is often used in the southern United States for overseeding dormant lawns and athletic fields, where it germinates quickly, provides a playing surface during cold weather, and dies off in the summer. 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. In mixtures, perennial ryegrass is extremely competitive and if excessive amounts are used, the turf stand will be dominated by this species (Murphy and Mohr, 2002).

In 1967, the first turf-type perennial ryegrass "Manhattan" became commercially available, followed subsequently by the release of "Pennfine" in 1970. To date, many more cultivars been developed and have come to market and are readily available to turf managers for sports fields as well as home lawns. Newer cultivars have been improved upon to have increased stress tolerance, insect and disease resistance, improved mowing quality, dark green color, more uniform leaf texture, and 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 other research facilities.

The center of origin for perennial ryegrass includes Europe, North Africa, and parts of Asia. Because of this, international collection trips have been made in an effort to acquire new sources of germplasm. Plants collected from these foreign sources can contain new desirable traits that can then be used to breed the next generation of improved perennial ryegrass cultivars. In fact, this technique has resulted in sources of gray leaf spot resistance that have been used to develop improved disease resistant cultivars (Bonos et al., 2004; 2006).

One of the more important aspects of improved perennial ryegrass cultivars can be the presence of 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 Zijll de Jong, 2008). It has been shown that damage from foliar feeding insects, such as billbugs, sod webworm, and chinch bugs, can be significantly reduced by using a ryegrass cultivars containing endophytes (Ahmad et al. 1986; Funk et al. 1994). Turfgrass breeders and researchers are continuing to research the beneficial role of endophytes in turfgrasses.

PROCEDURES

Six perennial ryegrass trials were established between 2004 and 2008. Five of the trials were seeded at Adelphia, NJ (Tables 1, 3 to 6) and one was seeded at North Brunswick, NJ (Table 2). The five Adelphia trials were hand sown with 0.88 oz of seed into 3 x 5 ft plots (3.7 lb seed/1000 ft^2). The North Brunswick trial was hand sown with 2.1 oz into 3.5 x 5.5 ft plots (6.8 lb seed/1000 ft^2). All trials were arranged in a randomized complete block design with three replications, and plots had a six-inch unseeded border to limit contamination.

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A spring application of Dimension was used to control crabgrass on all trials (Tables 1 to 6). The 2006 and 2008 Adelphia trials (Table 3 and 6) were also sprayed with the postemergence herbicides 2,4-D and Banvel for broadleaf weed control in October. In August, trials reported in Tables 1 and 3 to 6 were sprayed with Dimension for control of annual bluegrass (*Poa annua* L.). The trial reported in Table 2 (2004 Perennial ryegrass trial in North Brunswick) received a second application of Dimension in June. For grub control, all Adelphia trials (Tables 1 and 3 to 6) received an application of Merit in June while Merit was applied in July to the North Brunswick trial (Table 2).

The annual rate of nitrogen (N) and mowing height for each trial is presented in Table 7. Single applications of fertilizer did not exceed 1.0 lb N/1000 ft^2. The amount and timing of N applied to the turf varied to encourage disease and other stresses. Trials were mowed regularly with reel mowers to maintain a 1.5 -inch height of cut. Rotary mowers were occasionally used to cut off reproductive tillers. Based on soil test results, trials were limed as needed to maintain a pH of 6.0 to 6.5. 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 resistance to damage from insects and diseases). Other ratings such as establishment, color, percent turf cover, and amount of residual reproductive stems were rated when significant differences were evident. All ratings, except for percent turf cover, were based on a 1 to 9 scale, where 9 represented the best turf characteristic. The rating for percent turf cover was based on a 0 to 100% scale, where 100% represented total turf 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 through 6. Entries in Tables 1 to 5 are ranked according to their overall (multi-year) quality average. The trial presented in Table 6 is ranked by the average quality rating for 2009. A high quality average is generally indicative of better disease resistance, a darker, bright green color, higher shoot density and uniformity, finer leaf texture, lower growth habit, improved mowing quality, and less damage due to insects. Tables 1 and 2 include entries of the 2004 National Perennial Ryegrass Test sponsored by the National Turfgrass Evaluation Program (NTEP).

Establishment

A September percent establishment rating in Table 6 indicates that most cultivars and selections were well established within two months of seeding. Seedling establishment and vigor can be affected by factors such as genetics, seed quality and storage, environmental conditions, after-ripening dormancy, and management procedures. Perennial ryegrass has quick establishment which helps to suppress weeds and prevent soil erosion. According to Table 6, cultivars Exacta II GLSR, Amazing GS, Charismatic II GLSR, Pleasure Supreme, Goalkeeper II, and Shining star had high ratings for establishment whereas PST-Syn-2MIN8, RAD-PR60, PST-Syn-2SHR8, and 07-5 PR had some of the lowest ratings.

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 on the overall turf quality of perennial ryegrass since the release of the first turf-type cultivars in the 1960s (Huff, 1997). Newer varieties such as All*Star 3, Derby Xtreme, and Uno as well as many promising experimentals such as RKS, PST-2MG7 Bulk, and 04-10 LP possess a darker green color, more uniform appearance, increased density, lower growth habit, cleaner mowing, better tolerance to diseases and insects, and improved tolerance to wear. Older cultivars such as Linn, Pinnacle, and Manhattan II consistently had the lowest quality scores, which demonstrates the vast improvements made to overall turfgrass quality through breeding efforts.

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 a 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 green color for each cultivar was also performed on the 2004 NTEP trial (Table 1). Entries with the darkest green color were All*Star 3, Palmer IV, Fiesta 4, APR 1648, Wayfarer, Sunshine 2, ASP6003, and Pick 02-R; cultivars Linn, Premier, and Pinnacle had the lightest green color.

Residual Reproductive Stems

A rating of "stemminess," or the amount of residual reproductive stems remaining in a plot after mowing, was taken in July 2009 on the 2008 perennial ryegrass trial (Table 6). Ratings were taken on a 1 to 9 scale, where 9 represented a plot with little residual reproductive stems. The lack of stemminess is an attractive trait as it allows for a more consistent and visibly appealing turfgrass stand. RHD Comp and ROB Comp both performed well for this trait while 07-5 PR and PST-Syn-2MIN8 retained the most residual reproductive stems into the middle of the summer.

SUMMARY

Turf type perennial ryegrass cultivars are some of the most versatile grasses available on the market today. Characteristics such as high traffic tolerance, rapid establishment, and deep green color are raising the demand for perennial ryegrass in the turfgrass seed industry. Although considerable improvements have been made to this turfgrass, increased genetically stable resistance to diseases is still needed. In addition, 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.

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

Bonos, S. A., J. A. Murphy, and B. B. Clarke. 2006. Integrated Control of Gray Leaf Spot on Perennial Ryegrass. Rutgers Cooperative Extension FS1048. 2 pages.

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 M. Mohr. 2002. Perennial ryegrass varieties for New Jersey. Rutgers Cooperative Extension, New Jersey Agricultural Experiment Station FS 989.

Murphy, J. A., and B. S. Park. 2004. Perennial ryegrass varieties for New Jersey sports fields. Rutgers Cooperative Extension New Jersey Agricultural Experiment Station FS 546.

Peterson, J. S. 2002. Perennial Ryegrass Plant Fact Sheet. USDA, NRCS, National Plant Data Center, Baton Rouge, LA. 2 pages.

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 turf trial established in August 2004 at Adelphia, NJ. (Includes all entries of the 2004 National Turfgrass Evaluation Program (NTEP) Perennial Ryegrass Test.)

	Cultivar or Selection	Turf Quality[1] 2005-2009 Avg.	2005 Avg.	2006 Avg.	2007 Avg.	2008 Avg.	2009 Avg.	Color[2] Sept. 2009
1	GL4 Comp	6.8	7.3	6.5	6.4	7.1	6.8	7.7
2	All*Star 3	6.5	7.1	6.7	6.7	6.0	6.1	8.0
3	Uno	6.5	7.0	6.5	6.3	6.4	6.4	7.7
4	Derby Xtreme	6.5	6.5	6.8	5.8	6.8	6.5	7.7
5	Kokomo II	6.5	6.4	6.2	6.3	6.9	6.7	7.3
6	Exacta II GLSR	6.4	7.1	6.5	6.1	6.1	6.4	7.7
7	Palmer IV	6.4	5.9	6.2	6.3	6.6	7.0	8.0
8	Palmer V	6.4	6.3	6.5	6.4	6.3	6.2	6.3
9	Stellar GL	6.3	6.5	6.4	6.3	6.1	6.4	7.3
10	Revenge GLX	6.3	6.6	6.5	5.8	6.0	6.6	7.7
11	Fiesta 4	6.2	7.0	6.2	5.5	6.5	6.0	8.0
12	Amazing GS	6.1	6.5	5.9	6.2	6.1	6.0	7.7
13	Dasher 3	6.1	6.3	6.6	5.5	6.2	5.9	7.3
14	Palmer GLS	6.1	6.2	6.0	6.1	5.9	6.2	6.3
15	Regal 5	6.1	6.5	6.0	6.1	6.1	5.7	7.7
16	Protégé GLR	6.1	5.9	6.2	5.9	6.2	6.1	7.7
17	Zoom	6.1	6.3	6.5	5.8	6.1	5.6	5.7
18	Fusion	6.0	6.0	6.1	6.0	5.8	6.3	7.3
19	GL3 Comp	6.0	6.1	6.0	6.2	5.9	5.9	7.7
20	Attribute	6.0	6.7	5.8	5.7	5.9	5.9	7.0
21	Panther GLS	6.0	6.6	5.5	6.2	5.6	5.9	6.7
22	Homerun	5.9	6.4	5.9	5.4	5.7	6.1	7.0
23	APR 1648	5.9	4.6	5.8	6.3	6.2	6.4	8.0
24	Palace	5.9	6.3	6.1	5.7	5.7	5.5	7.3
25	GL1 Comp	5.8	6.9	5.6	5.2	6.0	5.5	7.0

(Continued)

Table 1 (continued).

	Cultivar or Selection	Turf Quality[1] 2005-2009 Avg.	2005 Avg.	2006 Avg.	2007 Avg.	2008 Avg.	2009 Avg.	Color[2] Sept. 2009
26	SR 4600	5.8	6.9	6.0	5.1	5.8	5.4	7.0
27	Soprano	5.8	6.7	6.1	5.2	5.6	5.5	7.3
28	MMW	5.7	6.4	5.4	5.5	5.6	5.8	6.7
29	Primary	5.7	5.8	5.9	5.4	5.7	5.6	6.0
30	Keystone 2	5.7	6.0	5.5	5.9	5.5	5.4	5.7
31	Paragon GLR	5.6	6.4	5.6	5.7	5.3	4.9	6.3
32	Repell GLS	5.5	6.0	5.7	5.5	5.2	5.3	7.0
33	Defender	5.5	5.8	5.7	5.3	5.4	5.4	6.3
34	Silver Dollar	5.5	5.5	5.2	5.8	5.3	5.8	7.0
35	Harrier	5.5	6.1	5.6	5.1	5.4	5.3	6.3
36	Line Drive GLS	5.5	6.0	5.6	5.5	5.1	5.3	6.0
37	Buena Vista	5.5	5.5	5.4	5.6	5.5	5.5	7.3
38	1G Squared	5.5	6.7	5.2	4.9	5.5	5.2	5.7
39	Notable	5.5	6.6	5.5	5.6	5.0	4.8	5.7
40	Grand Slam 2	5.3	5.5	5.1	5.4	5.2	5.5	6.7
41	Phenom	5.3	6.0	5.4	4.9	5.3	5.0	5.3
42	Edge II	5.3	5.1	5.4	5.5	5.2	5.2	7.3
43	Apple GL	5.3	5.8	4.8	5.0	5.5	5.4	7.3
44	Transformer	5.3	5.9	5.7	5.0	4.6	5.1	5.7
45	Overdrive	5.2	4.8	5.0	5.5	5.3	5.6	6.0
46	Charismatic II GLSR	5.2	5.7	4.9	4.8	5.3	5.2	5.7
47	PST-2AG4	5.2	5.7	5.0	5.1	4.7	5.5	7.3
48	Secretariat II GLSR	5.2	6.0	5.2	5.0	4.8	4.8	5.3
49	Cabo II	5.1	4.9	5.1	4.9	5.2	5.1	7.7
50	ASP6004	5.0	4.7	4.9	5.2	5.2	5.1	7.7

(Continued)

Table 1 (continued).

	Cultivar or Selection	Turf Quality[1] 2005-2009 Avg.	2005 Avg.	2006 Avg.	2007 Avg.	2008 Avg.	2009 Avg.	Color[2] Sept. 2009
51	Calypso III	5.0	5.0	5.0	5.2	4.9	5.1	6.7
52	Prototype	5.0	4.9	4.9	5.0	5.1	5.0	6.3
53	Gray Fox	4.9	5.0	4.9	5.2	4.5	5.1	6.0
54	Pleasure Supreme	4.9	4.9	4.8	4.6	5.2	5.3	6.7
55	APR 1670	4.9	5.6	5.0	5.2	4.3	4.6	4.7
56	ASP6006	4.9	4.8	4.8	4.6	5.3	5.2	7.7
57	Majesty II	4.9	4.7	4.9	5.0	5.0	5.1	5.7
58	Gray Star	4.9	4.8	4.5	5.3	4.7	5.1	5.3
59	Dart	4.9	5.6	4.8	4.8	4.5	4.7	5.0
60	RAD-PR8	4.9	4.7	4.6	4.7	5.0	5.4	5.7
61	Nexus XR	4.8	4.6	4.4	4.8	5.1	5.2	7.7
62	Hawkeye 2	4.8	4.6	4.7	5.0	4.5	5.2	3.7
63	PST-2BLK	4.8	4.5	4.5	4.7	4.8	5.3	6.3
64	VB99	4.7	4.4	4.6	4.7	4.8	5.0	7.7
65	Quicksilver	4.7	4.2	4.2	5.1	4.8	5.3	6.7
66	Cutter II	4.7	4.0	4.5	4.9	5.1	5.0	7.0
67	PST-217	4.7	4.0	4.8	4.9	5.0	4.7	5.0
68	Fiji	4.6	4.4	4.5	4.6	4.7	5.1	7.0
69	Mach I	4.6	4.7	4.8	4.1	4.7	4.8	5.7
70	Manhattan 5 GLR	4.6	5.3	4.8	4.6	4.1	4.3	5.3
71	ES45	4.6	4.5	4.6	4.5	4.6	4.9	7.0
72	DP 17-9499	4.6	4.1	4.5	4.7	4.8	5.0	5.7
73	Top Gun II	4.6	4.1	4.4	4.7	4.7	5.0	6.0
74	Ringer II	4.6	4.5	4.5	4.7	4.3	5.0	5.3
75	Pentium	4.6	4.5	4.7	4.7	4.5	4.6	3.7

(Continued)

Table 1 (continued).

	Cultivar or Selection	Turf Quality[1] 2005-2009 Avg.	2005 Avg.	2006 Avg.	2007 Avg.	2008 Avg.	2009 Avg.	Color[2] Sept. 2009
76	Nexus XD	4.6	4.0	4.1	4.7	4.8	5.3	7.3
77	E-99	4.6	4.1	4.7	4.6	4.4	5.1	3.3
78	Firebolt	4.6	4.4	4.4	4.3	4.7	5.0	6.3
79	Delaware XL	4.5	4.3	4.4	4.6	4.7	4.9	7.3
80	Citation Fore	4.5	4.9	4.3	4.6	4.5	4.5	4.3
81	TR47	4.5	4.0	4.2	4.7	4.6	5.0	7.7
82	PM 102	4.5	4.1	4.6	4.7	4.4	4.7	7.7
83	La Quinta	4.5	4.0	4.4	4.7	4.5	4.8	7.3
84	Pinnacle II	4.5	4.6	4.5	4.4	4.6	4.4	5.7
85	Plateau	4.4	4.6	4.1	4.7	4.3	4.5	5.0
86	Headstart 2	4.4	3.7	4.1	4.9	4.6	4.9	7.7
87	D04-LP05	4.4	3.7	4.2	4.9	4.3	5.0	7.0
88	Pizzazz	4.4	3.9	4.3	4.5	4.3	4.9	6.7
89	Presidio	4.3	4.1	4.3	4.1	4.5	4.6	7.0
90	Wind Dance 2	4.3	3.5	4.3	4.6	4.6	4.6	7.7
91	Halo	4.3	4.0	4.2	4.4	4.3	4.5	7.0
92	Monterey 3	4.3	3.9	4.2	4.3	4.5	4.3	4.3
93	Wayfarer	4.2	4.0	4.1	4.4	4.1	4.7	8.0
94	Brea	4.2	4.5	4.0	3.9	4.1	4.6	6.0
95	Sunshine 2	4.2	3.7	3.9	4.2	4.4	4.8	8.0
96	BAR Lp 4420	4.2	4.1	4.2	4.3	4.0	4.6	6.3
97	Pacesetter II	4.2	3.3	4.5	4.2	4.2	4.6	5.3
98	Accent II	4.2	4.1	4.3	4.0	4.1	4.4	4.3
99	BAR Lp 4317	4.2	3.9	4.1	4.0	4.4	4.4	4.3
100	BAR Lp 4920	4.1	4.0	4.4	3.9	4.2	4.2	6.0

(Continued)

Table 1 (continued).

	Cultivar or Selection	Turf Quality[1] 2005-2009 Avg.	2005 Avg.	2006 Avg.	2007 Avg.	2008 Avg.	2009 Avg.	Color[2] Sept. 2009
101	Caddieshack II	4.1	3.2	3.9	4.4	4.3	4.8	5.3
102	Goalkeeper II	4.1	3.5	3.9	4.3	4.3	4.6	4.3
103	ASP6002	4.1	3.8	4.0	4.0	3.8	5.0	7.7
104	Pianist	4.1	3.9	3.9	4.2	4.0	4.5	6.0
105	ASP6001	4.0	3.3	3.8	4.0	4.2	4.9	7.7
106	SRX 4682	4.0	4.7	4.0	3.9	3.7	3.7	3.0
107	ASP6003	4.0	3.7	4.2	4.0	4.0	4.3	8.0
108	Brightstar SLT	4.0	3.9	4.0	3.8	4.2	4.2	4.0
109	Galatti	4.0	4.0	3.5	4.0	4.2	4.3	4.7
110	Pick 02-R	4.0	3.7	3.6	3.9	4.0	4.6	8.0
111	Inspire	3.9	3.4	3.9	4.1	3.8	4.5	5.0
112	ASP6005	3.9	3.9	3.7	3.6	4.1	4.1	7.0
113	Barlennium	3.6	3.1	3.3	3.8	3.7	4.2	3.3
114	Premier II	3.6	3.7	3.5	3.3	3.6	3.8	4.0
115	DP 17-9788	3.4	3.4	3.2	3.4	3.2	3.6	3.7
116	Palmer III	3.4	3.4	3.4	3.3	3.3	3.3	3.7
117	Panther	3.2	3.0	3.3	2.9	3.4	3.5	3.3
118	Affinity	2.9	3.2	3.0	2.6	3.0	2.9	2.0
119	LPR 02203	2.6	2.5	2.8	2.3	2.7	2.6	2.7
120	Premier	2.6	2.9	2.7	2.4	2.2	2.6	1.0
121	Pinnacle	2.3	2.1	2.4	2.4	2.2	2.4	1.7
122	Manhattan II	2.3	1.8	2.0	2.3	2.6	2.7	5.3
123	Linn	1.0	1.0	1.0	1.0	1.0	1.1	1.0

(Continued)

Table 1 (continued).

Cultivar or Selection	Turf Quality[1] 2005-2009 Avg.	2005 Avg.	2006 Avg.	2007 Avg.	2008 Avg.	2009 Avg.	Color[2] Sept. 2009
LSD at 5% =	0.6	0.7	0.8	1.0	0.8	0.9	1.7

[1]9 = best turf quality
[2]9 = darkest green genetic color

Table 2. Performance of perennial ryegrass cultivars and selections in a turf trial established in September 2004 at North Brunswick, NJ. (Includes all entries of the 2004 National Turfgrass Evaluation Program (NTEP) Perennial Ryegrass Test.)

	Cultivar or Selection	Turf Quality[1] 2005-2009 Avg.	2005 Avg.	2006 Avg.	2007 Avg.	2008 Avg.	2009 Avg.
1	All*Star 3	6.8	7.4	7.2	6.7	6.7	6.0
2	Uno	6.7	7.7	6.9	6.1	6.2	6.8
3	Amazing GS	6.7	6.8	7.0	6.9	6.5	6.3
4	Homerun	6.6	6.6	6.5	6.5	6.8	6.4
5	Zoom	6.5	6.4	6.6	7.0	6.7	5.8
6	Derby Xtreme	6.5	6.8	6.6	6.4	6.5	6.3
7	SR 4600	6.5	7.4	6.2	6.1	6.4	6.4
8	Regal 5	6.4	7.1	6.6	7.1	5.7	5.6
9	Fiesta 4	6.4	7.0	6.8	5.9	6.1	6.1
10	Palace	6.3	6.6	6.2	6.8	6.4	5.8
11	Attribute	6.3	6.9	6.6	6.6	6.1	5.6
12	Keystone 2	6.3	6.2	6.2	6.5	6.6	6.1
13	Primary	6.3	6.7	6.4	6.0	6.4	6.2
14	Palmer V	6.3	7.1	6.5	5.8	6.0	6.3
15	Kokomo II	6.3	6.7	6.3	6.0	6.5	5.9
16	Apple GL	6.3	6.8	5.6	6.3	6.4	6.4
17	Revenge GLX	6.3	6.7	5.8	6.6	6.3	5.9
18	Dasher 3	6.2	7.2	6.6	6.2	5.9	5.3
19	Exacta II GLSR	6.2	6.8	6.0	6.7	6.2	5.3
20	Grand Slam 2	6.2	6.1	6.5	6.0	6.5	5.9
21	Palmer IV	6.2	6.6	5.9	6.0	6.1	6.3
22	Palmer GLS	6.1	6.6	6.0	6.1	6.1	5.8
23	Transformer	6.0	6.9	6.2	5.7	5.8	5.7
24	Notable	6.0	6.6	6.2	5.9	5.6	5.7
25	Line Drive GLS	6.0	6.6	5.9	5.5	6.2	5.8
26	1G Squared	6.0	6.7	5.8	6.1	5.8	5.3
27	Silver Dollar	6.0	6.1	6.8	6.0	5.6	5.5
28	Panther GLS	6.0	6.7	6.7	5.6	5.8	5.0
29	Dart	5.9	6.7	5.9	5.8	5.7	5.8
30	Harrier	5.9	7.1	5.9	5.5	5.9	5.4
31	Paragon GLR	5.9	6.9	5.7	5.6	6.0	5.4
32	MMW	5.9	7.1	6.3	5.3	5.5	5.4
33	Charismatic II GLSR	5.9	6.6	5.9	5.8	5.7	5.6
34	SRX 4692	5.9	6.4	6.2	5.9	5.4	5.6
35	Defender	5.9	6.7	5.8	5.7	6.0	5.4

(Continued)

Table 2 (continued).

	Cultivar or Selection	Turf Quality[1] 2005-2009 Avg.	2005 Avg.	2006 Avg.	2007 Avg.	2008 Avg.	2009 Avg.
36	Secretariat II GLSR	5.9	6.6	5.8	5.7	5.6	5.7
37	Soprano	5.8	7.2	5.8	5.7	5.4	5.1
38	PST-2AG4	5.8	5.9	6.5	5.9	5.6	5.4
39	Prototype	5.7	5.8	6.0	5.8	5.8	5.1
40	Protégé GLR	5.7	6.4	6.1	5.9	4.9	5.0
41	Fusion	5.7	6.0	5.8	5.7	5.6	5.3
42	Manhattan 5 GLR	5.6	6.3	5.0	5.5	5.9	5.4
43	Gray Fox	5.6	5.8	6.1	5.5	5.7	4.9
44	APR 1670	5.6	6.5	5.7	5.8	5.6	4.6
45	Pleasure Supreme	5.5	5.1	5.4	5.7	5.6	5.8
46	Buena Vista	5.5	5.9	5.1	5.6	5.5	5.2
47	Calypso III	5.4	5.3	5.2	5.7	5.5	5.5
48	E-99	5.4	4.9	5.5	5.4	6.2	5.5
49	Stellar GL	5.4	6.5	5.6	4.9	5.2	5.0
50	ASP 6004	5.4	4.6	5.8	6.1	5.6	4.8
51	Gray Star	5.4	4.9	5.4	5.6	5.5	5.3
52	PST-2BLK	5.3	4.6	5.4	5.3	5.6	5.7
53	Repell GLS	5.3	6.0	5.1	5.4	5.1	4.9
54	Phenom	5.3	6.6	5.3	5.1	4.9	4.5
55	Delaware XL	5.2	4.5	5.8	5.6	5.1	5.1
56	Overdrive	5.2	4.9	5.5	5.6	5.2	5.0
57	APR 1648	5.2	3.5	5.5	6.3	5.4	5.4
58	ASP 6003	5.2	3.9	4.9	5.8	5.8	5.5
59	ASP 6006	5.2	4.7	5.1	5.8	5.1	5.0
60	Plateau	5.2	5.0	5.1	5.4	5.5	4.9
61	Brea	5.2	5.3	5.0	5.5	4.9	5.2
62	Cabo II	5.1	6.4	5.3	5.1	4.7	4.1
63	RAD-PR8	5.1	5.4	4.9	4.7	5.7	5.1
64	SRX 4682	5.1	5.8	4.9	5.1	4.9	4.8
65	Edge II	5.1	5.1	5.1	5.5	4.8	4.6
66	ES45	5.0	5.0	5.4	5.0	5.1	4.8
67	Wind Dance 2	5.0	4.8	4.9	5.4	5.1	4.9
68	Ringer II	5.0	5.3	4.5	5.3	5.0	5.0
69	Citation Fore	5.0	5.0	4.9	4.8	5.3	5.1
70	Pinnacle II	5.0	4.4	5.1	5.0	4.8	5.7

(Continued)

Table 2 (continued).

	Cultivar or Selection	Turf Quality[1] 2005-2009 Avg.	2005 Avg.	2006 Avg.	2007 Avg.	2008 Avg.	2009 Avg.
71	Fiji	5.0	4.5	5.4	5.6	4.9	4.4
72	ASP 6005	5.0	5.1	5.2	5.1	5.1	4.4
73	Pentium	5.0	4.0	5.5	5.2	5.1	5.0
74	ASP 6002	4.9	4.8	5.3	5.6	4.7	4.4
75	PST-217	4.9	4.5	5.0	5.0	5.2	4.8
76	Majesty II	4.9	4.7	4.9	5.0	5.0	4.7
77	Galatti	4.8	4.1	4.9	5.3	4.6	5.2
78	Accent II	4.8	3.8	4.7	5.0	5.5	5.2
79	Pizzazz	4.7	4.3	5.2	4.7	5.0	4.4
80	Inspire	4.7	3.3	4.6	4.8	5.4	5.5
81	Mach I	4.7	3.8	4.7	5.0	4.9	5.3
82	DP 17-9499	4.7	4.0	4.9	4.7	4.7	5.2
83	TR47	4.7	4.5	5.0	4.6	4.7	4.7
84	Presidio	4.7	4.4	5.0	5.1	4.5	4.4
85	Cutter II	4.7	3.7	4.7	5.1	4.9	5.1
86	Quicksilver	4.7	3.7	4.8	5.1	4.8	5.0
87	ASP 6001	4.6	3.8	4.8	4.9	5.2	4.4
88	Nexus XD	4.6	4.0	4.8	5.1	4.9	4.5
89	Top Gun II	4.6	3.4	4.7	5.4	4.7	5.0
90	Wayfarer	4.6	4.3	4.8	4.9	4.5	4.4
91	Nexus XR	4.6	4.7	5.2	4.6	4.4	4.1
92	Firebolt	4.5	3.8	3.7	5.0	4.9	5.0
93	Halo	4.4	4.0	4.7	4.9	4.0	4.3
94	Pacesetter II	4.4	3.2	4.5	4.6	4.7	4.9
95	D04-LP05	4.4	3.4	4.2	5.0	4.9	4.4
96	VB99	4.3	4.4	4.6	4.4	4.1	4.0
97	Brightstar SLT	4.3	3.6	4.2	4.4	5.1	4.4
98	BAR Lp 4420	4.3	4.1	3.9	4.7	4.6	4.5
99	Headstart 2	4.3	3.2	4.1	4.7	4.4	5.3
100	PM 102	4.3	3.6	4.2	4.5	4.5	4.6
101	BAR Lp 4920	4.2	3.5	4.0	4.2	4.4	5.0
102	Pianist	4.2	3.3	4.3	4.6	4.3	4.6
103	Palmer III	4.1	3.4	3.9	4.4	4.5	4.6
104	BAR Lp 4317	4.1	3.8	3.9	4.4	4.2	4.4
105	La Quinta	4.1	3.6	4.1	4.3	4.4	4.4

(Continued)

Table 2 (continued).

	Cultivar or Selection	Turf Quality[1] 2005-2009 Avg.	2005 Avg.	2006 Avg.	2007 Avg.	2008 Avg.	2009 Avg.
106	Barlennium	4.1	3.4	4.0	4.3	4.6	4.3
107	Goalkeeper II	4.1	3.1	3.6	4.2	4.7	4.8
108	DP 17-9788	4.0	3.8	4.1	4.0	4.0	4.3
109	Caddieshack II	4.0	2.9	4.0	4.5	4.1	4.5
110	Pick 02-R	4.0	3.2	3.4	4.6	4.2	4.4
111	Premier II	3.9	3.0	3.6	3.9	4.3	4.8
112	Monterey 3	3.9	3.3	4.6	4.2	3.8	3.6
113	Panther	3.8	2.4	3.6	3.8	4.6	4.8
114	Premier	3.8	3.4	3.8	3.5	4.4	4.2
115	Sunshine 2	3.8	3.2	3.3	4.1	4.1	4.2
116	Affinity	3.7	3.5	3.7	3.3	4.2	3.8
117	Pinnacle	3.4	2.6	3.1	2.9	3.7	4.5
118	LPR 02203	3.0	2.0	2.7	2.9	3.9	3.6
119	Manhattan II	2.9	2.1	2.5	2.9	3.5	3.7
120	Linn	1.0	1.1	1.0	1.1	1.1	1.0
	LSD at 5% =	0.7	0.7	0.9	1.1	1.1	1.1

[1]9 = best turf quality

Table 3. Performance of perennial ryegrass cultivars and selections in a turf trial established in August 2006 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 2007-2009 Avg.	Turf Quality[1] 2007 Avg.	Turf Quality[1] 2008 Avg.	Turf Quality[1] 2009 Avg.
1	Derby Xtreme	6.2	6.1	6.2	6.2
2	HP3 comp	6.2	6.1	6.2	6.2
3	HP1 comp	6.0	6.0	6.0	6.2
4	AMS comp	5.9	5.8	6.2	5.8
5	IS-PR 342	5.8	6.1	5.6	5.6
6	Soprano	5.8	6.3	5.6	5.4
7	IS-PR 314	5.8	6.2	5.7	5.4
8	Palmer V	5.8	6.3	5.5	5.5
9	APR 2036	5.8	5.9	5.5	5.8
10	HU1 comp	5.8	5.9	6.2	5.2
11	APR 2037	5.7	5.8	5.8	5.5
12	APR 1979	5.7	6.1	5.3	5.7
13	PAR comp	5.7	6.0	5.9	5.2
14	APR 1980	5.7	6.3	5.4	5.4
15	Pershing	5.7	5.6	5.9	5.5
16	Harrier	5.7	6.0	5.6	5.5
17	Paragon GLR	5.7	5.8	5.8	5.4
18	Apple GL	5.6	5.8	5.8	5.3
19	IS-PR 315	5.6	6.2	5.8	4.8
20	HP2 comp	5.5	5.7	5.3	5.5
21	Zoom	5.5	5.8	5.4	5.2
22	IS-PR 340	5.5	5.9	5.3	5.2
23	IS-PR 316	5.4	5.6	5.4	5.3
24	All*Star 3	5.4	5.8	5.5	5.0
25	MSH comp	5.4	5.3	5.6	5.3
26	Homerun	5.4	6.3	4.7	5.3
27	IG Squared	5.4	5.4	5.5	5.4
28	Stellar GL	5.4	5.5	5.6	5.1
29	Repell GLS	5.4	5.6	5.4	5.1
30	Applaud II	5.4	5.4	5.2	5.5
31	APR 2034	5.4	5.3	5.6	5.1
32	Gray Goose	5.3	5.0	5.3	5.6
33	APR 2025	5.3	5.4	5.5	5.1
34	APR 2031	5.3	5.5	5.4	5.0
35	RAD-PR44	5.3	5.4	5.5	5.0

(Continued)

Table 3 (continued).

	Cultivar or Selection	Turf Quality[1] 2007-2009 Avg.	2007 Avg.	2008 Avg.	2009 Avg.
36	PST-syn-2GLG	5.3	5.1	5.4	5.4
37	Silver Dollar	5.3	5.0	5.5	5.3
38	Gray Fox	5.3	5.3	5.2	5.3
39	Phenom	5.3	5.7	5.2	4.9
40	Palmer IV	5.3	5.2	5.6	5.0
41	SR 4600	5.2	5.9	4.8	4.9
42	All*Star 2	5.2	4.7	5.3	5.6
43	Prelude GLS	5.2	5.2	5.2	5.2
44	RAD-PR36	5.1	4.9	4.9	5.6
45	Integra II	5.1	4.7	5.4	5.3
46	PST-265M	5.1	4.7	5.1	5.6
47	PST-syn-2AM-A	5.1	5.2	5.0	5.1
48	PST-syn-2CNV	5.1	4.9	5.1	5.3
49	PST-2GSB	5.1	4.9	5.1	5.3
50	APR 2026	5.1	5.0	5.3	4.9
51	APR 2033	5.1	5.0	5.4	4.9
52	PST-2AG4	5.1	5.3	4.9	5.1
53	Panther GLS	5.1	5.4	5.1	4.8
54	APR 2035	5.1	5.3	5.2	4.7
55	Phenom	5.0	5.3	4.9	4.9
56	PST-2AG$	5.0	4.7	5.0	5.2
57	IG2	5.0	5.4	5.1	4.4
58	PST-2USA Bulk	5.0	4.8	5.0	5.2
59	APR 2024	5.0	5.1	4.6	5.2
60	PST-2LAN	4.9	4.7	5.1	5.1
61	APR 2032	4.9	5.0	5.1	4.6
62	Line Drive	4.9	4.6	5.0	5.1
63	Calypso III	4.9	4.6	5.1	5.0
64	PST-syn-2H20	4.9	4.6	5.1	4.9
65	Hawkeye 2	4.8	4.6	5.2	4.7
66	RAD-PR33	4.8	4.2	5.2	5.1
67	Wizard II	4.8	4.6	5.0	4.8
68	PST-2SDG Bulk	4.8	4.7	4.8	4.9
69	SR 4550	4.8	4.5	5.0	4.8
70	APR 2038	4.8	4.9	5.1	4.3

(Continued)

Table 3 (continued).

	Cultivar or Selection	Turf Quality[1] 2007-2009 Avg.	2007 Avg.	2008 Avg.	2009 Avg.
71	AUR comp	4.7	5.2	5.1	4.0
72	RAD-PR38	4.7	4.6	4.8	4.7
73	IS-PR 341	4.7	4.7	4.9	4.6
74	Applaud	4.7	5.4	4.3	4.4
75	RAD-PR28	4.7	4.8	4.9	4.4
76	Gray Star	4.7	4.9	4.7	4.5
77	Priority	4.7	4.5	4.8	4.7
78	Pennant III	4.6	4.3	4.8	4.7
79	Quicksilver	4.6	4.3	4.9	4.6
80	RAD-PR34	4.6	4.6	4.6	4.6
81	Delaware XL	4.6	4.6	4.6	4.5
82	Jet	4.5	4.3	4.9	4.4
83	Gator 3	4.5	4.3	4.7	4.6
84	PST-2RZB Bulk	4.5	4.6	4.6	4.4
85	PST-syn-2R04	4.5	4.3	4.9	4.4
86	Peregrine	4.5	4.4	4.7	4.4
87	Dart	4.5	4.6	4.7	4.1
88	SR 4220	4.5	4.5	4.5	4.3
89	Integra	4.5	4.3	4.8	4.3
90	Brea	4.5	4.5	4.5	4.4
91	SR 4420	4.4	4.3	4.5	4.5
92	Mach 1	4.3	4.3	4.4	4.1
93	Prelude IV	4.3	4.0	4.5	4.2
94	SR 4682	4.2	4.0	4.4	4.3
95	RAD-PR29	4.2	4.0	4.5	4.2
96	IS-PR 313	4.2	4.0	4.6	4.1
97	IS-MBH2	4.1	4.1	4.5	3.8
98	Headstart 2	4.1	3.5	4.6	4.2
99	Slugger	4.1	3.8	4.0	4.4
100	Manhattan 4	4.1	3.8	4.4	4.0
101	Ringer II	4.0	3.9	4.4	3.8
102	Ringer	4.0	3.9	4.2	3.8
103	Hawkeye	3.9	3.6	3.9	4.3
104	PST-2101	3.9	3.6	4.1	4.0
105	Confetti	3.9	3.5	3.8	4.4

(Continued)

Table 3 (continued).

	Cultivar or Selection	Turf Quality[1] 2007-2009 Avg.	2007 Avg.	2008 Avg.	2009 Avg.
106	IS-PR 225	3.9	4.0	4.0	3.7
107	Citation Fore	3.9	3.8	4.0	3.8
108	SR 4500	3.8	3.3	4.0	4.2
109	SR 4350	3.8	3.5	3.6	4.2
110	Sonata	3.8	3.1	4.0	4.1
111	04-HEAT	3.7	3.3	3.9	4.0
112	Pinstripe	3.7	2.9	4.5	3.8
113	RAD-PR35	3.7	3.7	3.9	3.5
114	STR 4TPCS	3.7	3.2	3.9	4.0
115	Frontier	3.6	3.4	3.8	3.7
116	PST-2M*	3.6	3.6	3.7	3.5
117	SRX 4SLT	3.6	3.1	4.0	3.7
118	PST-2SNS	3.6	3.3	3.7	3.7
119	Darkstar II	3.5	3.4	3.3	3.7
120	Calypso II	3.4	3.0	3.8	3.5
121	STR 4AAPR	3.3	2.9	3.6	3.3
122	STR 45AB4	3.2	3.1	3.3	3.0
123	APR 1802	3.1	2.7	3.7	3.0
124	STR X863	2.7	2.6	2.9	2.5
	LSD at 5% =	0.6	0.7	0.7	0.9

[1]9 = best turf quality

Table 4. Performance of perennial ryegrass cultivars and selections in a turf trial established in August 2007 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 2008-2009 Avg.	Turf Quality[1] 2008 Avg.	Turf Quality[1] 2009 Avg.
1	APR2072	5.4	5.7	5.1
2	PST-2USD	5.4	5.1	5.6
3	OC2 Comp	5.3	6.2	4.3
4	APR 2037	5.2	5.5	4.9
5	Palmer IV	5.2	5.4	4.9
6	IS-PR 342	5.1	5.8	4.4
7	Gray Goose	5.0	4.9	5.1
8	Priority	5.0	4.8	5.2
9	Buena Vista GLSR	5.0	5.4	4.6
10	All*Star 3	5.0	5.4	4.5
11	Uno	5.0	5.7	4.3
12	Amazing GS	5.0	5.1	4.9
13	Zoom	5.0	5.4	4.5
14	Fiesta 4	4.9	5.8	4.1
15	Palmer V	4.9	5.4	4.5
16	APR2070	4.9	5.0	4.8
17	GL-74	4.9	5.9	3.9
18	06 J Lp	4.9	5.0	4.8
19	APR2085	4.9	5.0	4.7
20	DF Comp	4.9	5.4	4.3
21	Defender	4.9	5.6	4.1
22	Gray Fox	4.9	5.0	4.7
23	Top Gun II	4.9	4.8	4.9
24	APR2083	4.9	5.3	4.4
25	IS-PR 409	4.9	5.1	4.6
26	Transformer	4.9	5.6	4.1
27	IS-PR 341	4.8	5.5	4.1
28	Soprano	4.8	5.3	4.3
29	Monterey 3	4.8	5.1	4.5
30	RKS Comp	4.8	5.5	4.1
31	Calypso III	4.8	5.0	4.6
32	HP1	4.8	5.3	4.3
33	GL-31	4.8	5.6	3.9
34	Dasher III	4.8	5.4	4.2
35	Pennant III	4.8	4.8	4.8

(Continued)

Table 4 (continued).

	Cultivar or Selection	Turf Quality[1] 2008-2009 Avg.	2008 Avg.	2009 Avg.
36	HU1	4.8	5.1	4.4
37	Wizard II	4.7	4.4	5.0
38	SAK Comp	4.7	5.3	4.1
39	PST 2COL-07	4.7	4.7	4.7
40	SR 4550	4.7	5.1	4.3
41	Edge II	4.7	4.7	4.7
42	Radiant II	4.7	4.7	4.7
43	APR2097	4.7	4.9	4.4
44	Derby Xtreme	4.7	4.8	4.5
45	06-K Lp	4.7	4.7	4.6
46	RAD-PR55	4.7	5.0	4.3
47	IG Squared	4.7	5.0	4.3
48	APR2084	4.6	5.1	4.1
49	Homerun	4.6	4.9	4.3
50	Pleasure Supreme	4.6	4.8	4.4
51	Sunshine 2	4.6	4.7	4.5
52	Applaud II	4.6	5.3	3.9
53	APR2090	4.6	5.0	4.1
54	IS-PR 340	4.6	5.0	4.2
55	PST-2NKM	4.6	5.0	4.2
56	Silver Dollar	4.6	4.9	4.3
57	06 H Lp	4.6	4.4	4.8
58	PST-2GSB	4.6	4.5	4.6
59	GM3 Comp	4.6	5.3	3.8
60	PST-21N4	4.6	4.6	4.5
61	Peregrine	4.5	4.9	4.2
62	Prelude GLS	4.5	4.7	4.3
63	APR2069	4.5	4.6	4.4
64	APR2089	4.5	4.4	4.6
65	ST1 Comp	4.5	5.3	3.7
66	RAD-PR53	4.5	4.8	4.2
67	Stellar GL	4.5	4.8	4.3
68	APR2081	4.5	4.7	4.3
69	APR2071	4.5	4.9	4.1
70	HU1	4.5	4.9	4.1

(Continued)

Table 4 (continued).

	Cultivar or Selection	Turf Quality[1] 2008-2009 Avg.	Turf Quality[1] 2008 Avg.	Turf Quality[1] 2009 Avg.
71	GM4 Comp	4.5	5.3	3.7
72	SR 4600	4.5	4.9	4.0
73	PST-2NKMS	4.5	4.7	4.2
74	APR2101	4.5	4.7	4.2
75	Repell GLS	4.5	4.6	4.3
76	APR2074	4.4	5.1	3.8
77	Manhattan 5 GLR	4.4	5.1	3.8
78	APR2077	4.4	4.4	4.4
79	PST-SYN-2NKE7	4.4	5.0	3.9
80	SR 4220	4.4	4.6	4.3
81	PST-2BLK-04	4.4	4.0	4.8
82	Caddieshack II	4.4	4.5	4.3
83	GL3 Bulk	4.4	5.1	3.7
84	06-N Lp	4.4	4.6	4.2
85	RAD-PR51	4.4	4.8	4.0
86	APR2067	4.4	4.9	3.9
87	APR2099	4.4	4.7	4.1
88	PST-SYN-2MAG7	4.4	4.8	3.9
89	06-I Lp	4.4	4.6	4.2
90	74-07	4.4	5.1	3.7
91	Panther GLS	4.4	5.0	3.8
92	Apple GL	4.4	4.9	3.9
93	PST 2101-07	4.4	4.5	4.2
94	Blazer 4	4.4	4.4	4.3
95	RAD-PR36	4.4	4.7	4.0
96	APR2079	4.3	4.9	3.8
97	APR2080	4.3	4.3	4.3
98	Hawkeye 2	4.3	4.7	3.9
99	RAD-PR46	4.3	4.8	3.9
100	HP1	4.3	5.0	3.7
101	PST-2MAGS	4.3	4.8	3.9
102	RAD-PR54	4.3	4.5	4.1
103	Phenom	4.3	4.6	4.0
104	Keystone 2	4.3	4.5	4.1
105	Revenge GLX	4.3	4.2	4.3

(Continued)

Table 4 (continued).

	Cultivar or Selection	Turf Quality[1] 2008-2009 Avg.	Turf Quality[1] 2008 Avg.	Turf Quality[1] 2009 Avg.
106	PST-SYN-2RES	4.3	4.6	3.9
107	APR2117	4.3	4.6	3.9
108	GM1 Comp	4.3	4.7	3.9
109	LP1 Comp	4.3	4.5	4.1
110	PST-2COL	4.3	4.3	4.3
111	RAD-PR23	4.3	4.6	3.9
112	RAD-PR49	4.3	4.8	3.7
113	Palmer GLS	4.2	4.5	4.0
114	GM2 Comp	4.2	4.8	3.6
115	Line Drive GLS	4.2	4.4	4.1
116	PST-2TQL	4.2	3.9	4.5
117	APR2096	4.2	4.8	3.5
118	Integra II	4.2	4.4	3.9
119	APR2086	4.1	4.1	4.1
120	06E Lp-A07	4.1	4.6	3.7
121	RAD-PR34	4.1	4.6	3.7
122	APR2075	4.1	4.2	4.0
123	APR2100	4.1	4.2	3.9
124	Gator 3	4.1	4.2	3.9
125	06 E Lp-B07	4.1	4.2	3.9
126	PST-2TSE	4.1	4.4	3.7
127	RAD-PR45	4.1	4.3	3.9
128	SR 4420	4.1	4.2	3.9
129	73-07-9	4.0	3.9	4.2
130	APR 1915	4.0	4.1	3.9
131	Accent II	4.0	4.2	3.8
132	RAD-PR38	4.0	4.5	3.5
133	IS-PR 313	4.0	4.2	3.7
134	73-07-6	4.0	4.4	3.6
135	Grand Slam 2	4.0	4.5	3.5
136	73-07-1	4.0	4.1	3.8
137	Prelude IV	3.9	4.3	3.5
138	Harrier	3.9	4.2	3.6
139	Overdrive	3.9	4.1	3.7
140	APR2095	3.9	4.3	3.5

(Continued)

Table 4 (continued).

	Cultivar or Selection	Turf Quality[1] 2008-2009 Avg.	Turf Quality[1] 2008 Avg.	Turf Quality[1] 2009 Avg.
141	APR2087	3.9	4.0	3.7
142	Mach 1	3.9	4.2	3.5
143	Vail II	3.9	3.9	3.9
144	SR 4682	3.8	4.0	3.7
145	Goalkeeper II	3.8	3.9	3.7
146	Headstart 2	3.8	3.8	3.7
147	Citation Fore	3.8	4.0	3.5
148	73-07-5	3.7	3.6	3.8
149	Hawkeye	3.7	3.6	3.7
150	73-07-7	3.7	3.5	3.9
151	Dart	3.6	3.8	3.5
152	IS-MBH2	3.6	3.7	3.5
153	APR2076	3.6	4.0	3.1
154	PR-27	3.6	3.6	3.5
155	61-07	3.5	3.7	3.3
156	APR2094	3.5	3.7	3.3
157	Shining Star II	3.5	3.4	3.5
158	APR2068	3.5	3.9	3.0
159	73-07-10	3.4	3.4	3.5
160	SR 4500	3.4	3.5	3.3
161	PST-2MAX-07	3.4	3.1	3.7
162	Calypso II	3.3	3.3	3.3
163	APR2082	3.3	3.7	2.9
164	Caddieshack	3.2	3.2	3.3
165	APR2093	3.2	3.2	3.2
166	Extreme	3.2	3.1	3.3
167	SRX 45LUP	3.2	3.2	3.1
168	73-07-3	3.1	3.0	3.2
169	SR 4350	3.1	3.3	2.9
170	Accent	3.0	3.0	3.1
171	SRX 4STD	2.9	2.3	3.4
	LSD at 5% =	0.7	0.9	0.8

[1]9 = best turf quality

Table 5. Performance of perennial ryegrass cultivars and selections in a turf trial established in August 2007 at Adelphia, NJ. (Includes all entries evaluated in the Cooperative Turfgrass Breeders Test – CTBT.)

	Cultivar or Selection	Turf Quality[1] 2008-2009 Avg.	Turf Quality[1] 2008 Avg.	Turf Quality[1] 2009 Avg.	Cover[2] (%) Oct. 2009
1	All*Star 3	5.7	6.6	4.8	60.0
2	PST-2MG7 Bulk	5.6	6.0	5.2	61.7
3	04-10 Lp	5.4	6.1	4.7	66.7
4	IS-PR 340	5.4	6.0	4.8	63.3
5	IS-PR 410	5.4	5.5	5.2	63.3
6	IS-PR 411	5.4	6.0	4.7	60.0
7	SR 4600	5.3	6.3	4.3	58.3
8	IS-PR 342	5.2	5.7	4.8	55.0
9	Silver Dollar	5.2	5.1	5.3	68.3
10	APR 2037	5.2	6.0	4.3	55.0
11	APR 2032	5.2	5.6	4.8	78.3
12	Applaud	5.1	5.3	4.9	66.7
13	PST-2AG4	5.1	5.1	5.1	70.0
14	GL-31	5.1	6.2	4.0	50.0
15	IS-PR 341	5.1	5.4	4.7	73.3
16	APR 1959	5.0	5.7	4.4	60.0
17	IS-PR 377	5.0	5.3	4.8	63.3
18	Paragon GLR	5.0	5.7	4.4	53.3
19	APR 1979	5.0	5.8	4.3	51.7
20	GL3	5.0	5.8	4.3	51.7
21	APR 2036	5.0	5.2	4.8	53.3
22	Calypso III	5.0	5.3	4.7	63.3
23	APR 1978	5.0	5.2	4.8	66.7
24	Dasher 3	5.0	5.4	4.5	43.3
25	Zoom	5.0	5.5	4.4	60.0
26	06-C-Lp EDB	5.0	5.4	4.5	58.3
27	Palmer V	4.9	5.7	4.1	48.3
28	Soprano	4.9	5.6	4.2	43.3
29	APR 2031	4.9	5.3	4.5	55.0
30	IGSquared	4.9	5.6	4.2	53.3
31	APR 2034	4.9	5.6	4.1	48.3
32	IS-PR 344	4.9	5.0	4.7	66.7
33	IS-PR-381	4.8	5.5	4.1	63.3
34	PST-2MAGS	4.8	5.3	4.4	61.7
35	HP-1	4.8	5.4	4.3	58.3

(Continued)

Table 5 (continued).

	Cultivar or Selection	Turf Quality[1] 2008-2009 Avg.	Turf Quality[1] 2008 Avg.	Turf Quality[1] 2009 Avg.	Cover[2] (%) Oct. 2009
36	A01PR Bulk	4.8	5.1	4.5	56.7
37	Applaud II	4.8	5.3	4.3	71.7
38	APR 2035	4.8	5.5	4.1	63.3
39	LineDrive GLS	4.8	5.2	4.3	61.7
40	IS-PR 409	4.8	5.6	3.9	38.3
41	APR 1980	4.8	5.5	4.1	46.7
42	04-4 Lp	4.8	5.3	4.2	70.0
43	PST-2GSB	4.8	5.3	4.2	58.3
44	APR 2064	4.8	4.8	4.7	56.7
45	APR 2025	4.8	5.6	3.9	43.3
46	APR 2033	4.7	5.5	3.9	41.7
47	Manhattan 5 GLR	4.7	5.4	4.1	63.3
48	PST-2NKMS	4.7	4.7	4.7	60.0
49	HU-1	4.7	5.2	4.3	55.0
50	PST-2TQL	4.7	4.7	4.7	63.3
51	PST-2USD	4.7	4.8	4.5	65.0
52	Gray Fox	4.7	4.8	4.5	50.0
53	APR 2026	4.6	5.0	4.3	45.0
54	Protege GLR	4.6	4.9	4.4	56.7
55	APR 1666	4.6	5.0	4.3	48.3
56	Pick EJ	4.6	4.9	4.3	53.3
57	05-SP-1	4.6	4.7	4.5	55.0
58	APR 2089	4.6	4.8	4.5	43.3
59	Jet	4.6	5.0	4.2	46.7
60	PST-2COL	4.6	4.1	5.1	61.7
61	06-B Lp	4.6	4.9	4.3	58.3
62	PST-2101-07	4.6	5.0	4.1	56.7
63	APR 2090	4.6	5.2	4.0	46.7
64	APR 2013	4.6	5.2	4.0	53.3
65	PST-21NA	4.6	4.7	4.4	51.7
66	Pizzazz	4.6	4.4	4.7	50.0
67	Gray Goose	4.6	4.7	4.5	61.7
68	06-K Lp	4.6	4.5	4.6	56.7
69	PST-2R57S Bulk	4.5	4.4	4.7	66.7
70	PM 102	4.5	4.7	4.4	60.0

(Continued)

Table 5 (continued).

	Cultivar or Selection	Turf Quality[1] 2008-2009 Avg.	Turf Quality[1] 2008 Avg.	Turf Quality[1] 2009 Avg.	Cover[2] (%) Oct. 2009
71	IS-PR 313	4.5	4.7	4.4	58.3
72	IS-PR382	4.5	5.8	3.3	45.0
73	06-J Lp	4.5	4.6	4.5	45.0
74	MD-07	4.5	4.5	4.5	43.3
75	PST-2R9J-05	4.5	4.4	4.6	60.0
76	APR 2024	4.5	4.6	4.4	50.0
77	PST-2NJM	4.5	4.6	4.4	63.3
78	APR 1965	4.5	4.8	4.2	53.3
79	06-N Lp	4.5	5.0	4.0	58.3
80	06-I Lp	4.5	4.4	4.5	58.3
81	PST-Syn-2R57	4.4	4.7	4.1	60.0
82	IS-PR 378	4.4	4.4	4.4	78.3
83	APR 1977	4.3	4.4	4.3	56.7
84	APR 2096	4.3	4.8	3.9	53.3
85	PST-2TES	4.3	4.5	4.1	43.3
86	04-18 Lp	4.2	4.3	4.1	55.0
87	06-C-Lp ACF	4.2	4.5	3.9	40.0
88	06-H Lp	4.1	4.5	3.8	56.7
89	APR 2075	4.1	4.1	4.1	58.3
90	Integra II	4.1	4.4	3.7	48.3
91	PST-2SNS	4.1	3.8	4.4	63.3
92	Prelude IV	4.1	3.8	4.3	50.0
93	Plateau	4.1	4.5	3.6	40.0
94	APR 2038	4.1	4.8	3.3	48.3
95	PST-Syn-2US7	4.0	4.0	4.1	60.0
96	MBH2	3.9	3.8	4.1	55.0
97	PST-Syn-2O4D	3.9	3.7	4.1	51.7
98	Penguin 2	3.9	3.6	4.1	63.3
99	06-Z Lp	3.9	3.8	3.9	55.0
100	PST-Syn-2GR7	3.8	3.4	4.2	48.3
101	SRX 4TPCS	3.5	3.2	3.9	68.3
102	SR 45 AB	3.4	2.7	4.0	63.3
103	Manhattan II	3.1	2.4	3.9	56.7
104	Cutter	3.1	2.6	3.6	51.7
105	PST-2MAX-07	3.1	2.3	3.8	53.3

(Continued)

Table 5 (continued).

Cultivar or Selection	Turf Quality[1] 2008-2009 Avg.	Turf Quality[1] 2008 Avg.	Turf Quality[1] 2009 Avg.	Cover[2] (%) Oct. 2009
LSD at 5% =	0.7	0.7	1.1	24

[1]9 = best turf quality
[2]Turf cover (%) where 100 = complete cover

Table 6. Performance of perennial ryegrass cultivars and selections in a turf trial established in August 2008 at Adelphia, NJ.

	Cultivar or Selection	Turf Quality[1] 2009 Avg.	Estabilshment[2] Sept. 2008	Stems[3] July 2009
1	04-10 LP	7.1	7.3	6.3
2	RKS	6.6	7.0	7.0
3	RAD-PR61	6.6	3.7	5.7
4	Palmer IV	6.6	7.3	6.7
5	Soprano	6.4	8.0	5.7
6	RAD-PR54	6.3	4.3	5.7
7	RHD Comp	6.3	6.7	7.7
8	GM3	6.2	6.7	5.7
9	Exacta II GLSR	6.1	8.3	5.7
10	Homerun	6.1	7.7	6.3
11	GL3	6.0	7.3	6.0
12	Zoom	6.0	7.3	5.7
13	PSG 4MSH7	6.0	5.3	7.0
14	IS-PR 314	6.0	6.0	6.3
15	PCG 4EAGGL11	5.9	7.0	5.3
16	SR 4600	5.9	7.0	5.7
17	Edge II	5.9	6.0	6.0
18	Defender	5.9	7.7	5.3
19	Dasher 3	5.9	8.0	4.7
20	06 O LP	5.8	7.0	4.7
21	PST-2MAGS	5.8	7.0	5.0
22	GL 31	5.8	7.0	6.0
23	RLB Comp	5.8	7.0	5.0
24	RAD-PR60	5.8	3.3	5.7
25	PSG 4MSHG	5.8	6.7	5.3
26	ROB Comp	5.8	6.0	7.7
27	PST-Syn-2LOC	5.7	5.7	6.7
28	Top Hat 2	5.7	7.7	7.0
29	Derby Xtreme	5.7	7.3	5.3
30	PSG 4CAGL9	5.7	6.7	5.7
31	HP1	5.7	7.7	6.0
32	PSG 4MSH45	5.7	6.7	6.7
33	PSG 4MSH6	5.6	5.3	6.3
34	PSG 4GM1	5.6	7.3	4.7
35	Amazing GS	5.6	8.3	5.7

(Continued)

Table 6 (continued).

	Cultivar or Selection	Turf Quality[1] 2009 Avg.	Estabilshment[2] Sept. 2008	Stems[3] July 2009
36	PSG 4MSH14	5.6	6.3	6.7
37	PST-Syn-2STP	5.6	6.7	6.0
38	Transformer	5.6	6.7	5.3
39	PSG 4DSL5	5.5	7.3	4.7
40	Keystone 2	5.5	7.7	5.3
41	Revenge GLX	5.5	6.7	6.0
42	PSG 4MSH83	5.5	6.7	5.3
43	PSG 4MSH47	5.5	6.0	6.3
44	PSG 4MSH27	5.5	5.7	6.3
45	Stellar GL	5.5	6.7	5.0
46	PSG 4MSW17	5.4	6.0	6.0
47	PST-2COL	5.4	6.3	6.0
48	RAD-PR58	5.4	7.3	5.0
49	2AG4-BS	5.4	7.0	6.0
50	Palmer GLS	5.4	7.0	5.0
51	UNO	5.4	7.3	5.7
52	Silver Dollar	5.4	7.0	5.7
53	04-8 LP	5.4	6.3	5.3
54	Harrier	5.3	8.0	4.3
55	PSG 4MSH33	5.3	6.3	5.7
56	2K9	5.3	6.7	5.3
57	Charismatic II GLSR	5.3	8.3	5.3
58	Apple GL	5.3	6.7	3.7
59	08-25 LP	5.3	6.3	5.0
60	PSG 4CAGL1	5.3	6.0	5.3
61	PSG 4MSH34	5.3	6.3	6.3
62	PSG 4MSH36	5.3	6.7	6.0
63	Vail II	5.3	7.7	5.3
64	Integra II	5.3	6.7	5.0
65	08-4 LP	5.3	6.7	5.0
66	PSG 4MSH48	5.3	6.3	6.7
67	RAD-PR62	5.3	4.7	6.3
68	SR 4220	5.2	7.0	6.0
69	RAD-PR57	5.2	6.0	6.0
70	Phenom	5.2	6.7	5.3
71	Paragon GLR	5.2	8.0	5.7
72	07-4 PR	5.2	6.0	5.3
73	RAD-PR56	5.2	5.3	5.3
74	Applaud II	5.2	6.7	5.7
75	07-13 PR	5.2	4.3	6.0

(Continued)

Table 6 (continued).

	Cultivar or Selection	Turf Quality[1] 2009 Avg.	Estabilshment[2] Sept. 2008	Stems[3] July 2009
76	PSG 4FSL1	5.1	7.7	5.3
77	PSG 4MSH16	5.1	7.0	6.0
78	2NJK	5.1	6.7	5.0
79	RAD-PR59	5.1	6.3	6.0
80	Applaud	5.1	7.3	5.7
81	Buena Vista GLSR	5.1	6.7	4.7
82	08-26 LP	5.1	5.0	4.0
83	SR 4550	5.1	6.0	5.7
84	05 E PR	5.0	6.7	6.0
85	PSG 4MSH31	5.0	7.0	5.3
86	PSG 4MSH12	5.0	5.7	5.3
87	1G Squared	5.0	6.3	5.3
88	PSG 4LCKP	5.0	5.3	4.0
89	2TPR	5.0	5.7	5.3
90	HU1	5.0	6.7	5.3
91	Wind Dance II	5.0	6.7	6.0
92	Headstart 2	5.0	7.3	5.3
93	Calypso 3	5.0	8.0	5.7
94	08-16 LP	4.9	5.7	5.0
95	PSG 4 PLK	4.9	5.3	4.0
96	PST-2R9R	4.9	6.7	5.0
97	Repell GLS	4.9	7.3	5.3
98	Hawkeye 2	4.9	6.7	5.7
99	08-27 LP	4.9	4.7	4.7
100	SR 4420	4.9	8.0	5.7
101	PST-Syn-2SHR8	4.9	3.3	3.3
102	Pleasure Supreme	4.8	8.3	5.3
103	2AG$	4.8	6.3	5.3
104	PST-2TQL	4.8	6.3	6.3
105	07-12 PR	4.7	4.0	4.0
106	Panther GLS	4.7	7.0	6.3
107	Dart	4.7	7.0	4.7
108	Wind Dance	4.6	6.7	6.3
109	Accent II	4.6	7.3	6.0
110	08-3 LP	4.6	6.7	4.3
111	PST-2RH0	4.6	7.0	7.0
112	PST-bulk-2DARB	4.6	5.0	4.7
113	PSG 4HSL7	4.5	6.0	3.3
114	Gator 3	4.5	7.3	5.7
115	07-6 PR	4.5	5.7	4.7

(Continued)

Table 6 (continued).

	Cultivar or Selection	Turf Quality[1] 2009 Avg.	Estabilshment[2] Sept. 2008	Stems[3] July 2009
116	PST-Syn-2MIN8	4.5	2.3	3.0
117	PST-2USD	4.5	7.3	4.0
118	Jet	4.5	6.7	5.0
119	Top Gun II	4.5	6.3	5.7
120	2R57S	4.4	5.7	4.7
121	07-7 PR	4.3	5.7	5.0
122	PSG 4STDSP	4.3	5.7	4.7
123	PST-2TSE	4.3	7.7	5.7
124	2H2O	4.3	3.7	5.0
125	08-5 LP	4.3	6.0	4.7
126	PST-2LAN	4.2	7.0	6.0
127	SR 4682	4.2	8.0	5.3
128	Integra	4.2	6.3	4.3
129	Hawkeye	4.1	6.7	5.0
130	Penguin 2	4.1	7.3	5.7
131	PSG 4PSL8	4.0	7.0	4.7
132	PSG 4AZSLT	4.0	6.3	5.7
133	Prelude GLS	4.0	6.7	4.7
134	Secretariat II GLSR	4.0	7.7	6.0
135	PSG 4TPCSP	4.0	6.3	5.3
136	APR 1472	4.0	7.3	5.0
137	07-5 PR	4.0	3.3	2.3
138	PST-2SNS	4.0	6.7	5.3
139	APR 1915	3.9	7.3	6.3
140	2NKR	3.9	4.3	4.0
141	08-17 LP	3.8	7.0	5.0
142	Calypso II	3.8	7.7	4.7
143	Racer 2	3.8	7.3	5.7
144	STR 4TPCS	3.8	7.3	4.0
145	PSG 4STDUP	3.7	6.0	3.3
146	Churchill	3.5	6.7	3.7
147	Shining Star II	3.5	7.7	3.7
148	Fiesta 4	3.4	6.7	4.3
149	Affirmed	3.4	7.7	5.0
150	Charismatic	3.4	7.3	5.0
151	Sonata	3.4	6.3	5.7
152	Goalkeeper II	3.4	8.3	4.3
153	08-12 LP	3.3	6.3	3.7
154	Shining Star	3.3	8.3	5.3
155	La Quinta	3.3	7.7	4.3

(Continued)

Table 6 (continued).

	Cultivar or Selection	Turf Quality[1] 2009 Avg.	Estabilshment[2] Sept. 2008	Stems[3] July 2009
156	Caddieshack II	3.2	6.7	5.7
157	PSG 4TPCUP	3.1	6.7	3.7
158	Wind Star	3.0	7.7	5.7
159	Cutter	3.0	7.7	3.7
160	Exacta	3.0	7.7	5.3
	LSD at 5% =	0.7	1.5	1.3

[1]9 = best turf quality
[2]9 = best establishment
[3]9 = fewest reproductive stems in the turf stand

Table 7. Yearly nitrogen (N) applied and mowing height (Ht) on perennial ryegrass tests established at Adelphia and North Brunswick, NJ.

	2004		2005		2006		2007		2008		2009	
	N[1]	Ht[2]	N	Ht	N	Ht	N	Ht	N	Ht	N	Ht
Table 1 (2004 Adelphia)	1.3	1.5	4.0	1.5	4.5	1.5	3.3	1.5	2.8	1.5	2.0	1.5
Table 2 (2004 North Brunswick)	0.5	1.5	3.0	1.5	3.0	1.5	2.7	1.5	3.0	1.5	0.7	1.5
Table 3 (2006 Adelphia)					1.0	1.5	2.7	1.5	3.0	1.5	2.8	1.5
Table 4 (2007 Adelphia)							1.5	1.5	5.3	1.5	2.8	1.5
Table 5 (2007 Adelphia)							1.5	1.5	5.3	1.5	2.8	1.5
Table 6 (2008 Adelphia, CTBT)									1.0	1.5	2.0	1.5

[1] Annual N applied (lb/1000 ft^2)
[2] Mowing height in inches