

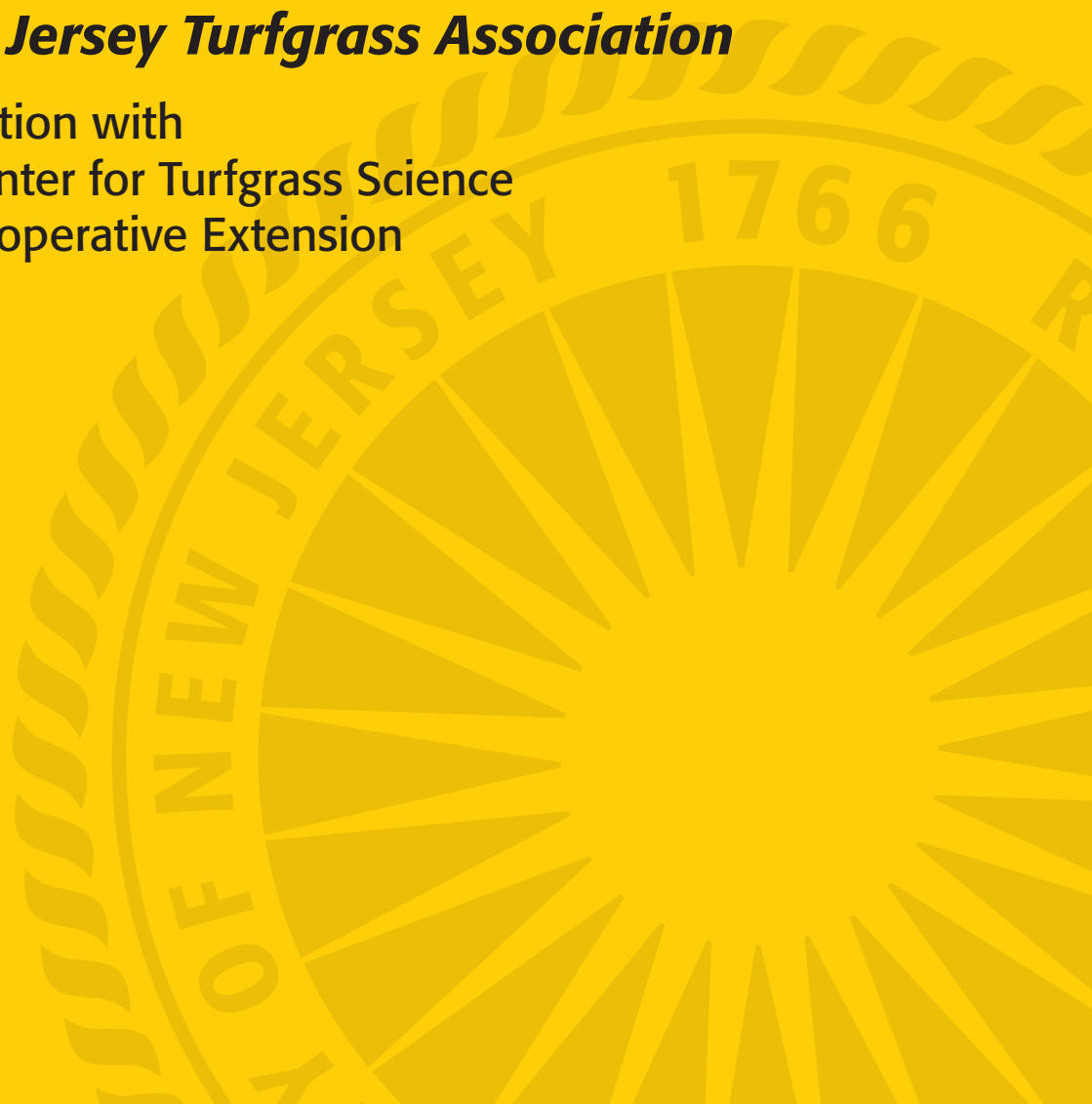
RUTGERS

New Jersey Agricultural
Experiment Station

2015 Turfgrass Proceedings

The New Jersey Turfgrass Association

In Cooperation with
Rutgers Center for Turfgrass Science
Rutgers Cooperative Extension



2015 RUTGERS TURFGRASS PROCEEDINGS

of the

GREEN EXPO Turf and Landscape Conference

December 8-10, 2015

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 2015 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

ASSESSING COOL-SEASON TURFGRASS BLENDS AND MIXTURES AT RUTGERS HORTICULTURAL RESEARCH FARM II DURING 2015

Bradley S. Park and James A. Murphy¹

Increased environmental concerns and greater restrictions on water and fertilizer have resulted in an increasing demand for turfgrasses that are well adapted to low-input situations (Meyer et al., 2015). A recently published Agronomy Monograph (No. 56) devotes an entire chapter to the subject of turfgrass management using fewer fertilization, irrigation, and pesticide inputs (Johnson et al., 2013).

Seed blends (two or more cultivars of a turfgrass species) and mixtures (two or more turfgrass species) are commonly recommended for the purpose of broadening the diversity and adaptation of the established turf. While the Rutgers turfgrass breeding program has been evaluating cool-season turfgrass species under low maintenance (Meyer et al., 2015), there is limited data available comparing the performance of seed mixtures under low input management programs.

A research trial was established at Rutgers University in autumn 2011 with the objective of evaluating the performance of cool-season turfgrass blends and mixtures under moderate fertilization and limited irrigation and pesticide inputs. Data from previous years of this study have been reported by Park et al. (2013; 2014a; 2014b) and Park and Murphy (2015). The objective of this report is to summarize the performance of turfgrass blends and mixtures during 2015.

MATERIALS AND METHODS

One hundred five entries were seeded in September 2011 in 6 x 5-ft plots on a loam at the Rutgers Horticultural Research Farm II, North Brunswick, NJ in a low-lying area of the research farm surrounded

by woods on three sides and a row of trees on the fourth side, restricting air circulation across the trial.

Entries consisted of blends and mixtures of hard fescue (*Festuca brevilipa* R. Tracey 'Beacon' and 'Firefly'), Chewings fescue (*F. rubra* L. subsp. *fallax* [Thuill.] Nyman 'Fairmont' and 'Intrigue II'), strong creeping red fescue (*F. rubra* L. subsp. *rubra* 'Celestial' and 'Wendy Jean'), tall fescue (*F. arundinacea* Schreb. 'Bullseye', 'Faith', and 'Mustang 4'), perennial ryegrass (*Lolium perenne* L. 'Fiesta 4', 'Paragon GLR', and PPG-PR 164), "Light" Kentucky bluegrass (*Poa pratensis* L. 'Bluenote' and A05-361), and "Dark" Kentucky bluegrass ('Midnight II' and 'Bewitched'). Each component of a seed blend or mixture was added in equivalent quantities based on seed count (e.g., 50:50%; 33.3:33.3:33.3%; 25:25:25:25%; etc.); percentages by weight are reported in Table 2. Each entry was seeded at a rate equivalent to 2,160 seeds per square foot (15 seeds per square inch). This trial also included 14 retail seed blends and mixtures (see Table 1 for cultivars and seeding rate). Entries were replicated three times and arranged in a randomized complete block design.

Soil testing (Mehlich 3) in March 2014 indicated that the soil pH was 6.2 and quantities of soil phosphorous and potassium were 228 and 274 lb per acre, respectively. Nitrogen (N) was applied as at 0.8 (26-0-5; 50% slow-release N) and 1.0 (26-0-5; 50% slow-release N) lb per 1000 ft² on 30 March and 15 September 2014, respectively.

During 2015, the test was mowed approximately once per week with a rotary mower at 2.5 inches. Mowing was withheld from the test whenever the trial exhibited drought stress. Irrigation was with-

¹Sports Turf Education and Research Coordinator and Extension Specialist in Turfgrass Management, respectively, New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State University of New Jersey, New Brunswick, NJ 08901-8520.

held until September 2015; 1.5 and 1.0 inches of irrigation were applied on 16-17 and 22 September 2015, respectively, to encourage recovery from severe drought stress.

Turfgrass quality (assessed monthly during April through October) and spring green-up (assessed on 10 April 2015) were visually evaluated during 2015 using a 1 to 9 scale where 9 = the best characteristic. Similarly, damage resulting from leaf spot (caused by *Bipolaris* spp.) and summer patch (caused by *Magnaporthe poae*) was assessed on 2 June and 31 July 2015, respectively, using a 1 to 9 scale (where 9 = no visual disease symptoms).

Turf density and cover were evaluated during 2015 by visual ratings of the fullness of turfgrass canopy (FTC) (0 to 100% scale where 100% = complete turf canopy) on 25 June 2015 and green turf cover (0 to 100% scale where 100% = complete green turf cover) on 29 October 2015.

The two Kentucky bluegrass blends that did not establish during 2012 were removed from data analysis in 2013, 2014, and 2015. Data were subjected to analysis of variance and means were separated using Fisher's protected least significant difference (LSD) test at $p \leq 0.05$.

RESULTS

A dramatic decline in turf quality was observed among many entries in response to severe summer stress, primarily drought and some insect activity, during 2015 (Table 2). Fifty-seven entries had the best turf quality in June 2015 and among these entries, 29 contained perennial ryegrass. However, by October 2015, these 29 entries containing perennial ryegrass were among entries with the poorest turf quality.

Similarly, of the 30 entries that had the best multi-year (2012-2015) average turf quality, only six had the best average turf quality during 2015 (Table 3). Moreover, among the 30 top entries for multi-year average turf quality, 13 had an average turf quality < 4.0 during 2015.

Not surprisingly, among the 60 entries that had the best spring green-up on 10 April 2015, 43 contained perennial ryegrass (Table 4). Of the 27 entries with the poorest spring green-up on 10 April

2015, 25 of these entries contained hard fescue and/or tall fescue.

Thirty-eight entries consisting of Chewings fescue and/or strong creeping red fescue (including retail entries with creeping red fescue as a component) were among the 39 entries with the most severe leaf spot disease on 2 June 2015 (Table 4). Thirty-one entries composed of hard fescue and/or tall fescue were among the 33 entries that had the least leaf spot disease in June 2015.

Sixty-five entries had the greatest FTC on 25 June 2015; among these entries, 64 consisted of tall fescue and/or perennial ryegrass (Table 4). Moreover, the plots least affected by summer patch on 31 July 2015 consisted of tall fescue and/or perennial ryegrass. Park and Murphy (2015) reported greater, more uniform turf cover in tall fescue and/or perennial ryegrass plots (and better turf quality) during 2014 compared to plots consisting of species susceptible to summer patch.

In contrast, each of the seven entries with the least FTC on 25 June 2015 all contained hard fescue and/or Chewings fescue and were among entries exhibiting the greatest damage from summer patch disease on 31 July 2015 (Table 4). The consistently poor performance of plots containing hard fescue and Chewings fescue since 2013 has been attributed to severe summer patch infection in these plots (Park et al., 2014a,b) and the poor turf recovery during 2014 (Park and Murphy, 2015).

Only six entries had the greatest (58 to 75%) green turf cover on 29 October 2015; each of these entries was seeded with a minimum of 52% tall fescue (by weight) (Table 4). All of the mixtures that contained 52 to 68% tall fescue and exhibited moderate (32 to 48%) green turf cover on 29 October also contained at least one fine fescue (25% or more by weight) and were highly damaged by summer patch. Each of the top 50 ranked entries for green turf cover on 29 October 2015 contained tall fescue while only two of the 54 entries with the least green turf cover contained tall fescue.

DISCUSSION

While entries containing perennial ryegrass exhibited better turf quality during 2014, many of these exhibited a dramatic decline in turf quality during the

summer stress of July and August 2015. In fact, 29 entries containing perennial ryegrass exhibited an average decline in turf quality rating points of 5.2 from June through October 2015 (range: 4.3 to 6.3). The declining performance of these perennial ryegrass-containing entries occurred in response to above average temperatures, below average rainfall, and the non-irrigated condition during July, August, and September.

A decline in perennial ryegrass turf quality triggered by severe environmental stress conditions is not surprising since this species is more limited in tolerance to drought and heat stresses (Turgeon, 2008). Others have found that newer perennial ryegrass cultivars have not demonstrated dramatically improved drought tolerance under field conditions (Bonos, unpublished data, 2011; Wilkins, 1991; Thorogood, 2003).

Better turf quality exhibited by entries containing tall fescue during 2015 was due, in large part, to the ability of these plots to maintain greater and more uniform turf cover compared to other plots. The October 2015 monthly turf quality rating was highly correlated with the green turf cover rating taken on 27 October 2015 ($r = 0.92$; $n = 309$). Traditionally, turf quality ratings take into account characteristics such as density, leaf texture, and genetic color. However, under the lower-input management and conditions of high environmental stresses and severe disease pressure in this trial, the quantity of green turf cover was the primary attribute affecting turf quality.

The performance of tall fescue in this test confirms the usefulness of this species for low maintenance turf relative to other cool-season turfgrasses used in New Jersey. Meyer and Funk (1989) noted the importance of this species for forage and roadside stabilization. Tall fescue has been recognized for its very good high-temperature and drought tolerance, better insect tolerance, and ability to persist under low fertility (Bonos and Huff, 2013; Buckner and Bush, 1979).

REFERENCES

Bonos, S. A., and D.R. Huff. 2013. Cool-season grasses: Biology and breeding. Pages 591-660 *in*: J. C. Stier et al., eds. Turfgrass: Biology, Use, and Management. Agronomy Monograph 56. ASA, CSSA, and SSSA, Madison, WI.

Buckner, R. C., and L. P. Bush, eds. 1979. Tall fescue. Agronomy Monograph 20. ASA, CSSA, and SSSA, Madison, WI.

Johnson, P. G., F. S. Rossi, and B. P. Horgan. 2013. Sustainable turfgrass management in an increasingly urbanized world. Pages 1007-1028 *in*: J.C. Stier et al., eds. Turfgrass: Biology, Use, and Management. Agronomy Monograph 56. ASA, CSSA, and SSSA, Madison, WI.

Meyer, W. A., S. A. Bonos, E. N. Weibel, A. Grimshaw, H. Qu, R. Bara, M. Mohr, D. Smith, and T. Tate. 2015. Overcoming the challenges of breeding cool-season turfgrasses for low-input turf. Page 16 *in*: B. Zilinskas and B. Fitzgerald, eds. Proceedings 24th Annual Rutgers Turfgrass Symposium. 16 January 2015. New Brunswick, NJ.

Meyer, W. A., and C. R. Funk. 1989. Progress and benefits to humanity from breeding cool-season grasses for turf. Pages 31-48 *in*: D. A. Slepert et al., eds. Contributions from breeding forage and turfgrasses. Special Publication 15. CSSA, Madison, WI.

Park, B. S., W. A. Meyer, S. A. Bonos, and J. A. Murphy. 2013. Assessing cool-season turfgrass blends and mixtures under low maintenance. Rutgers Turfgrass Proceedings 44:219-229.

Park, B. S., W. A. Meyer, S. A. Bonos, and J. A. Murphy. 2014a. Assessing cool-season turfgrass blends and mixtures under low maintenance. Pages 19-20 *in*: A. Zuin and K. Mueller-Beck, eds. European J. of Turfgrass Science 4th European Turf Society Conference. 6-9 July 2014. Osnabrueck, Germany.

Park, B. S., W. A. Meyer, S. A. Bonos, and J. A. Murphy. 2014b. Assessing cool-season turfgrass blends and mixtures under low maintenance. Rutgers Turfgrass Proceedings 45:201-219.

Park, B. S., and J. A. Murphy. 2015. Assessing cool-season turfgrass blends and mixtures under low maintenance during 2012-2014. Rutgers Turfgrass Proceedings 46:189-201.

Thorogood, D. 2003. Perennial ryegrass (*Lolium perenne* L.). Pages 75-106 *in*: M. D. Casler and R. R. Duncan, eds. Turfgrass Biology, Ge-

netics, and Breeding. John Wiley and Sons, Hoboken, NJ.

Turgeon, A. J. 2008. Turfgrass Management, 8th ed. Prentice Hall, Upper Saddle River, NJ.

Wilkins, P. W. 1991. Breeding perennial ryegrass for agriculture. *Euphytica* 52:201-214. doi:10.1007/BF00029397

Table 1. Cultivars and recommended seeding rates of 14 retail seed blends and mixtures evaluated in a cool-season species mixture trial established in September 2011 at North Brunswick, NJ.

Amturf Ultra Lawn Sun & Shade Grass Seed Mixture Lot: L152-11-650-3; Seeding rate: 2.5 lb per 1000 ft ²	
% by weight	Cultivar/Species
29.67	'Pennant II' Perennial Ryegrass
21.84	'Kenblue' Kentucky Bluegrass
19.95	'Culumbra II' Chewings Fescue
19.92	'Epic' Creeping Red Fescue
4.95	'Nordic' Hard Fescue

Diamond Grass Seed Sunny Lawn Mixture Lot: 21644; Seeding rate: 6.0 lb per 1000 ft ²	
% by weight	Cultivar/Species
19.60	'Brooklawn' Kentucky Bluegrass
19.60	'Guinness' Kentucky Bluegrass
19.60	'Top Gun' Perennial Ryegrass
19.60	'Extreme' Perennial Ryegrass
19.60	Red Fescue Creeping Type

Jonathan Green Black Beauty Ultra Grass Seed Mixture Lot: BBU-10-2; Seeding rate: 5.0 lb per 1000 ft ²	
% by weight	Cultivar/Species
29.70	'Dakota' Tall Fescue
29.65	'Taos' Tall Fescue
19.75	'Tombstone' Tall Fescue
9.85	'Blue-tastic' Kentucky Bluegrass
9.83	'Frontier' Perennial Ryegrass

Jonathan Green Full Sun Grass Seed Mixture Lot: FS-11-B; Seeding rate: 2.4 lb per 1000 ft ²	
% by weight	Cultivar/Species
19.70	'Deepblue' Kentucky Bluegrass
19.70	'Frontier' Perennial Ryegrass
19.65	'Stanton' Perennial Ryegrass
19.95	'Taos' Tall Fescue
9.81	'Eugene' Creeping Red Fescue
9.80	'Hood' Chewings Fescue

(Continued)

Table 1. Cultivars and recommended seeding rates of retail seed blends and mixtures (continued).

Pearl's Premium Ultra Low Maintenance Lawn Seed Mixture – Sunny Mixture
 Lot: JG-3811-A; Seeding rate: 6.3 lb per 1000 ft²

% by weight	Cultivar/Species
19.75	'Dakota' Tall Fescue
19.75	'Frontier' Perennial Ryegrass
19.65	'Deepblue' Kentucky Bluegrass
19.65	'Harpoon' Hard Fescue
19.65	'Carmen' Chewings Fescue

Pennington Smart Seed Northeast Mixture
 Lot: 03SMTNE00G; Seeding rate: 6.0 lb per 1000 ft²

% by weight	Cultivar/Species
24.63	'Integra II' Perennial Ryegrass
24.52	'1G Squared' Perennial Ryegrass
19.77	'Ridgeline' Kentucky Bluegrass
14.68	'7 Seas' Chewings Fescue
14.57	'Razor' Red Fescue

Pennington Smart Seed Tall Fescue Blend
 Lot: L144-10-3SMTF56G; Seeding rate: 8.0 lb per 1000 sq ft²

% by weight	Cultivar/Species
34.35	'Justice' Tall Fescue
34.35	'Virtue II' Tall Fescue
29.50	'Greystone' Tall fescue

Pennington Premium Grass Seed Tall Fescue Blend
 Lot: L144-10-3RBTF85; Seeding rate: 8.0 lb seed per 1000 ft²

% by weight	Cultivar/Species
39.10	'Rebel IV' Tall Fescue
39.10	'Rebel Advance' Tall Fescue
19.50	'Brockton' Tall Fescue

(Continued)

Table 1. Cultivars and recommended seeding rates of retail seed blends and mixtures (continued).

Scotts Turf Builder Grass Seed Sun & Shade Mix – Water Smart
Lot: 10020280; Seeding rate: 5.0 lb per 1000 ft²

% by weight	Cultivar/Species
9.56	'Fenway' Creeping Red Fescue
9.54	'Trapeze' Creeping Red Fescue
9.52	'Nexus XD' Perennial Ryegrass
9.48	'Silver Dollar' Perennial Ryegrass
6.81	'Envicta' Kentucky Bluegrass
2.83	'Thermal' Kentucky Bluegrass
50.00	Water Smart™ Coating

Scotts Turf Builder Grass Seed Sun & Shade Mix – Water Smart
Lot: 11020298; Seeding rate: 5.0 lb per 1000 ft²

% by weight	Cultivar/Species
9.52	'Wendy Jean' Creeping Red Fescue
8.68	'Uno' Perennial Ryegrass
8.56	'Silver Dollar' Perennial Ryegrass
8.52	'Wildhorse' Kentucky Bluegrass
6.82	'Abbey' Kentucky Bluegrass
5.64	'Fenway' Creeping Red Fescue
50.00	Water Smart™ Coating

Scotts Turf Builder Grass Seed Tall Fescue Mix – Water Smart
Lot: 11030345; Seeding rate: 9.1 lb per 1000 ft²

% by weight	Cultivar/Species
19.01	'Matador GT' Tall Fescue
14.43	'Innovator' Tall Fescue
14.30	'Tar Heel II' Tall Fescue
50.00	Water Smart™ Coating

(Continued)

Table 1. Cultivars and recommended seeding rates of retail seed blends and mixtures (continued).

Scotts Turf Builder Grass Sunny Mix – Water Smart
Lot: 11020570; Seeding rate: 4.4 lb per 1000 ft²

% by weight	Cultivar/Species
17.55	'Abbey' Kentucky Bluegrass
11.46	'Appalachian' Kentucky Bluegrass
6.63	'Silver Dollar' Perennial Ryegrass
6.56	'Inspire' Perennial Ryegrass
5.54	'Uno' Perennial Ryegrass
50.00	Water Smart™ Coating

Vigoro Sun-Shade Grass Seed Mixture
Lot: 52548; Seeding rate: 3.0 lb per 1000 ft²

% by weight	Cultivar/Species
19.47	'Bargena III' Creeping Red Fescue
18.45	'Brooklawn' Kentucky Bluegrass
14.80	'Longfellow II' Chewings Fescue
14.57	'Peak' Perennial Ryegrass
9.89	'Panterra' Italian Ryegrass
9.79	'Pirouette II' Perennial Ryegrass
9.25	'Barbeta (RPR)' Perennial Ryegrass

Vigoro Tall Fescue Grass Seed Blend
Lot: 54917; Seeding rate: 6.0 lb per 1000 ft²

% by weight	Cultivar/Species
29.64	'Barrington' Tall Fescue
24.48	'Barrera' Tall Fescue
19.69	'Bar FA 7676 (RTF)' Tall Fescue
14.55	'Barlexus II (RTF)' Tall Fescue
9.88	LS1100 Tall Fescue

Table 2. Turf quality of cool-season turfgrass blends and mixtures during 2015 in a low maintenance trial established in North Brunswick, NJ in September 2011.

	Species Composition of Seed Blend or Mixture ^{1,3}							Turf Quality ²							
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	2015 Avg.	April 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015
1	-	100.0	-	-	-	-	-	5.7	7.0	6.0	6.0	7.0	3.3	4.7	5.7
2	-	88.3	-	11.7	-	-	-	5.5	5.7	6.0	7.3	6.3	3.3	4.7	5.0
3	-	88.7	11.3	-	-	-	-	5.4	6.0	5.3	7.3	6.7	3.3	3.7	5.0
4	Vigoro Tall Fescue 54917							4.9	6.0	5.7	6.0	5.7	3.3	3.7	4.0
5	16.3	44.0	5.6	-	-	-	34.1	4.8	5.7	6.3	6.0	5.7	3.7	3.0	3.3
6	-	56.4	-	-	-	-	43.6	4.7	6.0	5.0	5.7	5.7	3.0	3.3	4.0
7	Pennington Tall Fescue L144-10-3RBTF85							4.6	7.0	6.3	6.7	5.3	2.3	2.0	2.7
8	24.8	66.7	8.5	-	-	-	-	4.5	6.3	5.3	6.3	4.7	3.7	2.3	3.0
9	-	52.4	-	7.0	-	-	40.6	4.5	6.3	4.7	5.0	5.7	2.7	3.0	4.0
10	27.1	72.9	-	-	-	-	-	4.5	5.7	5.7	6.7	4.7	3.3	2.3	3.0
11	24.7	66.5	-	8.8	-	-	-	4.5	6.7	6.3	7.0	4.7	3.0	1.7	2.0
12	Pennington Tall Fescue L144-10-3SMTF56G							4.4	7.3	5.3	6.3	5.3	2.3	2.0	2.3
13	-	52.6	6.7	-	-	-	40.7	4.4	5.0	5.0	5.3	5.3	2.7	3.3	4.0
14	-	41.2	-	5.5	21.4	-	31.9	4.4	5.7	6.0	7.0	4.3	3.3	2.0	2.3
15	-	34.6	4.4	-	18.0	16.3	26.7	4.3	6.7	6.0	7.3	4.7	2.7	1.3	1.7
16	17.3	46.6	-	-	-	-	36.1	4.3	6.0	5.7	6.0	5.7	2.7	1.3	2.7
17	-	41.3	5.2	-	21.5	-	32.0	4.3	5.7	5.7	8.0	4.7	3.0	1.7	1.7
18	-	62.6	8.0	-	-	29.4	-	4.2	6.0	5.7	6.3	4.7	2.7	2.0	2.3
19	11.4	30.7	3.9	-	15.9	14.4	23.7	4.1	5.3	6.3	7.3	4.7	2.7	1.0	1.3
20	-	68.0	-	-	-	32.0	-	4.1	5.3	4.7	6.3	4.3	2.0	2.7	3.3

(Continued)

Table 2. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,3}										Turf Quality ²					
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Fescue	Perennial Ryegrass	2015 Avg.	April 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015	
21	18.8	50.8	6.5	-	-	23.9	-	4.1	4.7	5.3	5.7	4.0	3.3	2.7	3.0	
22	Scotts Tall Fescue 11030345															
23	-	47.1	-	6.3	24.5	22.1	-	4.0	5.7	5.0	5.7	5.3	2.3	2.0	2.3	
24	13.3	35.8	4.6	-	-	18.6	27.7	4.0	5.7	5.3	7.0	4.7	2.7	1.7	2.0	
25	29.0	-	-	10.4	-	-	60.6	4.0	6.3	7.0	6.3	4.0	2.0	1.0	1.0	
26	-	42.1	-	5.6	-	19.8	32.5	3.9	5.3	5.0	6.0	3.7	2.3	2.3	3.0	
27	-	44.6	-	-	-	21.0	34.4	3.9	5.3	4.7	6.0	4.3	2.3	2.0	2.7	
28	13.5	36.5	4.6	-	-	17.2	28.2	3.9	5.0	5.3	7.0	4.0	2.7	1.7	2.0	
29	-	42.2	5.4	-	-	19.8	32.6	3.9	6.0	5.7	7.0	3.7	2.3	1.3	1.3	
30	16.3	43.9	-	5.8	-	-	34.0	3.9	4.3	5.0	4.7	4.0	2.7	2.7	4.0	
31	13.3	35.7	-	4.7	18.6	-	27.7	3.9	5.7	4.7	6.7	4.3	3.0	1.3	1.7	
32	13.5	36.4	-	4.8	-	17.1	28.2	3.9	5.3	5.0	7.3	4.7	2.3	1.3	1.3	
33	-	62.4	-	8.3	-	29.3	-	3.9	5.7	4.7	5.7	4.0	2.3	2.0	2.7	
34	14.9	40.2	5.1	-	20.9	18.9	-	3.9	5.0	5.3	6.0	4.0	2.7	1.7	2.3	
35	18.3	49.4	-	6.6	25.7	-	-	3.8	4.0	5.7	6.0	3.3	3.0	2.0	2.3	
36	-	-	-	-	40.2	-	59.8	3.6	5.7	4.7	7.0	3.7	2.3	1.0	1.0	
37	20.2	54.3	-	-	-	25.5	-	3.6	4.7	4.7	6.0	3.7	2.0	2.0	2.3	
38	-	60.5	-	8.1	31.4	-	-	3.6	4.7	4.7	6.0	4.3	2.3	1.3	2.0	
39	-	34.5	-	4.6	17.9	16.3	26.7	3.6	5.3	4.7	6.3	4.0	2.3	1.0	1.3	
40	-	-	-	9.3	36.4	-	54.3	3.5	6.0	4.3	6.7	3.7	2.0	1.0	1.0	

(Continued)

Table 2. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

		Species Composition of Seed Blend or Mixture ^{1,3}										Turf Quality ²				
		Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	2015 Avg.	April 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015
		-----(% by weight)----- ----- (1 to 9 scale)-----														
41	-	43.6	-	-	-	22.7	-	33.7	3.5	4.3	4.0	5.0	4.7	2.0	2.3	2.3
42	-	50.3	-	-	-	26.1	23.6	-	3.5	4.7	5.3	5.7	3.0	2.3	1.7	1.7
43	-	36.2	-	-	-	18.8	17.0	28.0	3.4	4.3	3.7	5.3	4.3	3.0	1.7	1.7
44	17.4	-	-	-	-	24.3	22.1	36.2	3.4	5.7	4.3	6.0	3.7	2.3	1.0	1.0
45	-	-	-	7.0	-	27.4	24.8	40.8	3.4	5.0	4.3	6.7	3.3	2.7	1.0	1.0
46	Jonathan Green Black Beauty BBU-10-2								3.4	4.3	3.7	6.0	4.3	2.3	1.3	1.7
47	Pennington Northeast 03SMTNE00G								3.4	5.3	4.3	6.3	3.3	2.3	1.0	1.0
48	Jonathan Green Full Sun FS-11-B								3.4	5.0	4.3	6.0	3.7	2.0	1.0	1.3
49	22.3	-	-	-	-	31.2	-	46.5	3.4	4.7	5.0	5.7	4.0	2.3	1.0	1.0
50	21.2	-	-	7.6	-	26.9	-	44.3	3.3	5.7	5.3	6.0	2.7	1.7	1.0	1.0
51	-	-	-	-	-	29.4	26.7	43.9	3.3	4.7	3.7	6.3	4.0	2.7	1.0	1.0
52	18.8	50.7	-	6.7	-	-	23.8	-	3.3	3.7	4.3	4.3	3.7	2.0	2.7	2.7
53	16.4	-	5.6	-	23.0	23.0	20.8	34.2	3.3	4.7	4.3	6.3	3.3	2.3	1.0	1.0
54	-	-	9.0	-	36.6	36.6	-	54.4	3.3	5.7	4.3	5.7	3.0	2.3	1.0	1.0
55	11.3	30.6	-	4.1	15.9	15.9	14.4	23.7	3.2	4.7	4.7	5.7	3.3	2.0	1.0	1.3
56	14.9	40.1	-	5.3	20.8	20.8	18.9	-	3.2	4.3	4.3	5.7	3.3	2.3	1.3	1.3
57	-	-	-	-	-	-	37.8	62.2	3.2	5.3	4.3	5.7	3.3	2.0	1.0	1.0
58	-	60.7	7.7	-	31.6	31.6	-	-	3.2	4.3	4.3	5.7	3.0	2.0	1.3	1.7
59	-	47.2	6.0	-	24.6	24.6	22.2	-	3.2	4.0	3.7	5.0	4.0	2.3	1.7	1.7
60	20.7	-	7.1	-	29.0	29.0	-	43.2	3.2	5.0	5.0	5.0	2.7	2.0	1.0	1.3

(Continued)

Table 2. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,3}										Turf Quality ²				
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	2015 Avg.	April 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015
61	16.4	-	-	5.9	22.9	20.7	34.1	3.1	4.7	4.0	5.7	3.3	2.3	1.0	1.0
62	-	-	-	14.7	-	-	85.3	3.1	5.7	4.0	5.3	3.3	1.3	1.0	1.0
63	-	-	9.3	-	-	34.3	56.4	3.1	5.0	3.7	5.7	3.7	1.7	1.0	1.0
64	-	-	-	11.8	46.3	41.9	-	3.1	4.3	3.7	6.0	3.3	2.3	1.0	1.0
65	18.4	49.6	6.3	-	25.7	-	-	3.1	3.0	4.0	4.3	2.7	2.3	2.3	2.7
66	-	-	6.7	-	27.5	24.9	40.9	3.1	4.3	3.7	5.7	3.0	2.7	1.0	1.0
67	20.7	-	7.4	-	28.9	-	43.0	3.0	4.3	4.7	5.3	3.0	2.0	1.0	1.0
68	-	-	-	9.6	-	34.2	56.2	3.0	5.3	3.3	5.7	3.3	1.7	1.0	1.0
69	-	65.8	-	-	34.2	-	-	3.0	3.0	4.0	4.7	3.0	2.3	1.7	2.3
70	-	-	-	-	-	-	100.0	3.0	4.7	4.7	4.3	3.3	1.7	1.0	1.3
71	19.6	52.9	-	-	27.5	-	-	3.0	3.0	3.3	4.0	3.7	2.7	2.0	2.3
72	29.2	-	10.0	-	-	-	60.8	2.8	4.3	4.0	4.7	3.0	1.7	1.0	1.0
73	Pearl's Premium Sunny Mixture JG-38811-A														
74	32.4	-	-	-	-	-	67.6	2.8	4.3	5.0	4.7	2.0	1.3	1.0	1.0
75	Diamond Sun Mix 21644														
76	-	-	14.1	-	-	-	85.9	2.7	4.3	3.7	4.7	3.3	1.0	1.0	1.0
77	-	-	11.4	-	46.5	42.1	-	2.7	4.7	3.0	5.3	2.0	2.0	1.0	1.0
78	Scotts Sun & Shade 10020280														
79	23.0	-	-	-	-	29.1	47.9	2.7	4.3	3.7	5.0	2.0	1.7	1.0	1.0
80	-	-	-	-	100.0	-	-	2.5	3.0	3.3	4.3	2.7	2.0	1.0	1.0

(Continued)

Table 2. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,3}										Turf Quality ²				
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Fescue	Perennial Ryegrass	2015 Avg.	April 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015
81	Vigoro Sun-Shade 52548							2.4	4.3	2.7	4.0	2.7	1.3	1.0	1.0
82	21.3	-	7.3	-	-	27.0	44.4	2.4	3.7	4.0	4.0	1.7	1.3	1.0	1.0
83	Scotts Sun & Shade 10020298							2.3	4.0	3.3	4.0	1.7	1.3	1.0	1.0
84	AmTurf Sun & Shade L152-11-650-3							2.3	3.0	3.3	4.0	2.7	1.3	1.0	1.0
85	-	-	-	-	52.5	47.5	-	2.3	3.3	3.0	4.3	1.7	1.7	1.0	1.0
86	38.3	-	13.2	-	-	48.5	-	2.3	3.3	3.0	4.0	2.0	1.3	1.3	1.0
87	Scotts Sunny Mix 11020570							2.3	3.0	2.7	4.0	3.0	1.3	1.0	1.0
88	38.1	-	-	13.6	-	48.3	-	2.2	2.7	3.0	4.0	2.0	1.3	1.0	1.0
89	-	-	-	22.0	-	78.0	-	2.1	3.0	2.3	3.7	2.0	1.3	1.0	1.0
90	-	-	21.3	-	-	78.7	-	1.9	3.7	2.3	3.0	1.0	1.3	1.0	1.0
91	24.9	-	8.6	-	34.9	31.6	-	1.9	2.3	2.7	3.0	1.3	1.3	1.3	1.0
92	24.8	-	-	8.9	34.8	31.5	-	1.8	3.0	3.0	2.7	1.0	1.0	1.0	1.0
93	44.1	-	-	-	-	55.9	-	1.8	2.7	2.7	3.3	1.0	1.0	1.0	1.0
94	-	-	-	-	-	100.0	-	1.6	2.0	2.3	3.0	1.0	1.0	1.0	1.0
95	-	-	19.7	-	80.3	-	-	1.6	2.0	2.3	2.3	1.3	1.0	1.0	1.0
96	41.7	-	-	-	58.3	-	-	1.5	2.3	2.0	2.0	1.0	1.0	1.0	1.0
97	27.3	-	-	-	38.2	34.5	-	1.4	1.7	2.0	2.0	1.3	1.0	1.0	1.0
98	36.5	-	12.5	-	51.0	-	-	1.3	1.7	1.3	2.0	1.3	1.0	1.0	1.0
99	100.0	-	-	-	-	-	-	1.3	1.7	1.7	1.7	1.0	1.0	1.0	1.0
100	-	-	-	20.4	79.6	-	-	1.2	1.0	1.3	2.0	1.3	1.0	1.0	1.0

(Continued)

Table 2. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,3}							Turf Quality ²							
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	2015 Avg.	April 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015
101	74.4	-	25.6	-	-	-	-	1.2	1.3	1.7	1.3	1.0	1.0	1.0	1.0
102	36.2	-	-	13.0	50.8	-	-	1.2	1.0	1.3	2.0	1.0	1.0	1.0	1.0
103	73.6	-	-	26.4	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LSD at 5% =								1.1	2.0	2.1	2.5	1.7	1.2	1.2	1.4

¹ Cultivars for each species were: 'Beacon' and 'Firefly' hard fescue; 'Fairmont' and 'Intrigue II' Chewings fescue; 'Celestial' and 'Wendy Jean' strong creeping red fescue; 'Bullseye', 'Faith', and 'Mustang 4' tall fescue; 'Fiesta 4', 'Paragon GLR', and PPG-PR 164 perennial ryegrass; 'Bluenote' and A05-361 "Light" Kentucky bluegrass; 'Midnight II' and 'Bewitched' "Dark" Kentucky bluegrass

² 9 = best turfgrass quality

³ See Table 1 for species/cultivar composition of retail blends and mixtures

Table 3. Annual and multi-year average turf quality of cool-season turfgrass blends and mixtures in a low maintenance trial established in North Brunswick, NJ in September 2011.

	Species Composition of Seed Blend or Mixture ^{1,3}										Turf Quality ²				
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Fescue	Perennial Ryegrass	2012-2015 Avg.	2012 Avg.	2013 Avg.	2014 Avg.	2015 Avg.			
1	-	88.3	-	11.7	-	-	-	5.3	3.9	5.8	6.0	5.5			
2	-	88.7	11.3	-	-	-	-	5.3	3.6	5.7	6.3	5.4			
3	-	100.0	-	-	-	-	-	5.1	3.6	5.5	5.7	5.7			
4	-	41.3	5.2	-	21.5	-	32.0	5.1	5.2	5.2	5.7	4.3			
5	-	52.6	6.7	-	-	-	40.7	4.9	5.2	4.9	5.0	4.4			
6	29.0	-	-	10.4	-	-	60.6	4.8	4.8	4.9	5.5	4.0			
7	20.7	-	7.1	-	29.0	-	43.2	4.8	5.3	5.8	5.1	3.2			
8	-	56.4	-	-	-	-	43.6	4.8	4.2	5.1	5.1	4.7			
9	Pennington Tall Fescue L144-10-3RBTF85														
10	27.1	72.9	-	-	-	-	-	4.8	3.4	5.4	5.6	4.6			
11	22.3	-	-	-	31.2	-	46.5	4.8	5.3	5.6	5.0	3.4			
12	24.8	66.7	8.5	-	-	-	-	4.7	4.2	4.8	5.3	4.5			
13	-	41.2	-	5.5	21.4	-	31.9	4.7	4.7	4.7	5.2	4.4			
14	-	42.1	-	5.6	-	19.8	32.5	4.7	5.0	4.7	5.4	3.9			
15	-	34.6	4.4	-	18.0	16.3	26.7	4.7	4.5	4.7	5.1	4.3			
16	13.5	36.5	4.6	-	-	17.2	28.2	4.7	5.0	4.6	5.0	3.9			
17	-	-	-	-	40.2	-	59.8	4.7	4.6	5.2	5.1	3.6			
18	17.4	-	-	-	24.3	22.1	36.2	4.6	5.0	5.1	5.1	3.4			
19	-	-	9.0	-	36.6	-	54.4	4.6	4.8	5.5	5.0	3.3			
20	24.7	66.5	-	8.8	-	-	-	4.6	3.8	4.6	5.6	4.5			

(Continued)

Table 3. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

		Species Composition of Seed Blend or Mixture ^{1,3}										Turf Quality ²				
		Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	2012-2015 Avg.	2012 Avg.	2013 Avg.	2014 Avg.	2015 Avg.			
		-----(% by weight)-----										----- (1 to 9 scale) -----				
21		18.8	50.8	6.5	-	-	23.9	-	4.6	4.9	4.5	4.9	4.1			
22		32.4	-	-	-	-	-	67.6	4.6	5.3	5.5	5.0	2.8			
23		13.3	35.8	4.6	-	-	18.6	27.7	4.6	3.9	5.2	5.2	4.0			
24		14.9	40.2	5.1	-	20.9	18.9	-	4.6	4.3	5.2	5.0	3.9			
25		-	43.6	-	-	22.7	-	33.7	4.6	4.7	5.2	4.8	3.5			
26	Pennington Tall Fescue L144-10-3SMTF56G								4.5	3.6	4.9	5.3	4.4			
27		13.5	36.4	-	4.8	-	17.1	28.2	4.5	4.4	4.7	5.1	3.9			
28		-	60.5	-	8.1	31.4	-	-	4.5	4.5	5.2	4.7	3.6			
29	Vigoro Tall Fescue 54917								4.5	3.2	4.7	5.0	4.9			
30		-	-	-	9.3	36.4	-	54.3	4.5	4.5	4.8	5.2	3.5			
31	Pennington Northeast 03SMTNE00G								4.4	4.7	4.9	4.8	3.4			
32		-	-	-	14.7	-	-	85.3	4.4	4.7	4.7	5.3	3.1			
33		16.3	44.0	5.6	-	-	-	34.1	4.4	3.8	4.3	4.7	4.8			
34		16.3	43.9	-	5.8	-	-	34.0	4.4	4.3	4.8	4.5	3.9			
35		20.2	54.3	-	-	-	25.5	-	4.4	4.6	4.6	4.7	3.6			
36		-	-	-	7.0	27.4	24.8	40.8	4.4	4.7	4.7	4.8	3.4			
37		18.4	49.6	6.3	-	25.7	-	-	4.4	5.0	5.3	4.3	3.1			
38		-	52.4	-	7.0	-	-	40.6	4.4	3.9	4.4	4.7	4.5			
39		21.2	-	-	7.6	26.9	-	44.3	4.4	4.6	4.6	4.8	3.3			
40		16.4	-	5.6	-	23.0	20.8	34.2	4.4	4.7	4.7	4.6	3.3			

(Continued)

Table 3. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,3}							Turf Quality ²				
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	2012-2015 Avg.	2012 Avg.	2013 Avg.	2014 Avg.	2015 Avg.
41	20.7	-	7.4	-	28.9	-	43.0	4.4	4.8	5.0	4.6	3.0
42	-	62.6	8.0	-	-	29.4	-	4.3	4.1	4.3	4.7	4.2
43	11.4	30.7	3.9	-	15.9	14.4	23.7	4.3	4.3	4.0	4.9	4.1
44	-	44.6	-	-	-	21.0	34.4	4.3	4.4	4.2	4.8	3.9
45	-	42.2	5.4	-	-	19.8	32.6	4.3	4.5	4.1	4.8	3.9
46	18.3	49.4	-	6.6	25.7	-	-	4.3	4.1	4.9	4.4	3.8
47	-	-	-	-	-	37.8	62.2	4.3	4.6	4.5	4.9	3.2
48	21.3	-	7.3	-	-	27.0	44.4	4.3	4.9	5.2	4.8	2.4
49	17.3	46.6	-	-	-	-	36.1	4.3	4.3	4.0	4.6	4.3
50	16.4	-	-	5.9	22.9	20.7	34.1	4.3	4.5	4.7	4.6	3.1
51	-	47.1	-	6.3	24.5	22.1	-	4.3	4.3	4.1	4.5	4.0
52	-	50.3	-	-	26.1	23.6	-	4.3	4.4	4.8	4.5	3.5
53	-	36.2	-	-	18.8	17.0	28.0	4.3	4.9	4.3	4.5	3.4
54	13.3	35.7	-	4.7	18.6	-	27.7	4.2	4.0	3.8	5.3	3.9
55	-	-	-	-	-	-	100.0	4.2	4.5	4.5	4.9	3.0
56	-	34.5	-	4.6	17.9	16.3	26.7	4.2	3.9	4.3	5.0	3.6
57	-	60.7	7.7	-	31.6	-	-	4.2	4.1	4.9	4.4	3.2
58	18.8	50.7	-	6.7	-	23.8	-	4.1	4.3	4.3	4.6	3.3
59	23.0	-	-	-	-	29.1	47.9	4.1	4.9	4.5	4.6	2.7
60	-	62.4	-	8.3	-	29.3	-	4.1	4.1	3.8	4.6	3.9

-----(% by weight)-----
----- (1 to 9 scale)-----

(Continued)

Table 3. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,3}										Turf Quality ²				
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	2012-2015 Avg.	2012 Avg.	2013 Avg.	2014 Avg.	2015 Avg.			
61	11.3	30.6	-	4.1	15.9	14.4	23.7	4.1	4.4	4.5	4.3	3.2			
62	-	-	9.3	-	-	34.3	56.4	4.1	4.6	4.2	4.3	3.1			
63	-	65.8	-	-	34.2	-	-	4.1	3.9	5.0	4.4	3.0			
64	29.2	-	10.0	-	-	-	60.8	4.1	4.0	4.9	4.4	2.8			
65	14.9	40.1	-	5.3	20.8	18.9	-	4.0	4.4	4.2	4.2	3.2			
66	-	-	14.1	-	-	-	85.9	4.0	4.6	4.6	4.2	2.7			
67	Scotts Tall Fescue 11030345														
68	19.6	52.9	-	-	27.5	-	-	3.9	3.6	4.7	4.2	3.0			
69	-	-	-	-	100.0	-	-	3.9	4.6	4.6	3.8	2.5			
70	-	68.0	-	-	-	32.0	-	3.8	3.4	3.3	4.5	4.1			
71	-	-	6.7	-	27.5	24.9	40.9	3.8	4.0	4.0	4.3	3.1			
72	41.7	-	-	-	58.3	-	-	3.8	5.4	5.3	3.3	1.5			
73	74.4	-	25.6	-	-	-	-	3.8	5.4	5.4	3.3	1.2			
74	-	-	-	-	29.4	26.7	43.9	3.8	3.9	3.9	4.1	3.3			
75	-	47.2	6.0	-	24.6	22.2	-	3.8	4.0	4.0	4.0	3.2			
76	Jonathan Green Full Sun FS-11-B														
77	-	-	-	11.8	46.3	41.9	-	3.8	3.8	3.6	4.3	3.4			
78	-	-	-	9.6	-	34.2	56.2	3.7	4.2	3.7	3.6	3.1			
79	24.8	-	-	8.9	34.8	31.5	-	3.6	4.1	3.2	4.2	3.0			
80	38.1	-	-	13.6	-	48.3	-	3.6	5.1	4.3	3.3	1.8			
								3.6	4.8	4.1	3.2	2.2			

(Continued)

Table 3. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,3}										Turf Quality ²				
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	2012-2015 Avg.	2012 Avg.	2013 Avg.	2014 Avg.	2015 Avg.			
81	73.6	-	-	26.4	-	-	-	3.6	5.6	5.2	2.5	1.0			
82	Diamond Sun Mix 21644														
83	Scotts Sun & Shade 10020298														
84	-	-	19.7	-	80.3	-	-	3.5	4.5	4.5	3.3	1.6			
85	Jonathan Green Black Beauty BBU-10-2														
86	-	-	11.4	-	46.5	42.1	-	3.4	3.5	3.6	3.9	2.7			
87	36.2	-	-	13.0	50.8	-	-	3.4	4.8	5.0	2.8	1.2			
88	-	-	-	-	52.5	47.5	-	3.4	4.1	3.9	3.4	2.3			
89	38.3	-	13.2	-	-	48.5	-	3.4	4.5	3.5	3.3	2.3			
90	Pearl's Premium Sunny Mixture JG-38811-A														
91	27.3	-	-	-	38.2	34.5	-	3.3	4.5	4.4	3.0	1.4			
92	Scotts Sunny Mix 11020570														
93	36.5	-	12.5	-	51.0	-	-	3.3	4.5	4.5	2.8	1.3			
94	Scotts Sun & Shade 10020280														
95	100.0	-	-	-	-	-	-	3.2	3.7	3.1	3.5	2.7			
96	AmTurf Sun & Shade L152-11-650-3														
97	24.9	-	8.6	-	34.9	31.6	-	3.0	3.3	3.2	3.2	2.3			
98	-	-	-	20.4	79.6	-	-	3.0	4.0	3.6	2.4	1.9			
99	Vigoro Sun-Shade 52548														
100	-	-	-	22.0	-	78.0	-	2.9	2.3	3.2	3.8	2.4			
								2.7	3.6	2.3	2.7	2.1			

(Continued)

Table 3. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

Species Composition of Seed Blend or Mixture ^{1,3}										Turf Quality ²				
Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	2012-2015 Avg.	2012 Avg.	2013 Avg.	2014 Avg.	2015 Avg.			
101	-	-	21.3	-	-	-	78.7	3.8	2.3	2.9	1.9			
102	44.1	-	-	-	-	-	55.9	3.5	2.8	2.5	1.8			
103	-	-	-	-	100.0	-	100.0	3.3	2.5	2.8	1.6			
LSD at 5% =							0.8	1.1	1.1	1.2	1.1			

¹ Cultivars for each species were: 'Beacon' and 'Firefly' hard fescue; 'Fairmont' and 'Intrigue II' Chewings fescue; 'Celestial' and 'Wendy Jean' strong creeping red fescue; 'Bullseye', 'Faith', and 'Mustang 4' tall fescue; 'Fiesta 4', 'Paragon GLR', and PPG-PR 164 perennial ryegrass; 'Bluenote' and A05-361 "Light" Kentucky bluegrass; 'Midnight II' and 'Bewitched' "Dark" Kentucky bluegrass

² 9 = best turfgrass quality

³ See Table 1 for species/cultivar composition of retail blends and mixtures

Table 4. Performance characteristics of cool-season turfgrass blends and mixtures in a low maintenance trial established in North Brunswick, NJ in September 2011.

Species Composition of Seed Blend or Mixture ^{1,6}											
Hard Fescue	Tail Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Fescue	Perennial Ryegrass	Spring Green-up ² 10 April 2015	Leaf Spot ³ 2 June 2015	Fullness of Turfgrass Canopy ⁴ 23 June 2015	Summer Patch ³ 31 July 2015	Green Turf Cover ⁵ 29 Oct. 2015
1	-	100.0	-	-	-	-	4.3	7.0	80.0	9.0	75.0
2	-	56.4	-	-	-	43.6	5.0	7.0	75.0	9.0	68.3
3	-	88.7	11.3	-	-	-	2.0	6.0	83.3	9.0	66.7
4	-	88.3	-	11.7	-	-	2.3	7.0	85.0	8.7	63.3
5	-	52.4	-	7.0	-	40.6	5.3	6.3	73.3	7.3	61.7
6	-	52.6	6.7	-	-	40.7	5.7	6.7	80.0	7.3	58.3
7	16.3	43.9	-	5.8	-	34.0	4.7	7.7	73.3	6.3	55.0
8	Vigoro Tall Fescue 54917						4.8	4.2	5.1	5.1	4.7
9	16.3	44.0	5.6	-	-	34.1	3.3	7.7	85.0	6.7	50.0
10	-	68.0	-	-	32.0	-	3.0	3.3	83.3	5.7	48.3
11	27.1	72.9	-	-	-	-	2.3	6.0	86.7	6.0	45.0
12	18.8	50.8	6.5	-	23.9	-	3.0	4.7	81.7	5.7	45.0
13	18.8	50.7	-	6.7	23.8	-	2.0	4.3	68.3	4.3	45.0
14	-	43.6	-	-	22.7	33.7	5.7	6.0	70.0	5.3	43.3
15	24.8	66.7	8.5	-	-	-	2.0	6.0	88.3	6.0	41.7
16	Pennington Tall Fescue L144-10-3SMTF56G						3.0	5.3	80.0	9.0	41.7
17	-	62.6	8.0	-	29.4	-	4.7	5.0	88.3	6.0	41.7
18	Pennington Tall Fescue L144-10-3RBTF85						3.3	7.0	83.3	9.0	40.0
19	-	42.1	-	5.6	19.8	32.5	5.0	5.3	81.7	5.7	40.0
20	Scotts Tall Fescue 11030345						2.7	5.0	80.0	9.0	40.0

(Continued)

Table 4. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,6}										Spring Green-up ² 10 April 2015	Leaf Spot ³ 2 June 2015	Fullness of Turfgrass Canopy ⁴ 23 June 2015	Summer Patch ³ 31 July 2015	Green Turf Cover ⁵ 29 Oct. 2015
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	(% by weight)	(%)	--(1 to 9 scale)--					
21	-	41.2	-	5.5	21.4	-	-	31.9	-	4.7	4.7	90.0	6.0	40.0	
22	17.3	46.6	-	-	-	-	-	36.1	-	3.7	7.0	81.7	6.7	38.3	
23	-	44.6	-	-	-	21.0	-	34.4	-	4.7	4.7	80.0	6.0	38.3	
24	-	62.4	-	8.3	-	29.3	-	-	-	4.0	4.0	83.3	6.0	38.3	
25	18.3	49.4	-	6.6	25.7	-	-	-	-	3.7	6.3	85.0	4.0	36.7	
26	18.4	49.6	6.3	-	25.7	-	-	-	-	4.7	5.7	66.7	3.7	36.7	
27	20.2	54.3	-	-	-	25.5	-	-	-	2.3	4.3	81.7	4.7	36.7	
28	19.6	52.9	-	-	27.5	-	-	-	-	4.0	4.7	73.3	5.7	35.0	
29	-	47.1	-	6.3	24.5	22.1	-	-	-	4.7	3.7	90.0	4.7	35.0	
30	-	41.3	5.2	-	21.5	-	-	32.0	-	6.0	5.3	95.0	6.0	33.3	
31	14.9	40.2	5.1	-	20.9	18.9	-	-	-	4.3	5.0	81.7	5.7	33.3	
32	-	36.2	-	-	18.8	17.0	-	28.0	-	5.3	3.7	80.0	5.0	33.3	
33	-	47.2	6.0	-	24.6	22.2	-	-	-	3.3	3.0	80.0	5.0	33.3	
34	24.7	66.5	-	8.8	-	-	-	-	-	2.3	7.7	91.7	6.0	31.7	
35	-	60.5	-	8.1	31.4	-	-	-	-	6.3	5.0	83.3	5.7	31.7	
36	13.3	35.7	-	4.7	18.6	-	-	27.7	-	4.0	5.0	93.3	6.0	31.7	
37	-	65.8	-	-	34.2	-	-	-	-	5.0	4.3	68.3	4.3	31.7	
38	-	60.7	7.7	-	31.6	-	-	-	-	5.3	3.3	75.0	5.3	31.7	
39	13.5	36.5	4.6	-	-	17.2	-	28.2	-	4.3	5.7	86.7	5.3	30.0	
40	-	50.3	-	-	26.1	23.6	-	-	-	5.3	5.7	80.0	4.3	30.0	

(Continued)

Table 4. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,6}										Green Turf Cover ⁶ 29 Oct. 2015	
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	Spring Green-up ² 10 April 2015	Leaf Spot ³ 2 June 2015	Fullness of Turfgrass Canopy ⁴ 23 June 2015		Summer Patch ⁵ 31 July 2015
	-----(% by weight)-----										(%)	
41	13.5	36.4	-	4.8	-	17.1	28.2	5.3	4.7	88.3	5.7	28.3
42	-	34.6	4.4	-	18.0	16.3	26.7	5.3	5.0	93.3	5.3	26.7
43	-	42.2	5.4	-	-	19.8	32.6	5.7	5.0	86.7	5.0	26.7
44	14.9	40.1	-	5.3	20.8	18.9	-	3.3	4.0	76.7	4.7	26.7
45	-	34.5	-	4.6	17.9	16.3	26.7	5.7	5.0	83.3	5.7	23.3
46	13.3	35.8	4.6	-	-	18.6	27.7	3.7	4.3	90.0	6.7	23.3
47	11.3	30.6	-	4.1	15.9	14.4	23.7	4.3	4.0	81.7	4.7	23.3
48	Jonathan Green Black Beauty BBU-10-2											
49	Jonathan Green Full Sun FS-11-B											
50	11.4	30.7	3.9	-	15.9	14.4	23.7	4.0	6.0	95.0	6.0	18.3
51	-	-	-	-	-	-	100.0	6.3	6.0	66.7	9.0	14.0
52	Scotts Sunny Mix 11020570											
53	Pearl's Premium Sunny Mixture JG-38811-A											
54	-	-	14.1	-	-	-	85.9	6.3	5.7	63.3	5.3	10.0
55	-	-	19.7	-	80.3	-	-	5.3	4.0	48.3	1.3	10.0
56	20.7	-	7.1	-	29.0	-	43.2	5.7	5.3	75.0	3.0	9.3
57	23.0	-	-	-	-	29.1	47.9	4.7	6.0	68.3	3.3	8.3
58	32.4	-	-	-	-	-	67.6	4.3	5.7	68.3	2.3	8.3
59	38.3	-	13.2	-	-	48.5	-	4.0	4.7	58.3	2.0	8.3
60	Diamond Sun Mix 21644											
								5.3	3.0	78.3	4.0	8.3

(Continued)

Table 4. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,6}										Spring Green-up ² 10 April 2015	Leaf Spot ³ 2 June 2015	Fullness of Turfgrass Canopy ⁴ 23 June 2015	Summer Patch ⁵ 31 July 2015	Green Turf Cover ⁶ 29 Oct. 2015
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	-----(% by weight)-----		----- (1 to 9 scale)-----					
61	Vigoro Sun-Shade 52548										5.3	4.0	66.7	5.0	7.7
62	-	-	-	-	29.4	26.7	43.9				5.0	3.0	86.7	6.0	6.7
63	-	-	20.4		79.6	-					5.3	5.0	36.7	2.0	6.0
64	-	-	11.8		46.3	41.9					5.0	2.3	76.7	4.0	6.0
65	27.3	-	-	-	38.2	34.5					4.7	4.3	45.0	1.3	5.7
66	36.2	-	-	13.0	50.8	-					6.0	6.0	35.0	1.3	5.3
67	-	-	9.0	-	36.6	-	54.4				6.3	3.0	83.3	4.7	5.3
68	29.2	-	10.0	-	-	-	60.8				2.7	5.3	70.0	3.3	5.0
69	-	-	-	14.7	-	-	85.3				5.7	5.0	71.7	7.0	5.0
70	-	-	-	9.3	36.4	-	54.3				5.7	4.0	86.7	4.7	5.0
71	-	-	-	-	100.0	-					4.0	4.0	60.0	3.3	5.0
72	Scotts Sun & Shade 10020298										4.7	2.7	68.3	3.3	5.0
73	-	-	11.4	-	46.5	42.1					5.7	2.7	70.0	2.3	5.0
74	21.3	-	7.3	-	-	27.0	44.4				5.0	4.3	66.7	2.0	4.3
75	Pennington Northeast 03SMTNE00G										5.7	2.7	85.0	4.7	4.3
76	-	-	6.7	-	27.5	24.9	40.9				4.7	2.7	81.7	4.3	4.3
77	22.3	-	-	-	31.2	-	46.5				5.0	5.0	80.0	5.3	3.3
78	-	-	-	-	-	37.8	62.2				5.7	5.0	85.0	4.0	3.3
79	36.5	-	12.5	-	51.0	-					4.3	4.3	40.0	1.0	3.3
80	17.4	-	-	-	24.3	22.1	36.2				4.7	4.0	85.0	5.0	3.3

(Continued)

Table 4. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,6}										Spring Green-up ² 10 April 2015	Leaf Spot ³ 2 June 2015	Fullness of Turfgrass Canopy ⁴ 23 June 2015	Summer Patch ³ 31 July 2015	Green Turf Cover ⁵ 29 Oct. 2015
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	-----(% by weight)-----		----- (1 to 9 scale) -----					
81	AmTurf Sun & Shade L152-11-650-3										5.3	4.0	68.3	4.0	3.3
82	29.0	-	-	10.4	-	-	-	60.6	-	-	4.7	7.7	91.7	5.7	2.7
83	21.2	-	-	7.6	26.9	-	-	44.3	-	-	6.0	4.3	81.7	3.7	2.7
84	24.8	-	-	8.9	34.8	31.5	-	-	-	5.3	4.0	58.3	1.0	2.7	
85	-	-	9.3	-	-	34.3	-	56.4	-	6.3	3.0	76.7	5.7	2.7	
86	41.7	-	-	-	58.3	-	-	-	-	5.7	4.7	40.0	1.0	1.7	
87	-	-	-	9.6	-	34.2	-	56.2	-	5.3	4.7	78.3	3.7	1.7	
88	24.9	-	8.6	-	34.9	31.6	-	-	-	4.7	3.3	58.3	2.0	1.7	
89	16.4	-	5.6	-	23.0	20.8	-	34.2	-	4.7	3.0	81.7	4.3	1.7	
90	38.1	-	-	13.6	-	48.3	-	-	-	2.7	3.0	60.0	2.3	1.7	
91	-	-	-	22.0	-	78.0	-	-	-	4.3	2.3	56.7	2.3	1.7	
92	-	-	21.3	-	-	78.7	-	-	-	3.7	2.0	51.7	1.3	1.7	
93	73.6	-	-	26.4	-	-	-	-	-	2.3	6.0	23.3	1.0	1.0	
94	20.7	-	7.4	-	28.9	-	-	43.0	-	5.7	4.7	80.0	4.0	1.0	
95	Scotts Sun & Shade 10020280									3.7	3.0	75.0	4.3	1.0	
96	-	-	-	-	52.5	47.5	-	-	-	4.3	1.7	71.7	1.7	1.0	
97	100.0	-	-	-	-	-	-	-	-	4.0	6.3	38.3	1.3	0.0	
98	74.4	-	25.6	-	-	-	-	-	-	2.7	5.0	33.3	1.0	0.0	
99	-	-	-	-	40.2	-	-	59.8	-	5.3	4.0	90.0	5.0	0.0	
100	-	-	-	7.0	27.4	24.8	-	40.8	-	5.3	3.3	85.0	4.3	0.0	

(Continued)

Table 4. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

	Species Composition of Seed Blend or Mixture ^{1,6}													
	Hard Fescue	Tall Fescue	Kentucky Bluegrass Dark	Kentucky Bluegrass Light	Chewings Fescue	Strong Creeping Red Fescue	Perennial Ryegrass	Spring Green-up ² 10 April 2015	Leaf Spot ³ 2 June 2015	Fullness of Turfgrass Canopy ⁴ 23 June 2015	Summer Patch ³ 31 July 2015	Green Turf Cover ⁵ 29 Oct. 2015		
	-----(% by weight)-----													
101	16.4	-	-	5.9	22.9	20.7	34.1	3.7	3.3	83.3	5.0	0.0		
102	-	-	-	-	-	100.0	-	5.0	2.7	51.7	1.0	0.0		
103	44.1	-	-	-	-	55.9	-	3.7	2.3	58.3	1.0	0.0		
	LSD at 5% =										1.9	2.5	2.2	18.4

¹ Cultivars for each species were: 'Beacon' and 'Firefly' hard fescue; 'Fairmont' and 'Intrigue II' Chewings fescue; 'Celestial' and 'Wendy Jean' strong creeping red fescue; 'Bullseye', 'Faith', and 'Mustang 4' tall fescue; 'Fiesta 4', 'Paragon GLR', and PPG-PR 164 perennial ryegrass; 'Bluenote' and A05-361 "Light" Kentucky bluegrass; 'Midnight II' and 'Bewitched' "Dark" Kentucky bluegrass

² 9 = best spring green-up

³ 9 = least disease

⁴ 100% = full canopy

⁵ 100% = complete green cover

⁶ See Table 1 for species/cultivar composition of retail blends and mixtures