

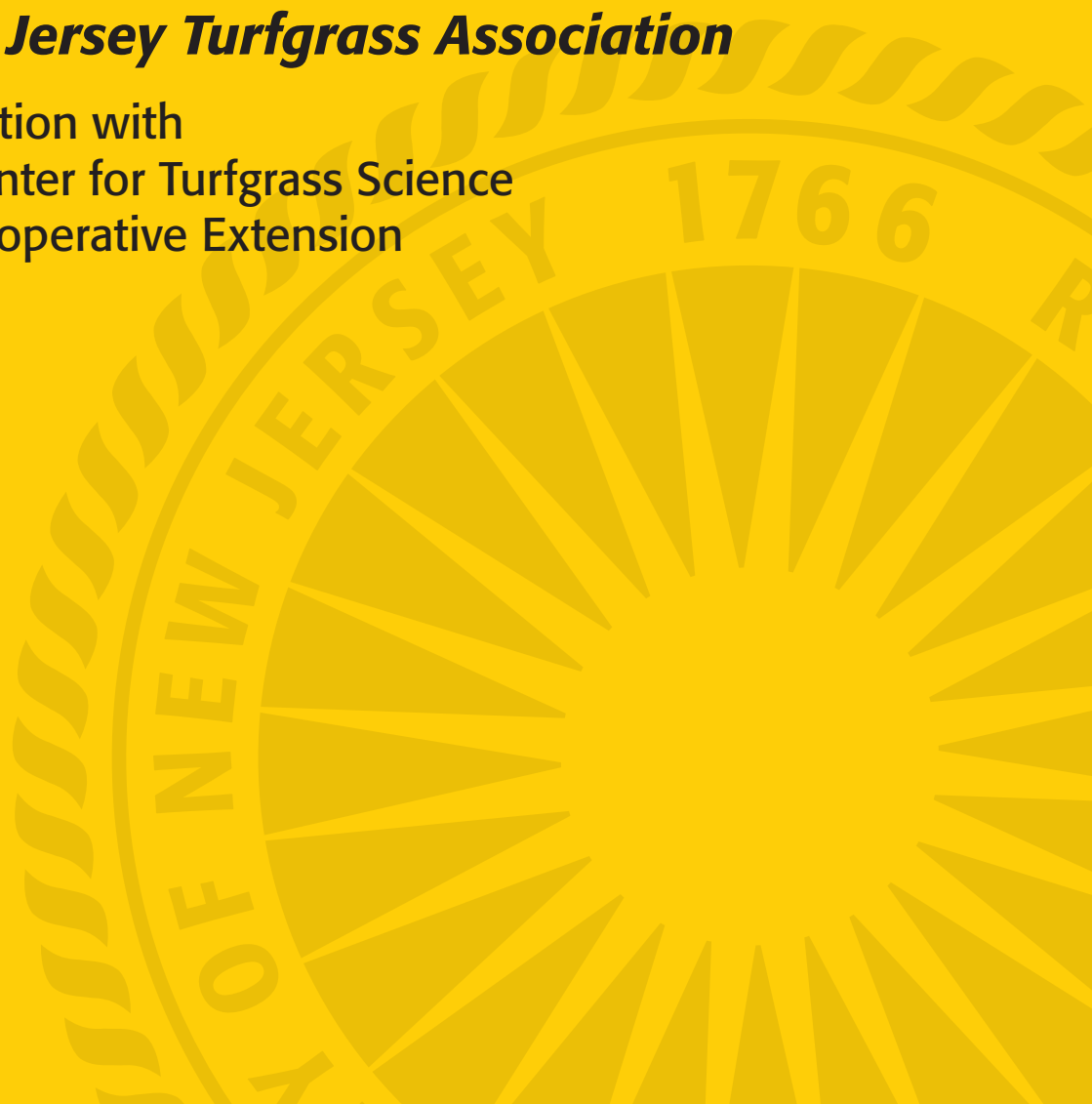
RUTGERS

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In Cooperation with
Rutgers Center for Turfgrass Science
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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 2014 GREEN EXPO Turf and Landscape Conference. Publication of these lectures provides a readily available source of information

covering a wide range of topics and includes technical and popular presentations of importance to the turfgrass industry.

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

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

ASSESSING COOL-SEASON TURFGRASS BLENDS AND MIXTURES UNDER LOW MAINTENANCE DURING 2012-2014

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Johnson et al. (2013) recently authored a book chapter addressing cool-season turfgrass management using fewer fertilization, irrigation, and pesticide inputs. Seed blends (two or more cultivars of a single turfgrass species) and mixtures (two or more different turfgrass species) are commonly recommended for the purpose of broadening the diversity and adaptation of the established turf; however, there is limited data available comparing the performance of seed mixtures. The objective of this trial was to evaluate the long-term performance of cool-season turfgrass blends and mixtures under moderate fertilization and limited irrigation and pesticide inputs.

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 1. 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 2 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 (P) and potassium (K) were 228 and 274 lb per acre, respectively. Nitrogen (N) was applied as at 1.0 (30-0-0; 80% slow-release N) and 1.1 (26-0-5; 50% slow-release N) lb per 1000 ft² on 1 April and 5 September 2014, respectively.

During 2014, 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 withheld during 2014; however, turf did not enter severe dormancy due to relatively frequent rains and cool summer temperatures. Turfgrass quality (1 to 9 scale; 9 = best quality) was visually rated monthly during April through October (seven ratings).

Damage from pink snow mold (caused by *Microdochium nivale*) was observed in the trial in early spring 2014 and was visually rated on 20 March 2014 using a 1 to 9 scale where 9 represented no visual disease symptoms.

Spring green-up was visually rated on 14 April 2014 using a 1 to 9 scale where 9 equaled the best spring green-up.

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Dramatic differences in ground cover were observed during autumn 2014. The test was visually rated for percent ground cover on 27 October 2014 using a 0 to 100% scale where 100% equaled complete ground cover.

Both the Light and Dark Kentucky bluegrass blends did not establish during 2012 and were removed from 2013 and 2014 data analysis. 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

Sixty-one entries had the best multi-year average turf quality during 2012 through 2014; among these, 58 entries contained perennial ryegrass (40 entries) and/or tall fescue (36 entries) (Table 1). Several entries with tall fescue as a component have dramatically improved in average turf quality (> 2 rating units) over the three years of this trial including the two tall fescue and Kentucky bluegrass mixtures and two tall fescue blends (Bullseye, Faith, and Mustang 4; and Rebel IV, Rebel Advance, and Brockton [Pennington Tall Fescue]).

The hard fescue blend has experienced the greatest decline in average turf quality over the three years of this trial (3.3 rating units) (Table 1). Other mixtures exhibiting a large numerical decline (> 2.0 rating units) in average turf quality include the two hard fescue and Kentucky bluegrass mixtures, hard fescue mixed with Chewings fescue, and hard fescue mixed with Kentucky bluegrass-Light and Chewings fescue.

Eighty-three entries had the least pink snow mold on 20 March 2014 (Table 1). The most severe snow mold was observed in the perennial ryegrass blend (Fiesta 4, Paragon GLR, and PPG-PR 164) and the two mixtures of perennial ryegrass and Kentucky bluegrass. All other mixtures with perennial ryegrass greatly improved tolerance to this disease.

Forty-eight entries exhibited the best spring green-up on 14 April 2014; not surprisingly, 40 of these entries contained perennial ryegrass (Table 1). Each of the 24 entries that had the poorest spring green-up was composed of either tall fescue and/or hard fescue.

Sixty-five entries had the greatest live cover when evaluated on 27 October 2014 (Table 1). Eleven entries had percent ground cover < 60%; each of these contained hard fescue and/or Chewings fescue.

Sixty-five entries had the best ground cover on 27 October 2014; each of these entries exhibited ground cover > 80% (Table 1). Additionally, 62 of these entries contained tall fescue and/or perennial ryegrass; the three non-perennial ryegrass/tall fescue entries consisted of a minimum of 41.9% strong creeping red fescue. Entries with the poorest percent ground cover (< 38.3%) consisted of hard fescue and some combination of hard fescue, Chewings fescue, and Kentucky bluegrass.

DISCUSSION

The continued decline in average turf quality of most hard fescue mixtures and the improvement of tall fescue blends and mixtures during 2014 underscores the need to assess cool-season turfgrass blends and mixtures longer than one or two years to develop sound recommendations.

Summer patch (caused by *Magnaporthe poae*) susceptibility greatly reduced the turfgrass quality of hard fescue, Chewings fescue and mixtures containing these species during 2013 (Park et al. 2014). The severity of damage and slow growing nature of these grasses limited the recovery during 2014 and subsequently resulted in continued poor turf quality ratings of these plots.

Higher turf quality exhibited by tall fescue and perennial ryegrass entries was due, in large part, to the ability of these plots to maintain greater and more uniform turf cover compared to summer patch-affected plots. The October 2014 monthly turf quality rating (data not shown) was highly correlated with the percent ground cover rating taken on 27 October 2014 ($r = 0.93$; $n = 103$).

Traditionally, turf quality ratings take into account characteristics such as density, leaf texture, and genetic color. However, under low-input management and severe disease pressure, turf cover and freedom from voids (exposed soil) are the attributes that govern turf quality.

REFERENCES

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

Table 1. Performance 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 | | | | | | | | | | Turf Quality ² | | | | Pink Snow Mold ³ | Spring Green-up ⁴ | Ground Cover ⁵ |
|----|---|-------------|-------------------------|--------------------------|-----------------|----------------------------|--------------------|----------------|-----------|-----------|---------------------------|--------------|---------------|--------------|-----------------------------|------------------------------|---------------------------|
| | Hard Fescue | Tall Fescue | Kentucky Bluegrass Dark | Kentucky Bluegrass Light | Chewings Fescue | Strong Creeping Red Fescue | Perennial Ryegrass | 2012-2014 Avg. | 2012 Avg. | 2013 Avg. | 2014 Avg. | 20 Mar. 2014 | 14 April 2014 | 27 Oct. 2014 | | | |
| 1 | - | 41.3 | 5.2 | - | 21.5 | - | 32.0 | 5.3 | 5.2 | 5.7 | 8.3 | 5.0 | 5.0 | 91.7 | | | |
| 2 | 20.7 | - | 7.1 | - | 29.0 | - | 43.2 | 5.3 | 5.8 | 5.1 | 7.3 | 5.3 | 5.3 | 73.3 | | | |
| 3 | 22.3 | - | - | - | 31.2 | - | 46.5 | 5.3 | 5.6 | 5.0 | 5.7 | 5.3 | 5.3 | 85.0 | | | |
| 4 | - | 88.3 | - | 11.7 | - | - | - | 5.2 | 5.8 | 6.0 | 9.0 | 1.7 | 1.7 | 98.3 | | | |
| 5 | - | 88.7 | 11.3 | - | - | - | - | 5.2 | 5.7 | 6.3 | 9.0 | 2.0 | 2.0 | 100.0 | | | |
| 6 | 32.4 | - | - | - | - | - | 67.6 | 5.2 | 5.5 | 5.0 | 5.3 | 5.0 | 5.0 | 83.3 | | | |
| 7 | 29.0 | - | - | 10.4 | - | - | 60.6 | 5.1 | 4.9 | 5.5 | 6.0 | 6.0 | 6.0 | 86.7 | | | |
| 8 | - | - | 9.0 | - | 36.6 | - | 54.4 | 5.1 | 5.5 | 5.0 | 6.3 | 5.7 | 5.7 | 86.7 | | | |
| 9 | 17.4 | - | - | - | 24.3 | 22.1 | 36.2 | 5.1 | 5.1 | 5.1 | 7.0 | 6.0 | 6.0 | 90.0 | | | |
| 10 | - | 52.6 | 6.7 | - | - | - | 40.7 | 5.1 | 4.9 | 5.0 | 6.3 | 4.0 | 4.0 | 91.7 | | | |
| 11 | - | 42.1 | - | 5.6 | - | 19.8 | 32.5 | 5.0 | 4.7 | 5.4 | 7.7 | 5.7 | 5.7 | 86.7 | | | |
| 12 | - | - | - | - | 40.2 | - | 59.8 | 5.0 | 5.2 | 5.1 | 6.7 | 5.0 | 5.0 | 91.7 | | | |
| 13 | 21.3 | - | 7.3 | - | - | 27.0 | 44.4 | 5.0 | 5.2 | 4.8 | 8.0 | 5.0 | 5.0 | 75.0 | | | |
| 14 | - | 100.0 | - | - | - | - | - | 4.9 | 5.5 | 5.7 | 9.0 | 2.0 | 2.0 | 100.0 | | | |
| 15 | - | - | - | 14.7 | - | - | 85.3 | 4.9 | 4.7 | 5.3 | 2.3 | 5.0 | 5.0 | 96.7 | | | |
| 16 | 13.5 | 36.5 | 4.6 | - | - | 17.2 | 28.2 | 4.9 | 4.6 | 5.0 | 6.7 | 4.3 | 4.3 | 83.3 | | | |
| 17 | - | 43.6 | - | - | 22.7 | - | 33.7 | 4.9 | 5.2 | 4.8 | 7.7 | 4.7 | 4.7 | 65.0 | | | |
| 18 | 27.1 | 72.9 | - | - | - | - | - | 4.9 | 4.9 | 5.8 | 9.0 | 2.0 | 2.0 | 90.0 | | | |
| 19 | 18.4 | 49.6 | 6.3 | - | 25.7 | - | - | 4.9 | 5.3 | 4.3 | 9.0 | 2.7 | 2.7 | 58.3 | | | |
| 20 | - | 41.2 | - | 5.5 | 21.4 | - | 31.9 | 4.8 | 4.7 | 5.2 | 7.0 | 4.3 | 4.3 | 90.0 | | | |

(Continued)

Table 1. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

| | Species Composition of Seed Blend or Mixture ¹ | | | | | | | | | | Turf Quality ² | | | Pink Snow Mold ³ 20 Mar. 2014 | Spring Green-up ⁴ 14 April 2014 | Ground Cover ⁵ 27 Oct. 2014 |
|----|---|-------------|-------------------------|--------------------------|-----------------|----------------------------|--------------------|----------------|-----------|-----------|---------------------------|---------------|----------------|--|--|--|
| | Hard Fescue | Tall Fescue | Kentucky Bluegrass Dark | Kentucky Bluegrass Light | Chewings Fescue | Strong Creeping Red Fescue | Perennial Ryegrass | 2012-2014 Avg. | 2012 Avg. | 2013 Avg. | 2014 Avg. | (% by weight) | (1 to 9 scale) | | | |
| 21 | 14.9 | 40.2 | 5.1 | - | 20.9 | 18.9 | - | - | 4.8 | 4.3 | 5.0 | 8.7 | 3.7 | 83.3 | | |
| 22 | 20.7 | - | 7.4 | - | 28.9 | - | 43.0 | - | 4.8 | 4.8 | 4.6 | 7.0 | 5.0 | 73.3 | | |
| 23 | 24.8 | 66.7 | 8.5 | - | - | - | - | - | 4.8 | 4.2 | 5.3 | 9.0 | 2.0 | 85.0 | | |
| 24 | - | - | - | 9.3 | 36.4 | - | 54.3 | - | 4.8 | 4.5 | 5.2 | 7.7 | 6.0 | 80.0 | | |
| 25 | - | 56.4 | - | - | - | - | 43.6 | - | 4.8 | 4.2 | 5.1 | 5.3 | 4.3 | 93.3 | | |
| 26 | Pennington Northeast 03SMTNE00G ⁶ | | | | | | | | | | 4.8 | 4.7 | 4.9 | 4.8 | 7.7 | 88.3 |
| 27 | - | 60.5 | - | 8.1 | 31.4 | - | - | - | 4.8 | 4.5 | 4.7 | 9.0 | 3.3 | 68.3 | | |
| 28 | Pennington Tall Fescue L144-10-3RBTF85 | | | | | | | | | | 4.8 | 3.4 | 5.4 | 9.0 | 2.3 | 96.7 |
| 29 | 13.3 | 35.8 | 4.6 | - | - | 18.6 | 27.7 | - | 4.8 | 3.9 | 5.2 | 7.0 | 4.3 | 88.3 | | |
| 30 | - | 34.6 | 4.4 | - | 18.0 | 16.3 | 26.7 | - | 4.8 | 4.5 | 5.1 | 7.7 | 5.3 | 96.7 | | |
| 31 | 18.8 | 50.8 | 6.5 | - | - | 23.9 | - | - | 4.8 | 4.9 | 4.9 | 9.0 | 3.7 | 85.0 | | |
| 32 | 13.5 | 36.4 | - | 4.8 | - | 17.1 | 28.2 | - | 4.7 | 4.4 | 5.1 | 8.7 | 5.0 | 88.3 | | |
| 33 | - | - | - | 7.0 | 27.4 | 24.8 | 40.8 | - | 4.7 | 4.7 | 4.8 | 7.0 | 5.3 | 93.3 | | |
| 34 | - | - | - | - | - | 37.8 | 62.2 | - | 4.7 | 4.6 | 4.9 | 6.0 | 5.7 | 91.7 | | |
| 35 | 16.4 | - | 5.6 | - | 23.0 | 20.8 | 34.2 | - | 4.7 | 4.7 | 4.6 | 9.0 | 5.0 | 85.0 | | |
| 36 | 74.4 | - | 25.6 | - | - | - | - | - | 4.7 | 5.4 | 3.3 | 9.0 | 1.3 | 28.3 | | |
| 37 | 21.2 | - | - | 7.6 | 26.9 | - | 44.3 | - | 4.7 | 4.6 | 4.8 | 6.3 | 6.3 | 91.7 | | |
| 38 | 20.2 | 54.3 | - | - | - | 25.5 | - | - | 4.7 | 4.6 | 4.7 | 9.0 | 3.0 | 88.3 | | |
| 39 | 16.4 | - | - | 5.9 | 22.9 | 20.7 | 34.1 | - | 4.7 | 4.5 | 4.6 | 8.3 | 5.0 | 83.3 | | |
| 40 | 23.0 | - | - | - | - | 29.1 | 47.9 | - | 4.7 | 4.9 | 4.6 | 7.0 | 5.7 | 78.3 | | |

(Continued)

Table 1. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

| | Species Composition of Seed Blend or Mixture ¹ | | | | | | | | | | Turf Quality ² | | | Pink Snow Mold ³ 20 Mar. 2014 | Spring Green-up ⁴ 14 April 2014 | Ground Cover ⁵ 27 Oct. 2014 | |
|----|---|-------------|-------------------------|--------------------------|-----------------|------------------------|--------------------|----------------|-----------|-----------|---------------------------|---------------|----------------|--|--|--|------|
| | Hard Fescue | Tall Fescue | Kentucky Bluegrass Dark | Kentucky Bluegrass Light | Chewings Fescue | Strong Creeping Fescue | Perennial Ryegrass | 2012-2014 Avg. | 2012 Avg. | 2013 Avg. | 2014 Avg. | (% by weight) | (1 to 9 scale) | | | | (%) |
| 41 | 24.7 | 66.5 | - | 8.8 | - | - | - | - | - | - | 4.6 | 3.8 | 4.6 | 5.6 | 9.0 | 2.0 | 90.0 |
| 42 | - | - | - | - | - | - | - | - | 100.0 | - | 4.6 | 4.5 | 4.5 | 4.9 | 3.7 | 6.0 | 91.7 |
| 43 | 41.7 | - | - | - | 58.3 | - | - | - | - | - | 4.6 | 5.4 | 5.3 | 3.3 | 9.0 | 4.7 | 36.7 |
| 44 | Pennington Tall Fescue L144-10-3SMTF56G | | | | | | | | | | 4.6 | 3.6 | 4.9 | 5.3 | 9.0 | 2.7 | 93.3 |
| 45 | - | 36.2 | - | - | 18.8 | 17.0 | 28.0 | - | - | - | 4.6 | 4.9 | 4.3 | 4.5 | 6.3 | 5.3 | 85.0 |
| 46 | 16.3 | 43.9 | - | 5.8 | - | - | 34.0 | - | - | - | 4.5 | 4.3 | 4.8 | 4.5 | 7.0 | 3.0 | 76.7 |
| 47 | - | 50.3 | - | - | 26.1 | 23.6 | - | - | - | - | 4.5 | 4.4 | 4.8 | 4.5 | 9.0 | 4.3 | 73.3 |
| 48 | 18.3 | 49.4 | - | 6.6 | 25.7 | - | - | - | - | - | 4.5 | 4.1 | 4.9 | 4.4 | 9.0 | 3.3 | 71.7 |
| 49 | - | 44.6 | - | - | - | 21.0 | 34.4 | - | - | - | 4.5 | 4.4 | 4.2 | 4.8 | 6.0 | 4.0 | 90.0 |
| 50 | - | 42.2 | 5.4 | - | - | 19.8 | 32.6 | - | - | - | 4.5 | 4.5 | 4.1 | 4.8 | 6.0 | 5.3 | 91.7 |
| 51 | 29.2 | - | 10.0 | - | - | - | 60.8 | - | - | - | 4.5 | 4.0 | 4.9 | 4.4 | 6.0 | 4.3 | 71.7 |
| 52 | - | 60.7 | 7.7 | - | 31.6 | - | - | - | - | - | 4.5 | 4.1 | 4.9 | 4.4 | 9.0 | 3.7 | 75.0 |
| 53 | - | - | 14.1 | - | - | - | 85.9 | - | - | - | 4.5 | 4.6 | 4.6 | 4.2 | 3.3 | 4.7 | 80.0 |
| 54 | 73.6 | - | - | 26.4 | - | - | - | - | - | - | 4.5 | 5.6 | 5.2 | 2.5 | 9.0 | 1.7 | 21.7 |
| 55 | - | 65.8 | - | - | 34.2 | - | - | - | - | - | 4.4 | 3.9 | 5.0 | 4.4 | 9.0 | 3.3 | 60.0 |
| 56 | - | 34.5 | - | 4.6 | 17.9 | 16.3 | 26.7 | - | - | - | 4.4 | 3.9 | 4.3 | 5.0 | 8.3 | 5.7 | 90.0 |
| 57 | 11.4 | 30.7 | 3.9 | - | 15.9 | 14.4 | 23.7 | - | - | - | 4.4 | 4.3 | 4.0 | 4.9 | 8.0 | 4.7 | 96.7 |
| 58 | 18.8 | 50.7 | - | 6.7 | - | 23.8 | - | - | - | - | 4.4 | 4.3 | 4.3 | 4.6 | 9.0 | 4.0 | 70.0 |
| 59 | 13.3 | 35.7 | - | 4.7 | 18.6 | - | 27.7 | - | - | - | 4.4 | 4.0 | 3.8 | 5.3 | 8.3 | 4.3 | 91.7 |
| 60 | - | - | 9.3 | - | - | 34.3 | 56.4 | - | - | - | 4.4 | 4.6 | 4.2 | 4.3 | 7.0 | 6.0 | 85.0 |

(Continued)

Table 1. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

| | Species Composition of Seed Blend or Mixture ¹ | | | | | | | | | | Turf Quality ² | | | Pink Snow Mold ³ 20 Mar. 2014 | Spring Green-up ⁴ 14 April 2014 | Ground Cover ⁵ 27 Oct. 2014 |
|----|---|-------------|-------------------------|--------------------------|-----------------|----------------------------|--------------------|----------------|-----------|-----------|---------------------------|-----|-----|--|--|--|
| | Hard Fescue | Tall Fescue | Kentucky Bluegrass Dark | Kentucky Bluegrass Light | Chewings Fescue | Strong Creeping Red Fescue | Perennial Ryegrass | 2012-2014 Avg. | 2012 Avg. | 2013 Avg. | 2014 Avg. | | | | | |
| 61 | 11.3 | 30.6 | - | 4.1 | 15.9 | 14.4 | 23.7 | 4.4 | 4.4 | 4.5 | 4.3 | 7.7 | 3.7 | 85.0 | | |
| 62 | - | 62.6 | 8.0 | - | - | 29.4 | - | 4.3 | 4.1 | 4.3 | 4.7 | 9.0 | 2.7 | 93.3 | | |
| 63 | - | 52.4 | - | 7.0 | - | - | 40.6 | 4.3 | 3.9 | 4.4 | 4.7 | 7.3 | 4.0 | 90.0 | | |
| 64 | - | 47.1 | - | 6.3 | 24.5 | 22.1 | - | 4.3 | 4.3 | 4.1 | 4.5 | 9.0 | 3.3 | 90.0 | | |
| 65 | Vigoro Tall Fescue 54917 | | | | | | | | | | | | | | | |
| 66 | 17.3 | 46.6 | - | - | - | - | 36.1 | 4.3 | 4.3 | 4.0 | 4.6 | 8.3 | 3.0 | 90.0 | | |
| 67 | - | - | - | - | 100.0 | - | - | 4.3 | 4.6 | 4.6 | 3.8 | 9.0 | 3.7 | 60.0 | | |
| 68 | 16.3 | 44.0 | 5.6 | - | - | - | 34.1 | 4.3 | 3.8 | 4.3 | 4.7 | 5.3 | 2.7 | 90.0 | | |
| 69 | 14.9 | 40.1 | - | 5.3 | 20.8 | 18.9 | - | 4.3 | 4.4 | 4.2 | 4.2 | 8.7 | 2.7 | 73.3 | | |
| 70 | 36.2 | - | - | 13.0 | 50.8 | - | - | 4.2 | 4.8 | 5.0 | 2.8 | 9.0 | 5.3 | 30.0 | | |
| 71 | 24.8 | - | - | 8.9 | 34.8 | 31.5 | - | 4.2 | 5.1 | 4.3 | 3.3 | 8.7 | 5.3 | 63.3 | | |
| 72 | - | 62.4 | - | 8.3 | - | 29.3 | - | 4.2 | 4.1 | 3.8 | 4.6 | 9.0 | 4.7 | 86.7 | | |
| 73 | 19.6 | 52.9 | - | - | 27.5 | - | - | 4.1 | 3.6 | 4.7 | 4.2 | 9.0 | 4.0 | 60.0 | | |
| 74 | - | - | 19.7 | - | 80.3 | - | - | 4.1 | 4.5 | 4.5 | 3.3 | 9.0 | 5.0 | 51.7 | | |
| 75 | - | - | 6.7 | - | 27.5 | 24.9 | 40.9 | 4.1 | 4.0 | 4.0 | 4.3 | 8.0 | 5.7 | 78.3 | | |
| 76 | 38.1 | - | - | 13.6 | - | 48.3 | - | 4.0 | 4.8 | 4.1 | 3.2 | 9.0 | 3.0 | 65.0 | | |
| 77 | Scotts Tall Fescue 11030345 | | | | | | | | | | | | | | | |
| 78 | - | - | - | - | 29.4 | 26.7 | 43.9 | 4.0 | 3.9 | 3.9 | 4.1 | 7.3 | 5.7 | 85.0 | | |
| 79 | - | 47.2 | 6.0 | - | 24.6 | 22.2 | - | 4.0 | 4.0 | 4.0 | 4.0 | 8.7 | 3.0 | 83.3 | | |
| 80 | Scotts Sun & Shade 10020298 | | | | | | | | | | | | | | | |
| | | | | | | | | 3.9 | 3.8 | 3.9 | 3.9 | 8.7 | 5.3 | 80.0 | | |

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

(Continued)

Table 1. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

| | Species Composition of Seed Blend or Mixture ¹ | | | | | | | | | | Turf Quality ² | | | Pink Snow Mold ^b 20 Mar. 2014 | Spring Green-up ^c 14 April 2014 | Ground Cover ^d 27 Oct. 2014 | |
|-----|---|-------------|-------------------------|--------------------------|-----------------|----------------------------|--------------------|----------------|-----------|-----------|---------------------------|---------------|----------------|--|--|--|------|
| | Hard Fescue | Tall Fescue | Kentucky Bluegrass Dark | Kentucky Bluegrass Light | Chewings Fescue | Strong Creeping Red Fescue | Perennial Ryegrass | 2012-2014 Avg. | 2012 Avg. | 2013 Avg. | 2014 Avg. | (% by weight) | (1 to 9 scale) | | | | (%) |
| 81 | 27.3 | - | - | - | 38.2 | 34.5 | - | - | - | - | 3.9 | 4.5 | 4.4 | 3.0 | 8.3 | 4.7 | 51.7 |
| 82 | 36.5 | - | 12.5 | - | 51.0 | - | - | - | - | - | 3.9 | 4.5 | 4.5 | 2.8 | 8.7 | 4.3 | 38.3 |
| 83 | Jonathan Green Full Sun FS-11-B | | | | | | | | | | 3.9 | 3.8 | 3.6 | 4.3 | 8.7 | 5.7 | 90.0 |
| 84 | - | - | - | 11.8 | 46.3 | 41.9 | - | - | - | - | 3.9 | 4.2 | 3.7 | 3.6 | 9.0 | 4.3 | 80.0 |
| 85 | - | - | - | 9.6 | - | 34.2 | 56.2 | - | - | - | 3.8 | 4.1 | 3.2 | 4.2 | 6.0 | 6.0 | 93.3 |
| 86 | - | - | - | - | 52.5 | 47.5 | - | - | - | - | 3.8 | 4.1 | 3.9 | 3.4 | 8.7 | 5.0 | 75.0 |
| 87 | 38.3 | - | 13.2 | - | - | 48.5 | - | - | - | - | 3.8 | 4.5 | 3.5 | 3.3 | 9.0 | 3.3 | 66.7 |
| 88 | - | 68.0 | - | - | - | 32.0 | - | - | - | - | 3.7 | 3.4 | 3.3 | 4.5 | 9.0 | 3.3 | 96.7 |
| 89 | Diamond Sun Mix 21644 | | | | | | | | | | 3.7 | 3.9 | 3.2 | 4.2 | 8.3 | 5.7 | 80.0 |
| 90 | 100.0 | - | - | - | - | - | - | - | - | - | 3.7 | 5.2 | 4.2 | 1.9 | 9.0 | 1.7 | 31.7 |
| 91 | - | - | 11.4 | - | 46.5 | 42.1 | - | - | - | - | 3.7 | 3.5 | 3.6 | 3.9 | 9.0 | 3.7 | 80.0 |
| 92 | Scotts Sunny Mix 11020570 | | | | | | | | | | 3.6 | 3.4 | 3.9 | 3.6 | 7.3 | 4.3 | 78.3 |
| 93 | Pearl's Premium Sunny Mixture JG-38811-A | | | | | | | | | | 3.6 | 3.6 | 3.5 | 3.7 | 9.0 | 6.0 | 81.7 |
| 94 | Jonathan Green Black Beauty BBU-10-2 | | | | | | | | | | 3.5 | 2.9 | 3.7 | 3.9 | 9.0 | 2.7 | 90.0 |
| 95 | - | - | - | 20.4 | 79.6 | - | - | - | - | - | 3.5 | 4.0 | 4.3 | 2.2 | 8.7 | 5.7 | 36.7 |
| 96 | Scotts Sun & Shade 10020280 | | | | | | | | | | 3.4 | 3.7 | 3.1 | 3.5 | 8.7 | 5.0 | 91.7 |
| 97 | 24.9 | - | 8.6 | - | 34.9 | 31.6 | - | - | - | - | 3.3 | 4.0 | 3.6 | 2.4 | 8.3 | 3.3 | 55.0 |
| 98 | AmTurf Sun & Shade L152-11-650-3 | | | | | | | | | | 3.2 | 3.3 | 3.2 | 3.2 | 9.0 | 5.0 | 68.3 |
| 99 | Vigoro Sun-Shade 52548 | | | | | | | | | | 3.1 | 2.3 | 3.2 | 3.8 | 6.7 | 6.0 | 73.3 |
| 100 | - | - | 21.3 | - | - | 78.7 | - | - | - | - | 3.0 | 3.8 | 2.3 | 2.9 | 9.0 | 4.3 | 81.7 |

(Continued)

Table 1. Cool-season turfgrass blends and mixtures trial, 2011 (continued).

| | Species Composition of Seed Blend or Mixture ¹ | | | | | | | | | | Turf Quality ² | Pink Snow Mold ³ | Spring Green-up ⁴ | Ground Cover ⁵ | | |
|-------------|---|-------------|-------------------------|--------------------------|-----------------|----------------------------|--------------------|----------------|-----------|-----------|---------------------------|-----------------------------|------------------------------|---------------------------|-----------|------|
| | Hard Fescue | Tall Fescue | Kentucky Bluegrass Dark | Kentucky Bluegrass Light | Chewings Fescue | Strong Creeping Red Fescue | Perennial Ryegrass | 2012-2014 Avg. | 2012 Avg. | 2013 Avg. | | | | | 2014 Avg. | |
| 101 | - | - | - | - | - | 100.0 | - | - | 2.9 | 3.3 | 2.5 | 2.8 | 9.0 | 4.3 | 61.7 | |
| 102 | - | - | - | 22.0 | - | 78.0 | - | - | 2.9 | 3.6 | 2.3 | 2.7 | 9.0 | 3.3 | 76.7 | |
| 103 | 44.1 | - | - | - | - | 55.9 | - | - | 2.9 | 3.5 | 2.8 | 2.5 | 9.0 | 3.0 | 61.7 | |
| LSD at 5% = | | | | | | | | | | | 0.9 | 1.1 | 1.2 | 2.1 | 1.9 | 21.1 |

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 9 = no visual disease symptoms

⁴ 9 = best spring green-up

⁵ 100% = complete ground cover

⁶ See Table 2 for species/cultivar composition of retail blends and mixtures

Table 2. 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 2. 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 2. 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 2. 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 |
