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This publication includes lecture notes of papers presented at the 2021 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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PERFORMANCE OF FINE FESCUE CULTIVARS AND SELECTIONS IN NEW JERSEY TURF TRIALS, 2021

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INTRODUCTION

The fine fescues (*Festuca* spp.) are a group of cool-season grasses that have distinct, fine-textured leaves. Compared to other cool-season grasses, the fine fescues are better adapted to cool, dry, and shaded environments. This group is tolerant of acidic soils and drought conditions and exhibits the best performance under lower fertility levels. These qualities give the fine fescues a reputation as low maintenance grasses. The fine fescues perform best in well drained soils and are not suited for saturated soil conditions (Murphy, 1996). In general, these grasses have poor heat and wear tolerance and lack tolerance to excessive nitrogen fertilization during periods of high temperatures (Meyer and Funk, 1989).

There are many species and subspecies of fine fescue, but only six are generally used as turfgrasses. There are three subspecies of *F. rubra*: strong creeping red fescue (*F. rubra* L. ssp. *rubra* Gaudin), slender creeping red fescue [*F. rubra* L. ssp. *littoralis* (G. Mey.) Auquier], and Chewings fescue [*F. rubra* L. ssp. *commutata* Gaudin; syn. *F. rubra* L. ssp. *fallax* (Thuill.) Nyman] (Braun et al. 2020). Both the strong creeping red fescue and slender creeping red fescue are referred to as creeping red fescues because they spread by rhizomes. As the name infers, the strong creeping red fescues have a more aggressive, spreading habit than slender creeping red fescues. Chewings fescue is a dense and low growing bunch type grass with the greatest tolerance to low mowing heights, in comparison to the other fine fescues.

Hard fescue (*F. brevipila* Tracey) is a bunch-type grass that spreads by tillering. It has a dark green color forms a dense cover and grows slowly. Compared to Chewings fescue, hard fescue is considered to be more tolerant of heat, drought, and low fertility. The species is widely used in many low maintenance

situations due to increased disease resistance, even under low maintenance conditions. Sheeps fescue (*F. ovina* L.) and blue fescue (*F. glauca* Vill.) are the least widely used species of the fine fescues. They are bunch-type and have a wide variation in color that ranges from blue or green to a silvery-blue or silvery-green. These two species are rarely used in seed mixtures because of their color. They have a non-aggressive growth habit, which makes them a good addition to wildflower mixes to aid in the prevention of erosion and to add an interesting color to the mix. These species are also becoming more popular in ornamental landscapes due to their color.

When heavily fertilized, fine fescues can become soft, succulent, and thatchy, which makes them more susceptible to diseases and summer stresses. A fertilizer rate of 1 to 2 lb nitrogen per 1000 ft² per year is ideal for fine fescues. The increasing demand for lower fertilizer and water usage makes fine fescues an option for use in certain situations to address some of these issues.

Many of the newer fine fescue cultivars contain an *Epichloë festucae* Leuchtm. endophyte that improves drought tolerance, resistance to above ground feeding insects, and in some cases, diseases. The presence of endophyte can reduce the need for chemical inputs normally used to treat for insects and diseases. *Epichloë festucae* Leuchtm. is a non-pathogenic fungus that grows intercellularly within the aboveground plant tissue. The beneficial effects of the endophyte are often very evident under stress conditions.

The Rutgers turfgrass breeding program has improved many of the characteristics desired for a superior fine fescue turf. However, further work is needed, particularly in the areas of disease and insect resistance and wear tolerance. Rutgers continues to cooperate with the National Turfgrass Evaluation

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Program (NTEP), which evaluates many cultivars, collections, and experimental selections for turf performance across a wide range of geographical locations.

PROCEDURES

Five fine fescue trials were seeded in 2019 and 2020 at the Rutgers Plant Science Research and Extension Farm in Adelphia and Horticultural Research Farm #2, NJ (Tables 1 to 4). All tests consisted of 3 ft x 5 ft or 3 ft x 2 ft plots. The fine fescues were sown at 3.7 lb per 1000 ft². Plots were replicated three times in a randomized complete block design. A 6-inch unseeded border was left between plots to limit contamination. Tests were maintained at different fertility levels depending on the objectives of the test as well as the occurrence of disease or insects. Mowing height and fertilizer inputs of all tests are shown in Table 6. All tests were treated with pre-emergent herbicides and broadleaf weed control. The trials were irrigated to prevent severe stress and were mowed frequently with rotary mowers to avoid excessive accumulations of clippings.

All tests were rated monthly throughout the growing season for turf quality as well as for other characteristics including diseases such as leaf spot (*Pyricularia oryzae* Cavara. and *Bipolaris sorokiniana*) and dollar spot (*Clariireedia jacksonii*). Turf quality is a subjective characteristic that includes density, texture, color, growth habit, damage due to disease or insects, and overall performance. Plots were rated by different evaluators to help minimize personal biases toward a particular trait. All ratings were based on a 1 to 9 scale, where 9 represented the most desirable turf characteristics. Data for all trials were statistically analyzed using analysis of variance (ANOVA), and means were separated using Fisher's protected least significant difference (LSD) means separation test.

RESULTS AND DISCUSSION

Results in Tables 1 to 5 are presented with cultivars or selections grouped according to species and ranked according to best overall multiple-year turf quality average. A high-quality average is generally indicative of good disease resistance, dark green color, high shoot density and uniformity, fine leaf texture, low growth habit, good mowing quality, and minimal damage due to insects. The trial data were further ranked according to additional evaluation parameters (i.e., establishment, disease rating, etc.) to distinguish two or more cultivars or selections that

were equally ranked based on turf quality ratings. In addition to trial data collected in 2021, data from previous years are also included in the tables. These data have been discussed in prior proceedings articles and are included here for viewer convenience.

Care should be taken when drawing conclusions from the data for some of these trials. First, these tests were grown as monocultures in full sun. These conditions tend to cause different stresses that may not occur under other conditions. Second, the trials established in 2020 are sorted by turfgrass quality in 2021 only and reflects quality during the first year of establishment; some cultivars may perform differently as the turfgrass stand matures.

Turf Quality

For all trials included herein, the hard fescues, as a group, had the highest average turf quality, followed closely by the Chewings fescues (Tables 1, 3, 4 & 5); except in the 2020 fine fescue NTEP trial (Table 2) where the Chewings fescues had the highest average turf quality. The strong creeping red fescues, slender creeping red fescues, and sheeps fescues were variable for turf quality, but, in general, had lower turf quality ratings than hard and Chewings fescues (Tables 1 to 5). In the 2019 fine fescue trial (Table 1), PPG-FL 132, FL FH3, PPG-FL 129, and FL 14H6 hard fescue had the highest turf quality. The lowest ranked hard fescues for turf quality included SR 3210 and Azay Blue. The highest ranked Chewings fescues were PPG-FRC 130, PPG-FRC 126, PPG-FRC 127, and PPG-FRC 128. The lowest ranked Chewings fescue were Carousel and Windward. The highest ranked strong creeping red fescue were PPG-FRR 130, FRR FR2, and PPG-FRR 127 while Class One, Miser, and Epic strong creeping red fescue had the lowest turf quality. The highest ranked slender creeping red fescues were PPG FRT 105 and SeaMist, while Beudin exhibited the lowest turf quality. The sheep fescue in general exhibited poor performance in New Jersey. Only two cultivars were included in the trial, Blue Mesa and Little Big Horn, and both exhibited poor turf quality.

In the 2020 National Fine Fescue trial sponsored by the National Turfgrass Evaluation Program (Table 2), PPG-FRC-130, PVF-MVP-2020, PPG-FRC 127, and DLFPS-FRC-3105 Chewings fescue had the highest turf quality, while BAR FRC 123, Shadow IV, and BAR FRC 130 had the lowest turf quality. DLFPS-FL-3104, Tenacious, and PPG-FL 128 hard fescue had the highest turf quality while Gladiator,

BAR FT 132, and BAR FT 135 had the lowest turf quality. The better performing strong creeping red fescues were PPG-FRR-134 and BYE, while Boreal and Kevin strong creeping red fescues had the lowest turf quality. Only three sheep fescue cultivars and two slender creeping red fescue cultivars were included in the trial. Among these, Blue Hornet sheep fescue and Seabreeze GT slender creeping red fescue had the top performance, respectively.

In 2020, separate trials were established for each species of fine fescue (Tables 3 to 5). In the hard fescue trial (Table 3), PPG-FL 130, 14H6, and PPG-FL 138 were top performing hard fescues, while Rolute, Blue Mesa, and Dall hard fescue were the lowest performing hard fescues. In the Chewings fescue trial (Table 4), Woodall, Leeward, PPG-FRC 128, and FW2 Chewings fescue had the highest turf quality, while Carousel and PST-420E Chewings fescue had the lowest turf quality. In the creeping red fescue trial (Table 5), PPG-FRR 135, 20SC3, PPG-FRR 130, and PPG-FRR 133 were top performing strong creeping red fescues, and the poorest strong creeping red fescues were SR 5250, Garnet, and Class One.

Dollar Spot

Dollar spot (caused by *Clariireedia jacksonii*, formerly known as *Sclerotinia homoeocarpa* F.T. Bennet) is one of the most common diseases of cool-season turfgrasses and is particularly troublesome in fine fescue (Bonos et al., 2007). Dollar spot causes silver dollar-shaped spots of dead turf, which can converge to form larger areas of damage (Belanger et al., 2005; Bonos et al., 2007). As seen in the 2019 fine fescue trial (Table 1), the hard fescues and Chewings fescues were generally more resistant to dollar spot disease whereas the strong creeping red fescues were generally more susceptible to dollar spot disease. In the 2019 fine fescue trial (Table 1), PPG-FRC 128, Brittany 2, and RCF Chewings fescue and PPG-FL 132 and FL FH3 hard fescues had the least dollar spot disease, and Rosecity, SHD3, and Navigator II strong creeping red fescue had the most dollar spot disease.

Leaf Spot

Leaf spot is caused by *Bipolaris* and *Drechslera* spp. and it has been a significant problem on fine fescues in recent years. Symptoms of leaf spot disease appear as yellow leaf spots and leaf blight. In

the 2020 Chewings fescue trial (Table 4), PPG-FRC 128, PST-4TEB, Woodall, and DLFPS-FRC-3105 Chewings fescues had good tolerance to gray leaf spot while Chancellor, Windward, and Shadow IV Chewings fescues were most susceptible to gray leaf spot disease.

Establishment

Most cultivars and selections were well-established within one month of seeding, as evidenced by the results from September and October establishment ratings presented in Table 2 to 5. Factors such as genetics, environmental conditions, and seed quality and storage can affect seedling establishment and vigor. In the 2020 fine fescue NTEP trial (Table 2), Boreal strong creeping red fescue, BAR FRC 123, and PPG-FRC 127 Chewings fescue, and PPG-FL 128 hard fescue had the quickest establishment. Foxfire 2 strong creeping red fescue, DA5-RHF and Rolute hard fescues, and BAR FO 131 sheep fescue had the slowest establishment.

In the 2020 creeping red fescue, Chewings fescue and hard fescue trials (Tables 3-5), Kent strong creeping red fescue, Minimus, PPG-FL 136, and PPG-FL 134 hard fescue, and Woodall, Brittany 2, and Chancellor Chewings fescues had the quickest establishment. Rolute and SF 3 hard fescues, Carousel and SR 5130 Chewings fescues, and SR 5250, Garnet, and Class One strong creeping red fescues had the slowest establishment.

Color

In the United States, a dark green turf color is typically considered more desirable when compared to a light green turf color. In addition to the consideration of genetic color when rating for turf quality, the color for each cultivar was also assessed in the 2020 fine fescue NTEP test (Table 2). RAD-FC59 and PST-4SWTM Chewings fescue, BAR FO 131 sheep fescue, and RAD-FR64 strong creeping red fescue had the darkest green color, and Seabreeze GT slender creeping red fescue, Gladiator and PPG-FL 128 hard fescue, and PPG-FRC-130 Chewings fescue had the lightest green color.

Density

Turf density is measured by the number of leaves or shoots per area. The grasses with high density generally produce high-quality turf stands. In the 2020 fine fescue NTEP trial (Table 2), PPG-FL 128,

Tenacious, and DLFPS-FL-3104 hard fescue had the highest density, while Boreal, Kevin, Foxfire 2, DLF-FRR-3128, and RAD-FR64 strong creeping red fescue, and BAR FO 131 sheep fescue had the lowest density.

Percent Ground Cover

Percent ground cover is a measure of the competitive ability of a turfgrass on a long-term basis; cultivars and selections with greater percent cover are better able to persist under the environment of a given trial, whereas poor cover is a characteristic of a declining turf stand. In the 2020 fine fescue NTEP trial (Table 2), Tenacious, DLFPS-FL-3104, Resolute, and SPHD-20 hard fescue had the highest percent cover, while Boreal and Kevin strong creeping fescue, Shadow IV and BAR FRC 123 Chewings fescue, and BAR FRL 122 slender creeping red fescue had the lowest percent cover.

SUMMARY

Overall, it is encouraging to see that many of the higher-ranking fine fescues within all species are new experimental selections. Although advances in breeding efforts continue, there is still need for considerable improvement in resistance to red thread (*Laetisaria fuciformis*) for the fine fescues, dollar spot tolerance in strong creeping red fescues and for the hard fescues, efforts should be focused on summer patch (caused by *Magnaportheopsis poae*) and leaf spot (caused by *Pyricularia oryzae* Cavara.) disease resistance.

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Table 1. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2019 at Adelphia, NJ.

Cultivar or Selection	-----Turf Quality ¹ -----			Establishment ² Oct. 8, 2019	Dollar Spot ³ Jul. 21, 2021
	2020-21 Avg.	2020 Avg.	2021 Avg.		
HARD FESCUE					
1 PPG-FL 132	6.7	6.4	7.1	7.7	8.3
2 FL FH3	6.4	5.8	7.0	7.3	8.3
3 PPG-FL 129	6.3	6.1	6.5	7.3	7.0
4 FL 14H6	6.3	6.0	6.6	8.0	7.3
5 DLFPS-FL/3060	6.1	5.6	6.6	8.3	7.0
6 PPG-FL 128	6.1	5.6	6.5	6.7	6.7
7 PPG-FL 130	6.1	5.9	6.3	7.3	7.0
8 SR 3150	6.0	5.9	6.1	7.7	6.7
9 SPHD-5	6.0	5.9	6.2	7.3	7.0
10 Sword	6.0	5.6	6.5	8.3	7.0
11 DLFPS-FL/3066	6.0	5.6	6.4	8.3	7.3
12 Beacon	5.9	5.3	6.5	8.7	7.0
13 Sword	5.8	5.1	6.6	7.0	7.3
14 Jetty	5.8	5.2	6.4	7.7	7.7
15 SPHD-2	5.7	5.3	6.0	7.3	6.0
16 SPHD-9	5.5	5.2	5.8	7.0	6.7
17 Gladiator	5.5	4.8	6.3	6.7	6.7
18 SPHD-3	5.5	5.5	5.5	8.0	4.7
19 RHF	5.4	5.1	5.8	8.0	6.7
20 SPHD-4	5.4	5.5	5.4	7.3	5.7
21 Gladiator	5.4	4.9	5.9	6.7	5.0
22 Reliant IV	5.4	4.9	5.9	8.7	7.7
23 Stonehenge II	5.3	5.1	5.6	7.3	7.0
24 SPHD-6	5.3	5.4	5.3	7.3	5.3
25 SPHD-7	5.3	5.3	5.4	7.0	5.0
26 SPHD-Comp	5.3	5.4	5.3	8.0	4.7
27 Viking H2O	5.2	5.1	5.3	9.0	6.0
28 Resolute	5.2	4.0	6.3	4.7	7.7
29 SPHD-1	5.1	5.0	5.3	7.0	4.7
30 Spartan II	5.1	4.6	5.5	9.0	7.0
31 Clarinet	4.8	3.1	6.6	7.7	7.7
32 Blue Ray	4.8	4.9	4.8	8.0	5.3
33 Quatro	4.6	4.7	4.5	8.3	7.7
34 Eureka II	4.4	3.7	5.0	5.3	6.0
35 Azay Blue	2.0	1.4	2.6	1.0	6.7

(Continued)

Table 1. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2019 at Adelphia, NJ.

Cultivar or Selection	-----Turf Quality ¹ -----			Establishment ² Oct. 8, 2019	Dollar Spot ³ Jul. 21, 2021
	2020-21 Avg.	2020 Avg.	2021Avg.		
HARD FESCUE (continued)					
36 SR 3210	1.2	1.0	1.5	1.0	–
CHEWINGS FESCUE					
1 PPG-FRC 130	6.4	6.6	6.3	9.0	7.0
2 PPG-FRC 126	6.3	6.5	6.1	9.0	5.7
3 PPG-FRC 127	6.2	6.3	6.2	9.0	7.3
4 PPG-FRC 128	6.2	6.2	6.3	8.7	9.0
5 Woodall	5.9	6.4	5.4	9.0	8.0
6 PST-4TEB	5.8	6.3	5.4	8.7	6.3
7 PST-Syn-4CHE	5.8	5.4	6.1	8.7	7.3
8 7C34	5.7	6.0	5.4	9.0	4.7
9 Conductor	5.6	5.8	5.4	9.0	6.3
10 FRC FW2	5.5	5.4	5.7	9.0	6.3
11 PST-4SWTM	5.5	5.2	5.8	8.7	8.3
12 Brittany 2	5.5	5.6	5.4	9.0	8.7
13 RCF	5.4	5.0	5.8	8.0	8.7
14 PST-4CHG	5.4	5.5	5.4	9.0	7.0
15 Compass II	5.4	5.0	5.7	8.3	7.7
16 PST-4SWT	5.4	5.2	5.5	8.0	5.3
17 Leeward	5.3	5.7	5.0	9.0	8.0
18 Enchantment	5.2	5.4	5.0	9.0	5.7
19 Shadow II	5.1	5.0	5.2	8.0	7.7
20 Shadow IV	5.0	5.1	4.9	9.0	5.7
21 Wrigley 2	5.0	5.3	4.6	7.3	6.7
22 Fairmont	5.0	4.8	5.1	9.0	7.0
23 Radar	4.9	5.0	5.0	9.0	7.7
24 Shadelinks	4.9	4.6	5.2	9.0	6.7
25 SR 5130	4.8	4.8	4.9	6.3	6.7
26 Lacrosse	4.8	4.9	4.7	8.7	6.3
27 Sonar	4.8	4.8	4.8	9.0	6.7
28 Longfellow 3	4.7	4.8	4.7	7.7	6.7
29 Ambrose	4.7	4.5	4.9	9.0	6.7
30 Sonar	4.7	4.8	4.4	9.0	6.0

(Continued)

Table 1. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2019 at Adelphia, NJ.

Cultivar or Selection	-----Turf Quality ¹ -----			Establishment ² Oct.8, 2019	Dollar Spot ³ Jul. 21, 2021
	2020-21 Avg.	2020 Avg.	2021Avg.		
CHEWINGS FESCUE (continued)					
31 Castle	4.6	4.2	4.9	6.3	7.7
32 Shadow III	4.4	3.9	4.9	4.0	7.7
33 Siskin	4.3	4.3	4.3	8.0	7.0
34 Spindrift	3.8	4.3	3.2	8.3	4.7
35 Windward	3.7	3.8	3.6	7.7	8.0
36 Carousel	2.6	1.9	3.2	1.3	4.3
STRONG CREEPING RED FESCUE					
1 PPG-FRR 130	6.1	6.3	5.8	8.7	7.0
2 FRR FR2	5.8	5.6	5.9	8.7	8.3
3 PPG-FRR 127	5.7	5.9	5.4	8.7	8.3
4 FRR 5Z5	5.6	6.0	5.3	8.7	6.0
5 PPG-FRR 128	5.6	5.3	5.9	7.7	8.3
6 SHD2	5.5	5.9	5.2	7.0	5.0
7 FRR 5Z2	5.3	5.4	5.2	8.0	5.3
8 BYE	5.2	5.9	4.6	8.3	4.7
9 SHD1	5.2	6.0	4.4	8.0	4.0
10 PPG-FRR 123	5.2	5.6	4.7	8.7	6.7
11 SHD3	5.2	5.8	4.6	7.7	3.3
12 ORC 126 M2	5.1	5.2	5.0	8.3	6.3
13 RCRF	5.0	5.2	4.9	7.0	5.7
14 Chorus	4.9	5.8	4.1	9.0	4.0
15 DLFPS-FRR/3068	4.8	5.0	4.6	8.3	4.3
16 Cindy Lou	4.7	5.1	4.3	8.0	3.7
17 PPG-FRR 122	4.6	5.0	4.3	9.0	5.3
18 Marvel	4.5	4.9	4.2	6.3	3.7
19 Chantilly	4.5	4.7	4.3	8.7	5.3
20 DRBM	4.5	4.4	4.5	7.0	6.3
21 PST-4CR7	4.3	4.7	3.9	7.0	4.0
22 DR	4.3	4.7	3.8	6.7	4.3
23 Chantilly	4.3	4.5	4.0	9.0	4.0
24 Ruddy	4.3	4.6	4.0	8.7	3.7
25 Rosecity	4.3	5.1	3.3	9.0	3.0

(Continued)

Table 1. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2019 at Adelphia, NJ.

Cultivar or Selection	-----Turf Quality ¹ -----			Establishment ² Oct. 8, 2019	Dollar Spot ³ Jul. 21, 2021
	2020-21 Avg.	2020 Avg.	2021Avg.		
STRONG CREEPING RED FESCUE (continued)					
26 Cardinal II	4.3	4.0	4.5	8.3	5.7
27 Foxfire 2	4.3	4.5	4.0	8.3	4.3
28 Marvel	4.1	3.9	4.4	6.7	4.7
29 DR-BM2X	4.1	4.0	4.2	9.0	7.3
30 Orbit	3.9	3.8	4.0	9.0	6.0
31 Xeric	3.8	3.7	3.8	5.3	4.3
32 Rufi	3.7	3.6	3.8	9.0	5.3
33 SR 5250	3.6	3.5	3.7	4.0	4.7
34 Navigator II	3.6	4.4	2.9	9.0	3.3
35 Jasper II	3.5	3.7	3.3	6.0	5.3
36 PST-420E	3.5	3.7	3.3	8.7	4.3
37 Garnet	3.4	2.8	4.0	2.0	6.0
38 Fenway	3.3	2.7	3.8	8.0	7.0
39 Fenway	3.1	3.1	3.1	9.0	4.3
40 Maxima 1	3.1	3.2	3.0	5.7	6.0
41 Epic	2.9	2.7	3.0	9.0	7.0
42 Miser	2.4	2.5	2.3	9.0	6.3
43 Class One	1.7	1.0	2.4	1.0	5.0
SLENDER CREEPING RED FESCUE					
1 PPG-FRT 105	5.5	5.7	5.3	8.3	5.0
2 SeaMist	4.9	4.8	5.0	9.0	7.0
3 PST-4SEA19	4.5	4.3	4.7	9.0	4.7
4 PST-Syn-4SET	4.1	3.7	4.4	6.3	5.0
5 Beudin	3.6	3.7	3.4	7.3	5.0
SHEEP FESCUE					
1 Little Bighorn	3.1	3.1	3.3	8.0	5.7
2 Blue Mesa	3.0	3.0	3.1	8.0	6.7
LSD at 5%=	0.8	0.8	1.2	1.0	2.0

¹9 = best turf quality

²9 = quickest establishment

³9 = least disease

Table 2. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2020 at Adelphia, NJ. Includes all entries from the 2020 National Turfgrass Evaluation Program (NTEP) test.

Cultivar or Selection	Turf Quality ¹ 2021 Avg.	Establishment ² Sep. 23, 2020	Color ³ Nov. 5, 2020	Density ⁴ Nov. 5, 2020	Percent Ground Cover ⁵ Nov. 5, 2020
CHEWINGS FESCUE					
1 PPG-FRC-130	6.4	6.3	4.3	6.7	96.0
2 PVF-MVP-2020	6.2	6.0	4.7	5.7	97.7
3 PPG-FRC 127	6.2	7.7	4.3	6.3	94.7
4 DLFPS-FRC-3105	6.2	6.0	4.3	6.7	93.0
5 NAI-CHU1	6.0	7.0	5.0	7.0	96.3
6 Brittany 2	5.7	7.0	4.7	6.3	91.3
7 Jamestown VII	5.3	6.3	5.3	6.0	91.7
8 PST-4SWTM	4.9	5.3	7.3	5.0	86.7
9 Compass II	4.9	6.0	4.7	5.0	86.7
10 RAD-FC59	4.7	3.7	8.7	5.0	90.0
11 BAR FRC 130	4.1	5.3	6.0	6.0	83.3
12 Shadow IV	4.0	6.7	6.0	4.7	71.7
13 BAR FRC 123	3.2	7.7	5.7	5.0	73.3
HARD FESCUE					
1 DLFPS-FL-3104	6.3	5.7	7.0	8.0	97.7
2 Tenacious	6.3	4.0	6.3	8.3	99.0
3 PPG-FL 128	6.1	7.7	4.3	8.7	97.7
4 Sword II	5.8	6.3	5.3	7.3	94.7
5 PVF-PDB-2020	5.6	5.3	4.7	7.3	96.0
6 SPHD-20	5.5	5.3	5.7	6.7	97.7
7 Resolute	5.0	3.3	7.0	7.7	97.7
8 DA5-RHF	4.9	2.7	6.0	7.3	96.3
9 BAR FT 135	4.5	5.0	4.7	6.3	96.3
10 BAR FT 132	4.3	4.7	6.3	7.3	93.0
11 Gladiator	4.0	7.0	4.0	7.0	86.7
STRONG CREEPING RED FESCUE					
1 PPG-FRR-134	6.3	6.0	4.7	6.3	96.3
2 BYE	6.0	6.7	5.7	5.7	93.0
3 PPG-FRR 127	5.8	6.0	6.0	5.3	93.3
4 STB1	5.6	5.7	6.0	5.3	92.7
5 PPG-FRR 132	5.5	6.0	6.0	5.7	88.3

(Continued)

Table 2. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2020 at Adelphia, NJ. Includes all entries from the 2020 National Turfgrass Evaluation Program (NTEP) test.

Cultivar or Selection	Turf Quality ¹ 2021 Avg.	Establishment ² Sep. 23, 2020	Color ³ Nov. 5, 2020	Density ⁴ Nov. 5, 2020	Percent Ground Cover ⁵ Nov. 5, 2020
STRONG CREEPING RED FESCUE (continued)					
6 5Z5	5.3	6.0	5.7	5.0	89.7
7 PVF-HSY+	5.1	6.7	5.7	5.3	91.3
8 Foxfire 2	4.8	1.3	6.3	4.3	83.3
9 Cardinal II	4.7	6.0	6.7	6.0	90.0
10 5Z2	4.6	6.7	6.0	5.3	88.3
11 DLF-FRR-3128	4.4	6.7	6.3	4.3	83.3
12 RAD-FR64	4.1	5.3	8.0	4.3	83.3
13 Kevin	3.9	7.3	7.0	3.0	58.3
14 Boreal	2.2	8.0	6.0	2.7	45.0
SHEEP FESCUE					
1 Blue Hornet	4.8	5.0	5.3	6.7	96.0
2 BAR FO 131	4.0	3.0	8.0	4.0	83.3
3 Quatro	3.7	6.0	5.0	6.3	93.0
SLENDER CREEPING RED FESCUE					
1 Seabreeze GT	4.6	6.3	1.0	5.0	83.3
2 BAR FRL 122	4.0	5.3	4.3	5.7	73.3
LSD at 5%=	1.3	1.9	1.3	2.1	14.5

¹9 = best turf quality

²9 = quickest establishment

³9 = darkest genetic color

⁴9 = heighest shoot density

⁵100 = complete plot cover

Table 3. Performance of hard fescue cultivars and selections in a turf trial seeded in September 2020 at Hort Farm 2, NJ.

Cultivar or Selection	Turf Quality ¹ 2021 Avg.	Establishment ² Oct 6, 2020
1 PPG-FL 130	7.4	7.3
2 14H6	7.2	7.7
3 PPG-FL 138	7.1	6.3
4 14H2	7.0	7.3
5 FH3	6.7	7.3
6 PPG-FL 137	6.7	7.0
7 Minimus	6.7	8.0
8 PPG-FL 135	6.6	7.3
9 DLFPS-FL/3060	6.6	5.3
10 Gladiator	6.6	7.7
11 DA5-RHF	6.5	6.7
12 PPG-FL 136	6.5	8.0
13 DLFPS-FL/3066	6.4	5.7
14 Sword II	6.3	6.7
15 PPG-FL 134	6.3	8.0
16 Jetty	5.9	6.0
17 Beacon	5.9	6.0
18 Stonehenge II	5.8	5.0
19 DLFPS-FL-3104	5.6	5.3
20 Reliant IV	5.5	7.7
21 Sword	5.5	6.3
22 FL 76B	5.4	5.3
23 Blueray	5.4	7.0
24 FL 71 B	5.3	5.3
25 FL 80 B	5.2	5.0
26 Viking H2O	5.1	6.0
27 Eureka II	5.0	6.3
28 SR 3150	4.8	4.0
29 Quatro	4.6	5.7
30 Blue Hornet	4.4	7.7
31 SF 4 B	4.2	4.0
32 Spartan 2	4.2	7.3
33 Granite	4.0	5.7
34 SF 3	4.0	3.3
35 Blue Mesa	3.9	5.3

(Continued)

Table 3. Performance of hard fescue cultivars and selections in a turf trial seeded in September 2020 at Hort Farm 2, NJ.

Cultivar or Selection	Turf Quality ¹ 2021 Avg.	Establishment ² Oct 6, 2020
36 Dall	3.9	6.3
37 Resolute	1.2	1.0
LSD at 5%=	0.8	1.5

¹9 = best turf quality

²9 = quickest establishment

Table 4. Performance of chewings fescue cultivars and selections in a turf trial seeded in September 2020 at Adelphia, NJ.

Cultivar or Selection	Turf Quality ¹ 2021 Avg.	Establishment ² Oct 15, 2020	Leaf Spot ³ Aug 11, 2021
1 Woodall	6.6	8.3	6.0
2 Leeward	6.3	7.0	4.7
3 PPG-FRC 128	6.3	7.7	6.7
4 FW2	6.3	7.3	5.7
5 DLFPS-FRC-3105	6.2	8.0	6.0
6 PPG-FRC 132	6.1	7.3	5.0
7 PPG-FRC 134	6.1	7.3	5.0
8 PPG-FRC 133	5.9	6.7	5.3
9 Brittany 2	5.8	8.3	4.3
10 PST-4TEB	5.7	6.3	6.3
11 Treazure II	5.7	5.7	4.7
12 14W1-RCF	5.6	5.7	5.0
13 PPG-FRC 126	5.6	7.3	4.7
14 Bolster	5.5	7.3	5.7
15 Radar	5.4	8.0	2.7
16 Longfellow 3	5.3	5.0	3.3
17 20CH1	5.2	6.7	5.0
18 Compass II	5.1	7.3	3.3
19 20CH2	5.1	6.3	5.0
20 PST-4SWTM	4.8	6.3	3.7
21 Chancellor	4.7	8.3	1.0
22 PST-4CHG	4.6	6.3	5.0
23 Shadelinks	4.5	6.7	3.0
24 Spindrift	4.4	5.7	3.3
25 Lacrosse	4.4	3.7	3.3
26 Momentum	4.4	5.7	3.3
27 Ambrose	4.3	7.3	2.7
28 Wrigley 2	4.3	3.3	3.3
29 Shadow IV	4.1	6.3	2.3
30 Windward	3.9	4.0	2.0
31 SR 5130	3.1	2.0	4.3
32 PST-420E	2.5	4.3	2.7
33 Carousel	1.4	1.0	4.0
LSD at 5%=	0.9	1.4	2.1

¹9 = best turf quality

²9 = quickest establishment

³9 = least disease

Table 5. Performance of strong creeping red fescue cultivars and selections in a turf trial seeded in September 2020 at Adelphia, NJ.

Cultivar or Selection	Turf Quality ¹ 2021 Avg.	Establishment ² Oct 15, 2020
1 PPG-FRR 135	7.8	7.7
2 20SC3	7.1	5.3
3 PPG-FRR 130	6.5	7.7
4 PPG-FRR 133	6.5	7.7
5 PPG-FRR 128	6.3	8.0
6 SeaMist	6.2	7.7
7 Marvel	5.9	6.3
8 Navigator II	5.7	6.7
9 FR2	5.6	8.0
10 PPG-FRR 122	5.6	7.7
11 Chorus	5.5	8.0
12 PPG-FRR 132	5.4	7.3
13 PST-4SEA19	5.4	8.0
14 Cindy Lou	5.3	6.7
15 Chantilly	5.1	6.7
16 DLFPS-FRR/3069	5.1	7.3
17 Wendy Jean	5.1	8.0
18 RCRF	5.0	6.3
19 Rosecity	4.9	5.0
20 DLFPS-FRR/3068	4.9	6.3
21 Cardinal II	4.9	7.0
22 Jasper II	4.8	7.7
23 DRBM2X	4.8	7.3
24 DR	4.7	5.3
25 PST-4CR7	4.7	5.3
26 DRBM	4.3	6.0
27 Ruddy	4.3	5.7
28 Rufi	4.2	7.0
29 Foxfire 2	4.1	4.0
30 Seabreeze GT	4.0	8.0
31 DLFPS-FRR-3128	3.9	7.0
32 Indie	3.8	7.3
33 Kevin	3.7	8.0
34 Xeric	3.5	3.7
35 Leigh	3.4	5.0

(Continued)

Table 5. Performance of strong creeping red fescue cultivars and selections in a turf trial seeded in September 2020 at Adelphia, NJ.

Cultivar or Selection	Turf Quality ¹ 2021 Avg.	Establishment ² Oct 15, 2020
36 Kent	3.3	8.7
37 Oracle	3.3	7.3
38 Fenway	3.0	7.3
39 Fenway	2.8	6.7
40 Epic	2.5	8.0
41 Boreal	2.1	7.7
42 Miser	2.1	7.7
43 Maxim 1	1.6	1.0
44 Class One	1.3	1.0
45 Garnet	1.3	1.0
46 SR 5250	1.1	1.0
LSD at 5%=	1.3	1.7

¹9 = best turf quality

²9 = quickest establishment

Table 6. Yearly nitrogen (N) applied and mowing height (Ht) on fine fescue trials established at Adelphia, NJ.

	-----2019-----		-----2020-----		-----2021-----	
	N ¹	Ht ²	N	Ht	N	Ht
Table 1 (2019)	-	1.5	1	1.5	1	1.5
Table 2 (2020 NTEP)	-	-	1.3	1.5	1.5	1.5
Table 3 (2020 hard fescue)	-	-	0.7	1.5	0.5	1.5
Table 4 (2020 chewings fescue)	-	-	1.3	1.5	1.5	1.5
Table 5 (2020 strong creeping red fescue)	-	-	1.3	1.5	2	1.5

¹Annual N applied (lb/1000 ft²)

²Mowing height (inches)