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PERFORMANCE OF FINE FESCUE CULTIVARS AND SELECTIONS IN NEW JERSEY TURF TRIALS, 2020

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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. *rubra*), slender creeping red fescue (*F. rubra* L. var. *littoralis* Vasey ex Beal), and Chewings fescue [*F. rubra* L. subsp. *Fallax* (Thuill.) Nyman]. 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* R. 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 ft^2 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 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 from 2016 to 2019 at the Rutgers Plant Science Research and Extension Farm in Adelphia, NJ (Tables 1 to 5). All tests consisted of 3 ft x 5 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 pink patch (caused by the fungus *Limonomyces roseipellis*). 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, color, percent cover, 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 2020, 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 2019 are sorted by turfgrass quality in 2020 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 to 4); except in the 2019 fine fescue trial (Table 5) 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 2016 fine fescue trial (Table 1), the experimental selections A52 comp, A55 comp, A56 comp, and Z16-RHF hard fescue had the highest turf quality. The lowest ranked hard fescues for turf quality included Viking H2O, Reliant IV, and Blueray. The highest ranked Chewings fescues were WYR comp, Woodall, and PPG-FRC 120. The lowest ranked Chewings fescue were Z16-DRBM2X and Compass II. The highest ranked strong creeping red fescue were 5Z5 comp, PPG-FRR 116 and Radar while PST-4GRY, Fenway, and Oracle strong creeping red fescue had the lowest turf quality.

In the 2017 fine fescue trial (Table 2), PPG-FL 122, PPG-FL 115, and HAQ2 hard fescue exhibited the best turf quality in the trial, while Eureka II and Spartan II exhibited the lowest turf quality of the hard fescues. CHU1 and Z16-RCF were the top performing Chewings fescues. Windward and PST-Syn-4DUB were the lowest performing Chewings fescues. PPG-FRR 121 strong creeping red fescues had the highest turf quality, while Oracle and Epic had the lowest turf quality. SeaMist slender creeping red fescue exhibited improved performance compared to Shoreline slender creeping red fescue.

In the 2017 fine fescue CTBT trial (Table 3), PPG-FL 115, DLF-FL 63, and PPG-FL 113 hard fescue had the highest turf quality, while ACF309 and Eureka II had the lowest turf quality.

DLF-FRC 50, PPG-FRC 120, and DLF-FRC 54 Chewings fescue had the highest turf quality while Koket and DLF-FRC 52 had the lowest turf quality. The better performing strong creeping red fescues were Z16-RHF, Z16-RCF, and ASC295, while Boreal and DLF-FRR 76 strong creeping red fescues had the lowest turf quality.

In the 2018 fine fescue trial (Table 4), PPG-FL 121, AS6, FL 58 SEL and Jetty were top performing hard fescues, while SR 3150, Azay Blue, and SR 3210 hard fescue were the lowest performing hard fescues. FRC 45, SEL, Woodall, CLS2 and Enchantment Chewings fescue had the highest turf quality. Carousel Chewings fescue had the lowest turf quality. Z16-DR-BM2X, Cindy Lou, Navigator II, FRR 77B, and Orbit were top performing strong creeping red fescues and the poorest strong creeping red fescues were Class One, Maxima and Epic.

In the 2019 fine fescue trial (Table 5), PPG-FRC 130, PPG-FRC 126, and Woodall were top performing Chewings fescue while Shadow III, Windward, and Carousel exhibited poor performing Chewings fescue. PPG-FL 132, PPG-FL 129, and FL 14H6 hard fescue had the highest turf quality; Azay Blue and SR 3210 had the lowest turfgrass quality of the hard fescues. PPG-FRR 130, FRR 5Z5, Rev, and SHD1 were top performing strong creeping red fescues albeit quite a bit lower than the best performing hard fescues. Miser and Class One strong creeping red and Blue Mesa sheeps fescue had the lowest turf quality.

Pink Patch

Pink patch is caused by *Limonomyces roseipellis.* Symptoms of pink patch disease appear as roughly circular, pinkish red to tan patches. In the 2017 fine fescue CTBT trial (Table 3), DLF-FL 53 M3, AHF205, and Eureka II hard fescues, Z16-RHF strong creeping red fescue, and Bighorn GT sheep fescue had good tolerance to pink patch while ACF309 hard fescue, PPG-FRC 120, PST-4SWT, Survivor, and Culumbra II Chewings fescues, ASC295, ASC356, PST-4RUE strong creeping red fescue, PST-4GUD sheep fescue, and Seabreeze GT slender creeping red fescue are most susceptible to pink patch disease.

Establishment

Most cultivars and selections were well-established within one month of seeding, as evidenced by the results from October establishment ratings presented in Table 5. Factors such as genetics, environmental conditions, and seed quality and storage can affect seedling establishment and vigor. In the 2019 fine fescue trial (Table 5), in general, Chewings fescues, strong creeping red fescues, and slender creeping red fescue had the quicker establishment compared to the hard fescue. Viking H2O and Spartan 2 hard fescue had the quickest establishment of hard fescue. Carousel Chewings fescue, Azay Blue and SR 3210 hard fescues, Class One strong creeping red fescue had the slowest establishment.

<div align="center">SUMMARY</div>

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, and for the hard fescues, efforts should be focused on summer patch (caused by *Magnaporthiopsis poae*) and gray leaf spot (caused by *Pyricularia oryzae*) disease resistance.

<div align="center">ACKNOWLEDGEMENTS</div>

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Table 1. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2016 at Adelphia, NJ.

| | Cultivar or Selection | ---------------------------Turf Quality[1]--------------------------- | | | | | Dollar Spot[2] 25 Jul. 2019 |
		2017-2020 Avg.	2017 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	
	HARD FESCUE						
1	A52 comp	5.6	4.7	5.6	5.9	6.2	7.0
2	A55 comp	5.5	5.3	5.1	5.3	6.5	6.7
3	A56 comp	5.5	5.4	5.6	4.9	6.0	6.7
4	Z16-RHF	5.5	5.0	5.3	5.4	6.1	7.3
5	PPG-FL 113	5.4	5.5	5.1	4.8	6.0	7.0
6	A51 comp	5.3	5.7	4.9	4.9	5.7	6.0
7	A5C7 comp	5.3	5.2	5.2	4.8	5.9	6.0
8	Z16-RCF	5.3	5.0	5.0	5.7	5.5	7.7
9	PPG-FL 115	5.3	5.0	4.8	4.9	6.3	6.7
10	SPHD16 comp	5.2	4.5	5.0	5.2	6.0	6.7
11	Sword	5.2	5.3	4.6	4.9	5.9	6.7
12	A53 comp	5.1	4.8	5.1	4.7	5.9	5.3
13	A54 comp	5.0	4.5	5.2	5.0	5.4	5.3
14	Jetty	5.0	4.8	5.2	4.7	5.0	6.7
15	Beacon	4.9	4.8	4.2	4.6	6.1	6.3
16	Sword	4.9	4.5	4.7	4.7	5.7	6.0
17	Stonehenge II	4.9	4.8	4.1	4.7	5.9	7.3
18	Minimus	4.7	5.0	4.5	3.9	5.4	4.7
19	Viking H2O	4.5	4.7	4.1	4.0	5.2	4.3
20	Reliant IV	4.4	4.1	3.9	4.5	5.2	6.3
21	Blueray	3.9	4.5	4.1	3.3	3.6	5.0
	CHEWINGS FESCUE						
1	WYR comp	5.5	5.3	5.1	5.8	5.7	7.0
2	Woodall	5.2	4.9	5.0	5.4	5.5	6.7
3	PPG-FRC 120	5.1	4.9	5.0	5.1	5.1	6.7
4	WTC comp	4.8	4.8	4.7	5.3	4.4	6.0
5	Z16-DR	4.6	4.7	4.6	4.5	4.8	5.7
6	PH comp	4.5	4.8	4.3	4.5	4.5	3.7
7	Z16-RCRF	4.5	4.7	4.3	4.5	4.5	5.0
8	5Z4 comp	4.5	5.1	4.2	3.8	4.9	2.0
9	Gladiator	4.5	5.0	4.7	3.5	4.7	3.7
10	5Z3 Comp	4.4	5.1	4.2	3.7	4.5	3.3

(Continued)

Table 1. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2016 at Adelphia, NJ.

	Cultivar or Selection	2017-2020 Avg.	2017 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	Dollar Spot[2] 25 Jul. 2019
		------------------------- Turf Quality[1] -------------------------					

CHEWINGS FESCUE (Continued)

	Cultivar or Selection	2017-2020 Avg.	2017 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	Dollar Spot 25 Jul. 2019
11	PST-4BND	4.4	3.9	4.3	4.6	4.6	6.0
12	Z16-DRBM2X	4.3	4.1	3.9	4.7	4.7	6.7
13	Compass II	4.3	4.6	4.4	4.4	3.8	4.0

STRONG CREEPING RED FESCUE

	Cultivar or Selection	2017-2020 Avg.	2017 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	Dollar Spot 25 Jul. 2019
1	5Z5 comp	4.6	5.1	4.8	3.8	4.7	3.7
2	PPG-FRR 116	4.6	4.8	4.7	4.5	4.4	6.3
3	Radar	4.3	4.5	4.2	4.4	3.9	6.7
4	Fairmont	4.3	4.8	4.7	4.4	3.1	4.0
5	PST-Syn-45PR	4.2	4.0	4.7	3.7	4.5	6.3
6	Treazure II	4.2	4.4	4.4	4.4	3.6	3.7
7	Z16-DRBM	4.1	4.0	3.8	4.4	4.3	7.3
8	5Z1 comp	4.1	5.0	4.1	3.0	4.3	1.7
9	5Z2 comp	4.1	5.2	3.9	3.4	3.9	3.0
10	Cardinal II	4.1	4.4	4.0	3.8	4.2	5.3
11	PST-4SWT	4.1	4.3	3.6	4.1	4.1	6.7
12	Ambrose	4.0	3.8	3.6	4.6	4.2	6.3
13	Shademaster III	3.7	4.0	3.7	3.0	4.0	2.3
14	PST-4CHT	3.7	3.1	3.8	3.8	3.9	4.7
15	PST-4SHR-CH	3.6	3.4	3.6	4.0	3.6	5.3
16	PST-4BEN	3.5	4.4	3.3	2.6	3.7	2.3
17	PST-4SP14	3.5	3.9	3.5	2.6	3.9	2.0
18	PST-4ED4	3.4	3.9	3.3	2.5	4.1	1.3
19	Ruddy	3.4	4.7	3.0	2.4	3.5	1.0
20	PST-4CRD-P	3.4	4.3	2.9	2.9	3.6	2.0
21	PST-4DR4	3.4	4.3	3.4	2.6	3.3	1.0
22	PST-4RUE-14	3.4	3.8	3.3	2.7	3.7	2.7
23	Marvel	3.4	4.4	3.0	2.6	3.4	1.3
24	Kent	3.3	4.1	3.2	2.6	3.5	1.3
25	Kent	3.3	4.0	2.6	2.6	3.8	1.0
26	Navigator II	3.2	4.5	3.2	2.1	3.1	1.0
27	Wendy Jean	3.2	4.0	2.8	2.6	3.5	1.3
28	Orbit	3.2	4.1	3.0	2.5	3.3	1.0
29	PST-4CRD-U	3.2	4.2	3.1	2.3	3.2	1.3
30	Xeric	3.2	4.1	3.0	2.5	3.1	1.7

(Continued)

Table 1.   Performance of fine fescue cultivars and selections in a turf trial seeded in September 2016 at Adelphia, NJ.

	Cultivar or Selection	--------------------------Turf Quality[1]--------------------------					Dollar Spot[2]
		2017-2020 Avg.	2017 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	25 Jul. 2019
	STRONG CREEPING RED FESCUE (Continued)						
31	PST-4GRY	3.0	2.0	3.2	3.1	3.7	4.0
32	Fenway	3.0	3.5	2.7	2.1	3.6	1.7
33	Oracle	2.7	3.1	2.4	2.2	3.0	3.3
	SLENDER CREEPING RED FESCUE						
1	Sea Mist	4.3	4.4	3.9	4.6	4.1	6.7
	SHEEP FESCUE						
1	Azure	3.9	4.0	3.8	3.9	4.1	5.7
2	Blue Mesa	2.8	3.1	2.9	2.5	3.7	4.0
	LSD @ 5%=	0.5	0.6	0.8	0.7	1.0	1.6

[1]9 = best turf quality
[2]9 = least disease

Table 2. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2017 at Adelphia, NJ.

| | Cultivar or Selection | ----------------------------Turf Quality[1]---------------------------- | | | | Summer Patch[2] |
		2018-2020 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	25 Sep. 2019
	HARD FESCUE					
1	PPG-FL 122	6.3	5.7	6.1	7.0	7.3
2	PPG-FL 115	6.2	5.4	6.0	7.2	5.0
3	HAQ2	6.0	5.4	6.1	6.6	6.7
4	HAQ1	5.9	5.9	6.0	5.9	7.0
5	PPG-FL 124	5.8	5.8	5.6	6.1	5.0
6	BM2 SEL	5.8	5.4	5.8	6.2	7.3
7	Minimus	5.8	5.3	6.2	6.0	6.3
8	PPG-FL 123	5.8	5.7	5.3	6.4	3.7
9	PPG-FL 113	5.7	5.4	5.5	6.3	5.3
10	Z16-RHF	5.7	5.5	5.6	6.0	4.7
11	Jetty	5.4	5.6	5.4	5.3	5.3
12	Sword	5.4	4.9	5.1	6.2	6.3
13	Beacon	5.3	5.0	5.3	5.7	4.3
14	FL 58 SEL M2	5.3	5.2	4.7	6.0	5.0
15	Viking H2O	5.1	4.6	5.3	5.6	6.7
16	Gladiator	5.1	5.0	4.8	5.4	5.0
17	Reliant IV	5.0	4.3	4.8	5.9	5.7
18	SR 3150	4.9	4.5	4.8	5.3	4.7
19	Stonehenge II	4.4	4.1	3.9	5.0	3.7
20	Spartan II	3.8	3.9	3.6	3.7	3.3
21	Eureka II	3.3	3.5	3.1	3.2	2.7
	CHEWINGS FESCUE					
1	CHU1	5.8	5.7	6.0	5.6	7.7
2	Z16-RCF	5.6	5.4	5.8	5.5	8.3
3	Woodall	5.3	4.9	5.0	5.9	5.7
4	PPG-FRC 120	5.2	5.1	5.4	5.0	7.3
5	Radar	5.1	5.2	4.8	5.1	6.3
6	CHP1	5.0	5.1	4.7	5.1	6.0
7	Wrigley 2	4.9	4.5	5.0	5.2	7.0
8	Fairmont	4.9	5.2	4.9	4.7	6.7
9	PPG-FRC 126	4.9	5.3	5.0	4.4	5.7
10	CHU2	4.9	5.3	5.0	4.4	5.0

(Continued)

Table 2.   Performance of fine fescue cultivars and selections in a turf trial seeded in September 2017 at Adelphia, NJ.

| | Cultivar or Selection | --------------------------Turf Quality[1]-------------------------- | | | | Summer Patch[2] |
		2018-2020 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	25 Sep. 2019
	CHEWINGS FESCUE (continued)					
11	Leeward	4.8	4.9	4.7	4.7	6.3
12	LaCrosse	4.7	4.9	4.9	4.4	6.7
13	SR 5130	4.5	4.3	4.8	4.5	6.7
14	Compass II	4.5	4.8	4.1	4.6	4.3
15	CHP2	4.5	4.8	4.5	4.1	5.0
16	Sonar	4.4	4.6	4.0	4.6	3.7
17	Castle	4.3	4.4	4.6	4.1	7.7
18	Longfellow 3	4.1	4.5	3.8	4.0	4.0
19	Ambrose	4.1	4.2	4.4	3.6	7.0
20	Windward	3.5	3.9	3.4	3.2	5.0
21	PST-Syn-4DUB	2.1	2.3	1.9	2.2	3.0
	STRONG CREEPING RED FESCUE					
1	PPG-FRR 121	5.3	5.0	5.6	5.4	8.7
2	PPG-FRR 116	4.4	5.1	4.5	3.7	6.7
3	Z16-DR	4.4	4.0	4.9	4.3	7.7
4	Cardinal II	4.4	4.6	4.6	4.0	8.0
5	Z16-RCRF	4.3	4.4	4.3	4.4	7.0
6	PPG-FRR 122	4.1	4.3	4.2	3.8	7.3
7	Navigator II	4.1	4.6	4.5	3.2	6.7
8	Ruddy	4.0	4.4	4.2	3.5	7.7
9	Rose City	4.0	4.1	3.6	4.4	6.7
10	Z16-DRBM	4.0	3.8	4.3	3.9	7.0
11	Garnet	4.0	4.2	4.1	3.6	7.0
12	Cindy Lou	3.9	4.2	4.0	3.6	5.7
13	Orbit	3.8	3.9	4.1	3.6	7.7
14	Marvel	3.8	4.4	4.1	2.8	6.3
15	Chantilly	3.7	4.7	3.8	2.6	6.3
16	Jasper II	3.5	3.4	3.8	3.3	7.3
17	ORC 126	3.4	2.9	3.9	3.5	6.3
18	Class One	3.3	3.5	3.6	2.9	7.7
19	Z16-DRBM2X	3.1	3.1	3.2	3.1	6.3
20	Oracle	1.9	2.3	1.6	1.9	5.5
21	Epic	1.9	2.3	1.8	1.6	5.0

(Continued)

Table 2.   Performance of fine fescue cultivars and selections in a turf trial seeded in September 2017 at Adelphia, NJ.

| | Cultivar or Selection | --------------------------Turf Quality[1]-------------------------- | | | | Summer Patch[2] |
		2018-2020 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	25 Sep. 2019
	SLENDER CREEPING RED FESCUE					
1	Seamist	4.5	4.6	4.6	4.3	6.0
2	PPG-FRT 103	4.2	4.0	4.6	4.0	4.0
3	Shoreline	3.7	3.4	4.0	3.7	6.3
	SHEEP FESCUE					
1	Azure	3.6	3.9	3.4	3.4	2.7
2	PST-4GUDS Bulk	3.5	4.3	3.8	2.4	7.7
3	Quatro	3.3	3.8	2.7	3.3	3.0
4	Blue Mesa	2.8	3.5	2.7	2.2	4.0
	LSD @ 5%=	0.9	0.9	1.3	1.1	2.7

[1]9 = best turf quality
[2]9 = least disease

Table 3. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2017 at Adelphia, NJ. Includes all entries from the 2017 Cooperative Turfgrass Breeders Test (CTBT).

| | Cultivar or Selection | ------------------Turf Quality[1]------------------ | | | | Establish-ment[2] | Pink Patch[3] |
		2018-2020 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	12 Oct. 2017	12 Feb. 2020
	HARD FESCUE						
1	PPG-FL 115	6.9	6.6	6.9	7.1	6.3	8.0
2	DLF-FL 63	6.4	5.8	6.6	6.8	5.7	6.0
3	PPG-FL 113	6.3	5.8	6.4	6.7	6.3	8.0
4	DLF-FL 53 M3	6.2	5.9	6.6	6.0	5.3	9.0
5	AHF205	6.0	5.2	6.4	6.5	5.3	8.3
6	AHF218	5.7	4.9	5.4	6.9	7.3	8.0
7	DLF-FL 64	5.7	5.9	5.5	5.8	5.3	7.7
8	AHF222	5.6	4.7	5.7	6.4	6.0	8.0
9	Beacon	5.5	5.5	5.7	5.3	6.3	7.7
10	AHF225	5.5	5.0	5.3	6.2	6.3	8.0
11	SR 3150	5.5	4.8	5.4	6.2	7.0	7.7
12	ACF314	5.5	5.6	5.9	4.9	6.7	4.3
13	DLF-FL 54 M3	5.4	5.3	5.6	5.4	5.7	7.7
14	AHF211	5.3	4.5	5.0	6.3	7.0	7.7
15	ACF328	5.2	5.0	5.8	4.8	7.0	5.3
16	ACF303	5.1	5.2	5.3	4.9	6.3	5.0
17	ACF319	5.1	4.7	5.4	5.1	6.7	5.7
18	PST-4BND	4.7	4.4	4.6	5.2	4.7	7.7
19	ACF327	4.7	4.4	4.8	4.8	8.3	4.7
20	Eureka II	4.6	3.9	4.6	5.4	7.0	8.3
21	ACF309	4.2	3.7	4.3	4.6	7.0	3.7
	CHEWINGS FESCUE						
1	DLF-FRC 50	6.2	5.6	6.7	6.2	7.0	7.3
2	PPG-FRC 120	5.8	5.6	6.2	5.7	6.7	3.3
3	DLF-FRC 54	5.8	5.4	6.2	5.9	6.0	6.0
4	Radar	5.4	5.7	5.6	5.0	7.7	4.7
5	DLF-FRC 51	5.3	4.8	5.8	5.5	8.0	5.0
6	Sonar	5.2	4.9	5.5	5.1	8.0	5.7
7	PPG-FRC 118	5.1	5.1	5.5	4.8	7.3	4.0
8	PPG-FRC 113	5.0	4.8	5.4	4.8	4.3	5.3
9	PST-4SWT	4.9	4.1	5.3	5.3	7.3	2.0
10	Survivor	4.7	4.4	4.9	4.8	8.0	3.0

(Continued)

Table 3.   Performance of fine fescue cultivars and selections in a turf trial seeded in September 2017 at Adelphia, NJ. Includes all entries from the 2017 Cooperative Turfgrass Breeders Test (CTBT).

| | Cultivar or Selection | -------------------Turf Quality[1]------------------- | | | | Establish-ment[2] 12 Oct. 2017 | Pink Patch[3] 12 Feb. 2020 |
		2018-2020 Avg.	2018 Avg.	2019 Avg.	2020 Avg.		
	CHEWINGS FESCUE (continued)						
11	Culumbra II	4.5	4.4	4.5	4.4	6.3	3.7
12	DLF-FRC 52	3.7	3.7	3.5	3.9	5.7	4.3
13	Koket	2.6	2.2	2.5	3.2	7.3	5.7
	STRONG CREEPING RED FESCUE						
1	Z16-RHF	6.3	6.0	6.4	6.4	6.0	8.3
2	Z16-RCF	5.7	5.3	6.6	5.4	6.3	7.3
3	ASC295	5.0	4.6	4.9	5.4	5.0	2.0
4	ASR197	4.8	4.1	5.4	5.0	8.3	6.7
5	PPG-FRR 115	4.8	4.5	4.9	5.0	7.7	2.0
6	DLF-FRR 79	4.6	4.3	4.7	4.7	6.3	3.3
7	PST-4CR7	4.5	4.2	4.6	4.6	8.3	5.3
8	ASC362	4.4	3.7	4.3	5.2	7.0	7.0
9	ASC350	4.4	4.0	4.5	4.7	8.0	7.7
10	Cardinal II	4.4	4.0	4.7	4.4	4.0	3.7
11	ASC359	4.3	4.1	4.0	4.8	7.3	8.0
12	Z16-DRBM	4.1	3.5	4.2	4.7	7.7	4.0
13	PPG-FRR 116	4.1	4.1	4.8	3.4	7.3	4.7
14	PST-4BEN	4.0	3.7	3.8	4.6	5.0	4.0
15	ASC361	4.0	4.0	3.9	4.0	7.3	6.0
16	DLF-FRR 72 M2	3.8	3.7	4.3	3.6	8.3	3.0
17	ASC348	3.8	3.6	3.7	4.2	6.0	5.3
18	ASC351	3.8	3.6	3.6	4.1	8.0	3.7
19	ASC356	3.8	3.5	3.7	4.1	7.3	2.0
20	Shademaster III	3.7	3.4	3.7	4.2	6.3	2.3
21	ASR175	3.6	3.3	3.9	3.6	3.7	4.0
22	Lustrous	3.6	3.2	3.4	4.2	8.7	3.0
23	DLF-FRR 77	3.6	3.5	3.6	3.6	6.7	2.7
24	PST-4SP14	3.5	3.5	4.0	3.1	3.7	4.0
25	PST-4DR4	3.4	3.5	3.0	3.5	3.7	2.7
26	PPG-FRR 114	3.3	3.2	3.6	3.2	9.0	2.3
27	ASC347	3.3	3.4	3.2	3.3	6.3	2.3
28	ASC354	3.3	3.1	3.2	3.6	6.3	3.0
29	Z16-DRBM2X	3.2	2.8	3.1	3.7	3.0	2.3
30	PST-4RUE	3.2	3.4	3.4	2.8	4.0	2.0

(Continued)

Table 3. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2017 at Adelphia, NJ. Includes all entries from the 2017 Cooperative Turfgrass Breeders Test (CTBT).

| | Cultivar or Selection | -------------------Turf Quality[1]------------------- | | | | Establish-ment[2] | Pink Patch[3] |
		2018-2020 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	12 Oct. 2017	12 Feb. 2020
	STRONG CREEPING RED FESCUE (continued)						
31	Xeric	3.1	3.0	2.9	3.4	7.0	3.3
32	PST-4ED4	2.9	3.4	2.7	2.6	8.0	2.7
33	DLF-FRR 75	2.3	2.2	1.9	2.7	7.3	3.0
34	DLF-FRR 76	2.0	2.0	1.6	2.6	8.7	2.7
35	Boreal	1.8	1.9	1.6	2.0	9.0	3.3
	SHEEP FESCUE						
1	Bighorn GT	4.5	3.9	4.6	5.1	5.7	8.7
2	PPG-FO 102	4.2	4.4	3.8	4.3	4.0	5.0
3	PST-4GUD	3.8	4.6	4.1	2.6	3.7	3.7
	SLENDER CREEPING RED FESCUE						
1	SeaMist	4.4	3.9	4.6	4.7	8.7	6.0
2	Seabreeze GT	3.4	3.3	2.8	4.0	4.3	2.7
	LSD @ 5%=	0.7	0.7	0.9	1.0	1.5	2.9

[1]9 = best turf quality
[2]9 = least disease
[3]9 = least disease

Table 4.   Performance of fine fescue cultivars and selections in a turf trial seeded in September 2018 at Adelphia, NJ.

| | Cultivar or Selection | ----------------------Turf Quality[1]---------------------- | | | Gray Leaf Spot[2] 17 Oct. 2018 |
		2019-2020 Avg.	2019 Avg.	2020 Avg.	
	HARD FESCUE				
1	PPG-FL 121	5.5	5.0	6.0	7.0
2	AS6	5.3	4.9	5.8	6.0
3	FL 58 SEL	5.0	4.9	5.1	5.7
4	Jetty	5.0	4.8	5.2	5.3
5	Z16-RHF	4.8	4.0	5.6	5.5
6	Minimus	4.7	3.6	5.8	3.0
7	Sword	4.5	3.4	5.6	4.0
8	Beacon	4.5	4.2	4.7	4.3
9	Stonehenge II	4.4	3.7	5.1	5.5
10	Clarinet	4.3	3.8	4.9	4.0
11	BM2 SEL	4.3	4.1	4.5	5.3
12	Blueray	4.2	3.9	4.6	7.3
13	Viking H2O	4.0	3.8	4.2	6.0
14	RAD-FL67	4.0	3.5	4.5	3.0
15	Gladiator	3.8	2.9	4.7	-
16	Reliant IV	3.7	3.1	4.3	4.3
17	SPHD Comp	3.7	3.5	3.9	3.0
18	Granite	3.7	3.4	3.9	4.0
19	Spartan 2	3.6	3.1	4.1	4.5
20	Eureka II	3.4	3.1	3.8	5.0
21	Beudin	3.3	3.3	3.3	7.0
22	Quatro	2.6	2.1	3.2	1.5
23	SR 3210	2.5	2.0	2.9	1.0
24	Azay Blue	2.3	1.6	3.0	8.0
25	SR 3150	2.2	1.8	2.6	–
	CHEWINGS FESCUE				
1	FRC 45 SEL	4.8	4.9	4.6	9.0
2	Woodall	4.7	4.7	4.6	9.0
3	CLS2	4.6	5.0	4.2	9.0
4	Enchantment	4.6	4.5	4.6	9.0
5	PSFC09-2	4.5	5.0	3.9	9.0

(Continued)

Table 4. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2018 at Adelphia, NJ.

	Cultivar or Selection	----------------------Turf Quality[1]----------------------			Gray Leaf Spot[2] 17 Oct. 2018
		2019-2020 Avg.	2019 Avg.	2020 Avg.	

CHEWINGS FESCUE (continued)

	Cultivar or Selection	2019-2020 Avg.	2019 Avg.	2020 Avg.	Gray Leaf Spot 17 Oct. 2018
6	Radar	4.4	5.1	3.6	9.0
7	Compass II	4.3	4.7	3.9	9.0
8	LS3000	4.2	4.5	3.8	9.0
9	Intrigue	4.1	4.8	3.5	9.0
10	PST-Syn-4SWG	4.1	4.2	3.9	8.7
11	Brittany 2	4.0	4.4	3.6	8.7
12	Treazure II	4.0	4.2	3.8	9.0
13	Shadow III	4.0	4.0	3.9	9.0
14	Wrigley 2	4.0	4.0	4.0	9.0
15	Carson	4.0	4.0	3.9	9.0
16	Conductor	4.0	4.2	3.8	9.0
17	Momentum	3.9	4.6	3.3	9.0
18	Lacrosse	3.9	4.6	3.3	9.0
19	PST-4SWTM	3.9	4.0	3.8	9.0
20	SR 5130	3.9	3.9	3.9	9.0
21	Z16-RCF	3.9	4.0	3.8	8.5
22	Ambrose	3.8	4.2	3.4	9.0
23	PST-4SWT	3.5	2.9	4.0	9.0
24	RAD-FC63	3.5	3.7	3.2	9.0
25	Castle	3.4	4.0	2.9	9.0
26	Longfellow 3	3.4	3.9	2.9	9.0
27	Chancellor	3.3	3.8	2.8	8.7
28	Caldris	3.1	2.9	3.4	9.0
29	Windward	3.0	3.1	2.8	9.0
30	Carousel	2.8	2.2	3.3	9.0

STRONG CREEPING RED FESCUE

	Cultivar or Selection	2019-2020 Avg.	2019 Avg.	2020 Avg.	Gray Leaf Spot 17 Oct. 2018
1	Z16-DR-BM2X	4.1	4.1	4.1	9.0
2	Cindy Lou	4.0	4.2	3.8	9.0
3	Navigator II	4.0	4.5	3.5	9.0
4	FRR 77B	4.0	4.2	3.8	9.0
5	Orbit	4.0	4.1	3.8	9.0

(Continued)

Table 4. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2018 at Adelphia, NJ.

| | Cultivar or Selection | -----------------------Turf Quality[1]----------------------- | | | Gray Leaf Spot[2] 17 Oct. 2018 |
		2019-2020 Avg.	2019 Avg.	2020 Avg.	
	STRONG CREEPING RED FESCUE (continued)				
6	FT7 SEL	3.9	4.3	3.6	9.0
7	Rosecity	3.8	4.3	3.4	9.0
8	PPG-FRR 121	3.8	4.1	3.5	9.0
9	RAD-FR64	3.8	4.2	3.3	9.0
10	Marvel	3.7	3.8	3.6	8.7
11	Wendy Jean	3.5	3.8	3.3	9.0
12	ORC 126 M2	3.5	3.7	3.3	9.0
13	Ruddy	3.5	3.8	3.1	9.0
14	Cardinal II	3.5	3.7	3.2	8.7
15	Z16-DRBM	3.5	3.5	3.4	9.0
16	Kent	3.4	3.5	3.4	9.0
17	PST-4ED4	3.4	4.0	2.8	9.0
18	Z16-RCRF	3.4	3.6	3.1	9.0
19	Jasper II	3.3	3.7	2.9	8.7
20	Chorus	3.3	3.7	2.9	9.0
21	Chantilly	3.3	4.0	2.6	9.0
22	PST-4CR7	3.2	3.4	2.9	9.0
23	Fenway	3.2	3.1	3.2	9.0
24	Fox Fire 2	3.1	3.5	2.8	9.0
25	Leigh	3.1	3.6	2.6	9.0
26	Fenway	3.0	3.4	2.6	9.0
27	Z16-DR	3.0	2.9	3.1	8.7
28	Shademaster III	2.9	2.8	3.0	9.0
29	Wisp	2.9	3.3	2.5	9.0
30	PST-420E	2.9	2.9	2.8	8.7
31	Xeric	2.8	3.1	2.5	9.0
32	SR 5250	2.8	2.7	3.0	9.0
33	Garnet	2.8	2.8	2.7	9.0
34	Class One	2.7	2.3	3.1	9.0
35	Maxima	2.7	2.6	2.7	8.7
36	Epic	2.5	3.0	2.1	8.3

(Continued)

Table 4. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2018 at Adelphia, NJ.

| | Cultivar or Selection | -----------------------Turf Quality[1]----------------------- | | | Gray Leaf Spot[2] 17 Oct. 2018 |
		2019-2020 Avg.	2019 Avg.	2020 Avg.	
	SHEEP FESCUE				
1	Bighorn GT	4.4	3.5	5.2	7.3
2	PST-4GUD Plus	3.5	3.1	3.8	8.5
3	Blue Mesa	3.2	2.8	3.6	8.7
4	Dall	3.1	2.8	3.4	7.3
5	PPG-FO 103	3.0	2.6	3.3	1.0
	LSD @ 5%=	0.8	1.0	0.9	1.0

[1]9 = best turf quality
[2]9 = least disease

Table 5. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2019 at Adelphia, NJ.

Cultivar or Selection	Turf Quality[1] 2020 Avg.	Establishment[2] 8 Oct. 2019
CHEWINGS FESCUE		
1 PPG-FRC 130	6.6	9.0
2 PPG-FRC 126	6.5	9.0
3 Woodall	6.4	9.0
4 PPG-FRC 127	6.3	9.0
5 PST-4TEB	6.3	8.7
6 PPG-FRC 128	6.2	8.7
7 Conductor	5.8	9.0
8 FRC 45 SEL	5.7	9.0
9 Brittany 2	5.6	9.0
10 PST-4CHG	5.5	9.0
11 Enchantment	5.4	9.0
12 PST-Syn-4CHE	5.4	8.7
13 FRC FW2	5.4	9.0
14 Wrigley 2	5.3	7.3
15 PST-4SWT	5.2	8.0
16 PST-4SWTM	5.2	8.7
17 PST-4SHAD	5.1	9.0
18 Compass II	5.0	8.3
19 RCF	5.0	8.0
20 Radar	5.0	9.0
21 Shadow II	5.0	8.0
22 Lacrosse	4.9	8.7
23 Sonar	4.8	9.0
24 Fairmont	4.8	9.0
25 Sonar	4.8	9.0
26 Longfellow 3	4.8	7.7
27 SR 5130	4.8	6.3
28 PST-4CHT	4.6	9.0
29 Ambrose	4.5	9.0
30 Siskin	4.3	8.0
31 PSFC09-2 M2	4.3	8.3
32 Castle	4.2	6.3
33 Shadow III	3.9	4.0
34 Windward	3.8	7.7
35 Carousel	1.9	1.3

(Continued)

Table 5. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2019 at Adelphia, NJ.

Cultivar or Selection	Turf Quality[1] 2020 Avg.	Establishment[2] 8 Oct. 2019
HARD FESCUE		
1 PPG-FL 132	6.4	7.7
2 PPG-FL 129	6.1	7.3
3 FL 14H6	6.0	8.0
4 PPG-FL 130	5.9	7.3
5 SPHD-5	5.9	7.3
6 SR 3150	5.9	7.7
7 FL FH3	5.8	7.3
8 PPG-FL 128	5.6	6.7
9 FL 58 SEL	5.6	8.3
10 BM2 SEL	5.6	8.3
11 Sword	5.6	8.3
12 SPHD-3	5.5	8.0
13 SPHD-4	5.5	7.3
14 SPHD-Comp	5.4	8.0
15 SPHD-6	5.4	7.3
16 SPHD-2	5.3	7.3
17 Beacon	5.3	8.7
18 SPHD-7	5.3	7.0
19 Jetty	5.2	7.7
20 SPHD-9	5.2	7.0
21 Viking H2O	5.1	9.0
22 Stonehenge II (AHF-177)	5.1	7.3
23 RHF	5.1	8.0
24 Sword	5.1	7.0
25 SPHD-1	5.0	7.0
26 Gladiator	4.9	6.7
27 Reliant IV	4.9	8.7
28 Blue Ray	4.9	8.0
29 Gladiator	4.8	6.7
30 Quatro	4.7	8.3
31 Spartan 2	4.6	9.0
32 Resolute	4.0	4.7
33 Eureka II	3.7	5.3
34 Beudin	3.7	7.3
35 Clarinet	3.1	7.7

(Continued)

Table 5. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2019 at Adelphia, NJ.

Cultivar or Selection	Turf Quality[1] 2020 Avg.	Establishment[2] 8 Oct. 2019
HARD FESCUE (continued)		
36 Azay Blue	1.4	1.0
37 SR 3210	1.0	1.0
STRONG CREEPING RED FESCUE		
1 PPG-FRR 130	6.3	8.7
2 FRR 5Z5	6.0	8.7
3 Rev	6.0	9.0
4 SHD1	6.0	8.0
5 BYE	5.9	8.3
6 PPG-FRR 127	5.9	8.7
7 SHD2	5.9	7.0
8 Chorus	5.8	9.0
9 SHD3	5.8	7.7
10 PPG-FRR 123	5.6	8.7
11 FRR FR2	5.6	8.7
12 FRR 5Z2	5.4	8.0
13 PPG-FRR 128	5.3	7.7
14 ORC 126 M2	5.2	8.3
15 RCRF	5.2	7.0
16 Rosecity	5.1	9.0
17 Cindy Lou	5.1	8.0
18 FT7 SEL	5.0	8.3
19 PPG-FRR 122	5.0	9.0
20 Marvel	4.9	6.3
21 Chantilly	4.7	8.7
22 DR	4.7	6.7
23 PST-4CR7	4.7	7.0
24 Ruddy (PSG 5RM)	4.6	8.7
25 Foxfire 2	4.5	8.3
26 Chantilly	4.5	9.0
27 Navigator II	4.4	9.0
28 DRBM	4.4	7.0
29 Cardinal II	4.0	8.3
30 DR-BM2X	4.0	9.0

(Continued)

Table 5. Performance of fine fescue cultivars and selections in a turf trial seeded in September 2019 at Adelphia, NJ.

Cultivar or Selection	Turf Quality[1] 2020 Avg.	Establishment[2] 8 Oct. 2019
STRONG CREEPING RED FESCUE (continued)		
31 Marvel	3.9	6.7
32 Orbit	3.8	9.0
33 Jasper II	3.7	6.0
34 PST-420E	3.7	8.7
35 Xeric	3.7	5.3
36 Rufi	3.6	9.0
37 SR 5250	3.5	4.0
38 Maxima 1	3.2	5.7
39 Fenway	3.1	9.0
40 Garnet	2.8	2.0
41 Fenway	2.7	8.0
42 Epic	2.7	9.0
43 Miser	2.5	9.0
44 Class One	1.0	1.0
SLENDER CREEPING RED FESCUE		
1 PPG-FRT 105	5.7	8.3
2 SeaMist	4.8	9.0
3 PST-4SEA19	4.3	9.0
4 PST-Syn-4SET	3.7	6.3
SHEEP FESCUE		
1 Little Bighorn	3.1	8.0
2 Blue Mesa	3.0	8.0
LSD @ 5%=	0.8	1.0

[1] 9 = best turf quality
[2] 9 = fastest establishment

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

| | -------2016------- | | -------2017------- | | -------2018------- | | -------2019------- | | -------2020------- | |
	N[1]	Ht[2]	N	Ht	N	Ht	N	Ht	N	Ht
Table 1 (2016)	1.25	1.50	1.25	1.50	1.50	1.50	1.00	1.50	0.50	1.50
Table 2 (2017)	–	–	1.25	1.50	1.50	1.50	1.00	1.50	0.50	1.50
Table 3 (2017 CTBT)	–	–	1.25	1.50	1.50	1.50	1.00	1.50	0.50	1.50
Table 4 (2018)	–	–	–	–	1.75	1.50	1.50	1.50	0.50	1.50
Table 5 (2019)	–	–	–	–	–	–	–	1.50	1.00	1.50

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