Fine Fescue Cultivar Selection for Fairways

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A few months ago I wrote a summary of a roundtable symposium held at the GCSAA conference in February on fine fescue use for golf course fairways (see "A Kingdom of Fairways" in the March/April issue). The article covered many thoughts on management of fine fescues but little on selection. As every turf manager knows, starting with the right grass can make all the difference in the world.

What are fine fescues? The term fine fescue is applied to several *Festuca* species that have extraordinarily narrow (fine) leaves. Often the leaves do not fully unfold, giving the leaf texture an even more narrow appearance. Five species are most commonly used for turf (Turgeon, 2002). Strong creeping red fescue (*Festuca rubra var. rubra*) produces long, abundant rhizomes and has 56 chromosomes. Slender creeping red fescue (*F. rubra var. littoralis* has shorter rhizomes and only 42 chromosomes. Chewings fescue (*F. rubra var. commutata*) has always been considered to be more tolerant of lower mowing heights than other fine fescues. It is a bunch type grass but produces more thatch than even the creeping red fescues. Sheeps fescue (*F. ovina*) has stiff leaves and is best adapted to dry, gravelly soils. It has a bluish green color and often grows in a swirl-type pattern. Hard fescue (*F. longifolia*) also has stiff leaves but is more tolerant of moist soils and has wider leaves than sheeps fescue. Both sheeps and hard fescue have bunch type growth habits.

No-mow mixtures are generally mixtures of several fine fescue species. Fine fescues mix quite well with Kentucky bluegrass and are often found in retail seed mixtures. Little work has been performed to determine their longevity and competitiveness in various mixtures, and their survival likely will depend a great deal on the environment and management inputs.

As a group the fine fescues are considered to be low maintenance because they require less water, fertility, and mowing than most other commonly used turfgrasses (Meyer and Funk, 1989). Although fairly tolerant of shade and acid soils, they do not perform well under high nitrogen (N) or in wet soils. Their traffic tolerance is generally poor and their recuperative ability minimal due to their slow growth rate. As a group fine fescues are notorious for turning brown in summer heat. Historically they generally do not tolerate mowing heights below one to two inches. Diseases such as net blotch (a type of leaf spot caused by *Drechslera dictyoides*), red thread, and dollar spot can be severe problems. In the past few years, however, numerous cultivars have been developed yet their newness has not allowed their characteristics to be fully explored. Some cultivars have had endophyte fungi incorporated into them for enhanced insect resistance.

Wisconsin cultivar trials. In 1998 the National Turfgrass Evaluation Program (NTEP) coordinated fine fescue cultivar trials in 26 states and one Canadian province. The trial had 78 fine fescue cultivars plus a novel species, tufted hairgrass. There were 27 Chewings cultivars, 25 hard, 22 strong creepers, 4 slender creepers, and 4 other (sheep, blue, blue x hard, and tufted hairgrass). Several states established more than one trial in order to evaluate performance under two different management regimes in a similar environment (e.g., high and low input) or under two environments (e.g., sun and shade). At the University of Wisconsin-Madison we planted two trials to be maintained at fairway height, with traffic to be applied on one of the two trials. The trial will conclude next year. Results from all locations are compiled annually and published at www.ntep.org.

Materials and Methods

Plots (5 ft x 5 ft) were established on a silt loam soil (pH 6.8) in early September 1998. The site had a slope of approximately 2% which provided good surface drainage. Seeding rate was approximately 3 lb per 1000 ft^2. A randomized complete block design was used with each cultivar replicated three times. Trafficked and non-trafficked plots were established adjacent to one another with a 10 foot border between the trials. A golf cart traffic simulator was designed and constructed by the Biological Systems Engineering Department at UW-Madison. The traffic simulator consisted of two articulated steel frames each holding two 50 gal drums filled with water. Each frame had one 5 ft. axle with several golf car tires placed from one end of the axle to the other to provide uniform pressure and wheel slippage. The entire system was designed to equal the force (psi) of a single golf cart with two sets of clubs and two 175 lb individuals. Simulated golf cart traffic was applied three times weekly (one pass each time) to the trafficked plot beginning early May 1999 and ending in September of each year.

Plots have been mowed at 0.875 inches two to three times weekly using a reel mower with clippings returned. All turf was fertilized with 0.5 lb N per 1000 ft^2 each growing month and irrigated to prevent stress (approximately 2 to 3 times weekly). A three-way herbicide (2,4-D, dicamba, and MCPP) was applied in 1999 to reduce competition from broadleaf weeds which germinated during establishment. Plots were sprayed autumn 2000 with sethoxydim (Vantage) to control creeping bentgrass which had been spread from other sites by mowers.

Turf quality was rated monthly on a visual scale of one to nine, with one equal to dead turf/bare soil and nine equal to ideal turf. A rating of five was considered acceptable. Spring green up was rated on a similar scale each April, and turf color was rated during October. Percent living ground cover was estimated each October. Data were analyzed using Analysis of Variance to detect significant differences among treatments. Treatment means were separated using Fisher's LSD ($P \leq 0.05$).

Results and discussion

Data from 2001 showed surprisingly good results for all turf. We had expected many of the cultivars to virtually disappear under the dual threats of low mowing height and traffic but all cultivars survived. Eighteen cultivars provided acceptable-quality turf when trafficked (rating at least 5.0), while 76 cultivars provided acceptable turf quality when no traffic was applied. Cultivars separated into top, several middle, and one low-performing groups. In the trafficked plot, 31 of the 79 cultivars were classed as top performers (average rating 5.0). Of these, 42% were new or

Table 1. Summer patch (*Magnaporthe poae*) resistance[1] of representative fine fescue cultivars mowed at 0.875 inch height and subjected to simulated golf cart traffic, Verona, WI, 2000.

Top group[2]			Bottom group[3]		
Species	**Cultivar**	**Rating**	**Species**	**Cultivar**	**Rating**
Chewings	Longfellow II	9.0	Hard	Nordic	5.3
Chewings	SR 5100	8.3	Hard	Reliant II	5.0
Chewings	Sandpiper	8.3	Hard	Defiant	4.3
Strong creeper	Navigator	8.3	Hard	Osprey	4.0
Strong creeper	Jasper II	8.3	Hard	Scaldis	4.0
Strong creeper	SR 5210	8.3	Chewings	PST-4HM	4.0
LSD (0.05) 1.9					

[1] Disease resistance was rated visually on a 1 to 9 scale; 1 = 100% turf symptoms, 9 = no disease.

[2] 32 cultivars were in the top group, none were hard fescue.

[3] 14 cultivars were in the bottom group, 12 were hard, 1 blue, and 1 Chewings.

experimental lines. Sixteen of the cultivars were Chewings, 12 were strong creeping red, 2 were slender creeping reds (both experimentals), and one hard (an experimental). The poorest-performing group had 13 cultivars (average ranking 3.5): 10 hard, 1 strong creeper, 1 blue, and the tufted hairgrass. Non-trafficked plots had 26 cultivars in the top group (average rating 6.5), 18 of which were also top performers in the trafficked group. Eleven were strong creepers, 10 Chewings, 4 hard, and 1 slender creeper.

Unlike traffic tolerance, turf color was largely cultivar-dependent, not species-dependent. For example, 'Wrigley' Chewings fescue, 'Rose' strong creeping red, and 'Bighorn' hard fescue all had a 7.0 rating, while 'Bridgeport' Chewings, 'Nordik E' hard, and 'Salsa' strong creeping red had ratings of 6.3 to 6.0. Turf color ranged from 6.0 to 7.0 with the biggest difference being moderately dark green to medium green.

Both summer patch and dollar spot disease resistance tended to be more affected by species than by cultivar. As a group, chewings and strong creeping red fescues had significantly better summer patch resistance than hard fescue (Table 1). Both hard and Chewings fescues had good dollar spot resistance, while some strong creepers had good resistance and others ranked at the low end (data not shown).

The comparison between trafficked and non-trafficked plots is important because it shows different results for many of the cultivars. One-third of the top performers in the non-trafficked plots did not make the top group in the trafficked plots. In the trafficked plots, nearly half (13 of 31) of the top-performing cultivars were not in the top group of the non-trafficked turf. Thus, cultivar selection should be based on conditions similar to those in how the truf will be used and managed.

The large number of cultivars and diverse reactions to stresses and diseases can make cultivar selection a daunting task. There is no single way to determine which cultivar should be used. One method is to summarize rating values for traits of interest as shown in Table 2. A value was only used for a trait if the cultivar was grouped statistically as a top performer for that trait (Wisconsin ratings). If not, a zero was given for the trait. Percent cover was evaluated on a 0 to 100%

Table 2. Top fine fescue cultivars for fairway mowing heights under simulated golf cart traffic. Cultivars in bold are the top performers using data from 2000 (summer patch and dollar spot) and 2001 (spring greenup, quality, and cover) in trials conducted at Verona, WI. Cultivars which did not place in the top group based on statistical analysis for a trait received a zero for that trait.

Cultivar	Species	Spring Green	Quality[1]	Summer patch	Dollar spot	%cover(.1)[2]	Total pts
Ambassador	Chewings	5.7[2]	5.1	8.0	6.5	0	25.3
Attila	Hard	5.7	0	0	0	0	5.7
Banner 3	Chewings	5.3	4.9	0	0	9.7	19.9
Bridgeport	**Chewings**	**6.0**	**5.5**	**8.3**	**0**	**9.5**	**29.3**
Brittany	Chewings	5.7	4.8	8.0	0	0	18.5
Culombra	Chewings	6.3	4.9	8.7	6.3	0	26.2
Cindy Lou	**Strong creeper**	**0**	**5.2**	**8.0**	**6.5**	**9.5**	**29.2**
Eureka	Hard	5.3	0	0	6.3	0	11.6
Florentine	Strong creeper	0	4.8	0	0	0	4.8
Heron	Hard	5.3	0	0	6.7	0	12.0
Intrigue	**Chewings**	**5.7**	**4.9**	**8.3**	**6.7**	**9.5**	**35.1**
Jamestown II	Chewings	5.3	0	0	0	9.8	15.1
Jasper II	**Strong creeper**	**0**	**5.2**	**8.3**	**6.5**	**9.5**	**29.5**
Longfellow II	**Chewings**	**5.7**	**5.4**	**9.0**	**7.0**	**9.7**	**36.8**
Magic	Chewings	5.3	0	0	6.3	9.3	20.9
Navigator	**Strong creeper**	**0**	**4.7**	**8.3**	**7.0**	**9.3**	**29.3**
Oxford	Hard	5.7	0	0	7.0	9.3	22
Pathfinder	Strong creeper	5.3	5.1	0	0	9.3	19.7
Reliant II	Hard	5.7	0	0	6.8	0	12.5
Salsa	Strong creeper	5.7	4.8	0	0	9.7	20.2
Sandpiper	**Chewings**	**5.7**	**4.7**	**8.3**	**0**	**9.3**	**28**
Scaldis II	Hard	5.7	0	0	6.5	0	12.2
Seabreeze	Slender creeper	5.3	0	7.7	0	0	13
Shademaster	Strong creeper	0	4.8	0	0	9.3	14.1
Shadow II	Chewings	5.3	5.0	0	0	0	10.3
Silhouette	Chewings	0	5.1	7.7	0	9.5	22.3
SR 5100	**Chewings**	**6.0**	**5.1**	**8.3**	**6.3**	**9.3**	**35**
Stonehenge	Hard	5.7	0	0	6.3	0	12
Tiffany	**Chewings**	**5.3**	**5.1**	**8.3**	**6.3**	**9.3**	**34.3**
Treazure	Chewings	0	5.4	0	0	9.8	15.2
Wrigley	Chewings	5.7	0	7.7	0	9.3	22.7

[1] Quality data were averaged over monthly ratings from May to October.
[2] Ratings were based on a scale of 1-10 where 1 = worst, 9 = ideal, except for cover. Cover values are 0.1 of percent cover ratings on a scale of 0 to 100%.

basis; these values were reduced by one decimal place to provide a value of equal magnitude for computational purposes. The top performers were several Chewings fescues ('Bridgeport', 'Intrigue', 'Longfellow II', 'Sandpiper', 'SR 5100', and 'Tiffany') and three strong creeping reds ('Cindy Lou', 'Jasper II', and 'Navigator'). The only hard fescue that performed close to these cultivars was 'Oxford'.

Conventional wisdom dictates that a mixture containing blends of fine fescue species be used for establishment. Our data indicate only certain Chewings and strong creeping red fescue cultivars are useful for fairway conditions. Unfortunately information which tells us how well a cultivar performs when grown by itself may not be indicative of how well it will perform when placed in a mix or a blend. Recent studies using DNA markers to identify individual species in blends have shown many cultivars which perform quite well on their own do not survive well in a blend (G. Jung, 2002, *unpublished*). Another problem with using blends is that if one cultivar is extremely susceptible to a disease, the pathogen may grow sufficiently well to overcome the resistance of the other cultivars (Vargas, 1994). With species-specific diseases, mixtures using only one cultivar of each species may result in less disease than mixes containing blends. The goal would be to develop a turf stand with plants of individual species mixed sufficiently well with resistant or immune species such that there is not a critical mass of susceptible plants that allows a given pathogen a "foothold". This approach may work with diseases such as summer patch which attacked all cultivars of hard fescue, though not all equally, while not impacting strong creeping red or commercial cultivars of Chewings fescues. This approach would not have an advantage non-specific diseases caused by facultative saprophytes such as *Pythium* spp. In any case, hard, slender creeping red, and sheeps fescues may still be useful for fairway mixtures if their performance in a mixture improves the overall turf performance. This summer we will be establishing research plots to determine if mixtures containing one cultivar of each species is as good or better than mixtures containing blends of each species. The project is part of a comprehensive plan to develop environmentally sustainable golf courses with reduced reliance on pesticides.

Literature Cited

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Golf cart traffic simulator for testing traffic tolerance of fine fescue cultivars.