

Breeding Improves Fine Fescue Varieties

By Leah A. Brilman

Improved fine fescues should be used more extensively in this country for fairways, homes and roadsides.

Through biotechnology and breeding on other species, we try to capture what we already have in improved fine fescues: low maintenance turfgrasses with reduced needs for fertilizer, nitrogen and irrigation. Yet, most consumers, whether homeowners, landscape contractors or superintendents, associate fine fescues only with turfgrass mixtures intended for shade sites.

Although the most appropriate use for older or common fine fescue varieties may have been for these shady sites, turfgrass breeders have made significant advances in new fine fescues, making them appropriate for many additional sites, both high and low maintenance.

Despite these dramatic differences in performance, the availability and cheap price of many of these older and common fine fescues have led to their continued use in turfgrass mixtures and have limited the commercialization of many of the improved fine fescue varieties. Increased use of the improved cultivars will increase breeding efforts of these valuable species.

Fine fescues are low-maintenance turfgrass species requiring less fertility, irrigation and mowing than many other turfgrass species. This has been demonstrated by their excellent performance on roadsides and as orchard cover in many areas. The newer cultivars can be used in full sun much further south than earlier varieties.

Endophyte presence

These expanded uses may be due to the presence of endophytes in the new cultivars, which provide protection against many surface feeding insects, increase dollar spot resistance and increase summer stress tolerance.

An additional characteristic of fine fescues, useful in many situations, is their tolerance to

the herbicides sethoxydim and fluazifop, enabling the removal of certain weeds and grasses from these stands (labels should be followed for this use).

Fine fescues prefer lower nitrogen levels than many turfgrasses. In fact, high levels of nitrogen can cause excessive thatch development and decrease their heat tolerance.

Brief taxonomy

Fine fescues include many species of turfgrasses characterized by their fine leaf texture, generally (less than one-third of an inch) and are included in the *Festuca* subgenus of the *Festuca* genus. The species are divided into two major complexes: the red fescue complex and the hard/sheep fescue complex. Taxonomy within these complexes remains under debate, and you may find many scientific names for each species in the literature. The following are the most recently accepted names but may still change over time.

The red fescues include the traditional turfgrass species, which include Chewings fescue, strong creeping red fescue, and slender creeping red fescue.

The members of the hard/sheep fescue complex that have been used for turf include hard fescue, sheep fescue, blue sheep fescue, fine-leaved sheeps fescue and Idaho fescue.

The two most important characteristics used to distinguish the two complexes based on Stace et al., 1992 are as follows:

Red rescue complex: Sheath of young tiller-leaves fused into a tube almost to top; some or all tillers extravaginal.

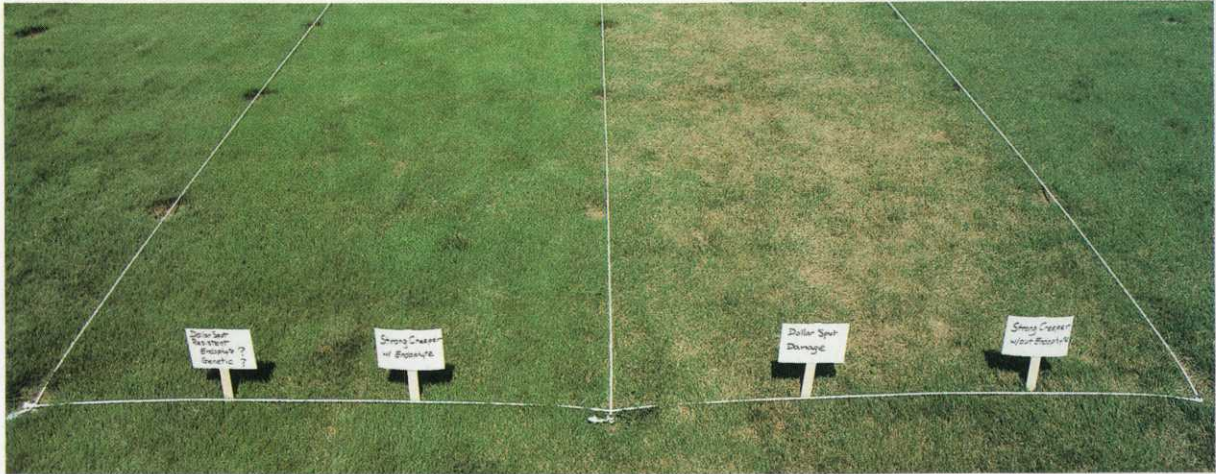
Hard fescue complex: Sheath of young tiller-leaves with at least the upper 40 percent with free, overlapping margins; all tillers intravaginal.

Additional characteristics, such as placement and number of sclerenchyma bundles in leaf cross-sections, width and folding of leaves, presence and absence of rhizomes and chro-



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The left-hand plot has been endophyte-enhanced while the right-hand plot has not. Endophytes enhance turfgrass' ability to battle diseases such as dollar spot.

mosome numbers, further divide these complexes. The taxonomy of these species is difficult, and correct names and designations of subspecies are still being debated. Here are the different varieties within those species.

Chewings fescues

Chewings fescues derive their common name from George Chewings, who exported seed with his name from New Zealand to many areas of the world (Morgan, 1998). It's probably one of the most versatile of the fine fescues being used for greens, fairways and roughs of golf courses; home lawns in sun and shade; highway roadsides and orchard covers; and in overseeding of warm-season turfgrasses as well. It's a bunch-type grass that germinates and establishes quickly.

Chewings fescues have seen significant improvements in heat and drought tolerance, seed yield, dwarf growth form, dark green color and disease resistance primarily against red thread, brown patch and dollar spot.

Improved cultivars have shown good performance in Arkansas, North Carolina and other areas in the Southern transition zone in full sun. In a trial at low pH, with no irrigation and low mowing height at Georgia's Griffin Research Station, SR 5100 and Bridgeport maintained 50 percent cover over three years, which would have been considered impossible a few years ago (1993 Fineleaf Fescue NTEP study results).

In the 1998 NTEP results, Chewings fescues have done the best of the fine fescues when managed under high input as a fairway grass, both with and without traffic. They show good resistance to summer patch,

which limits the use of some fine fescues in heavy wear or compacted areas. Overall, they show the most consistent performance under high to low management.

They blend well with other fine fescues, with colonial bentgrass, with Kentucky bluegrass and with perennial ryegrass, depending on the use. Improved cultivars of Chewings fescue include: Shadow II, Longfellow II, Ambassador, Longfellow II, Tiffany, Intrigue, Jamestown II, SR 5100, Magic, Banner III, Bridgeport, Silhouette, Columbra, Treasure (E), Sandpiper and Brittany. Other promising experimentals in the 1998 NTEP have not yet been brought to market.

Chewings fescues still need improvement in leaf-spot resistance. Newer cultivars are usually endophyte-enhanced, giving them resistance to many insects, dollar spot and summer stress. They also show improved establishment and excellent spring green-up.

Creeping reds

Though research into strong creeping red fescues have shown some of the most significant advancements, common creeping red fescue continues to be used extensively, which prevents the new varieties' advantages from being fully realized. This species is probably the most compatible with Kentucky bluegrasses and perennial ryegrasses in mixtures since they have similar color, leaf texture, density and extensive rhizomes.

Newer strong creeping red fescues are being released that are endophyte-enhanced to assist with insect resistance and summer stress tolerance.

The 1998 NTEP fine fescue tests in Okla-



QUICK TIP

One of the most frequently asked questions about Roundup Ready Creeping Bentgrass is, "How do I eliminate Roundup Ready Creeping Bentgrass if it ends up in my roughs?" Fortunately, the answer is simple: Use one of the other nonselective herbicides on the market today.

homa, which concluded in 2001, showed many promising varieties of the creeping reds. Several varieties showed an increased ability to maintain their ground coverage during the hot summer months. In particular, SRX 52961 (75 percent), Navigator (66.7 percent), Cindy Lou (63.3 percent) and Aberdeen (60 percent) showed great improvement.

A similar pattern was evident in Kentucky, where Jasper II (90 percent), SR 5210 (87.3 percent) Cindy Lou (85 percent) SRX 52691 (81.7 percent) and Navigator (80.3 percent) outshone their common creeping red cousins.

In private trials in Pomona and Fresno, Calif., with three companies cooperating, we've also seen this ability of the newest creeping red fescues to establish rapidly, perhaps due to their larger seed size and ability to maintain excellent turf cover under heat stress. Most of the same improved strong creeping red fescues above also showed excellent performance in fairway trials with traffic at Wisconsin. They show high summer patch, typhula blight and pink snow mold resistance, but need more work on red thread resistance in low-nitrogen sites.

Their drought resistance needs improvement, but creeping reds recover quickly from any damage due to their extensive rhizomes. Superior strong creeping red fescues should be included in turf mixtures for many areas of the country, for both sun and shade.

Slender creeping reds

Slender creeping red fescues have probably received the least breeding work in this country, yet show excellent attributes that make them ideal for many sites.

The slender creeping red fescues have slender short rhizomes and spread more slowly than the strong creepers. They've also been found to tolerate high salt levels and heavy metals more effectively.

Plants of this species can be found growing in tidal areas. The salt tolerance probably contributes to their resistance in initial trials against rapid blight, caused by chytridiomycete, in overseeding situations where saline or effluent water is used. They tolerate low mowing heights and have superior winter-active growth. The salt tolerance also makes it ideal for any area where salts are used for ice control.

TABLE 1

Mean turfgrass quality ratings of fine leaf fescue cultivars grown at the NTEP Madison (Fairway Traffic), Wisc., trials. Top statistical group + common shown:

2001 DATA

Variety	Species	Mean
BRIDGEPORT	CHEWINGS	5.5
LONGFELLOW II	CHEWINGS	5.5
TREAZURE (E)	CHEWINGS	5.4
SRX 52961	STRONG CREEPING	5.4
JASPER II	STRONG CREEPING	5.3
ACF 083	CHEWINGS	5.1
CINDY LOU (CIS FRR 7)	STRONG CREEPING	5.1
PATHFINDER	STRONG CREEPING	5.1
TIFFANY	CHEWINGS	5.1
ABERDEEN (PST-EFL)	STRONG CREEPING	5.1
AMBASSADOR	CHEWINGS	5.1
SRX 3961	HARD	5.1
SILHOUETTE (PICK FRC 4-92)	CHEWINGS	5.0
SR 5100	CHEWINGS	5.0
BAR SCF 8 FUS3	SLENDER CREEPING	5.0
SHADOW II	CHEWINGS	5.0
ASR 049	SLENDER CREEPING	4.9
NTRIGUE	CHEWINGS	4.9
MB-63	CHEWINGS	4.9
SHADEMASTER II	STRONG CREEPING	4.9
DGSC 94	STRONG CREEPING	4.9
FLORENTINE	STRONG CREEPING	4.9
ABT-CHW-1	CHEWINGS	4.9
ABT-CR-2	STRONG CREEPING	4.9
BANNER III	CHEWINGS	4.9
CULOMBRA	CHEWINGS	4.8
NAVIGATOR (CIS FRR 5)	STRONG CREEPING	4.8
PST-4FR	STRONG CREEPING	4.8
BRITTANY	CHEWINGS	4.8
SANDPIPER	CHEWINGS	4.8
WRIGLEY (ACF 092)	CHEWINGS	4.8
JAMESTOWN II	CHEWINGS	4.7
SALSA	STRONG CREEPING	4.7
BAR CHF 8 FUS2	CHEWINGS	4.7
INVERNESS (PST-47TCR)	STRONG CREEPING	4.7
SHADEMARK	STRONG CREEPING	4.7
ABT-HF-4	HARD	4.6
BARGENA III (BAR CF 8 FUS1)	CHEWINGS	4.6
DAWSON E+	SLENDER CREEPING	4.6
SEABREEZE	SLENDER CREEPING	4.6
BERKSHIRE (4001)	HARD	4.6
ABT-CR-3	STRONG CREEPING	4.6
COMMON CREEPING RED	STRONG CREEPING	4.3

LSD=.8

Initial problems being solved by breeders have been reduced seed yields compared to other fine fescues, especially in the highest quality, dense types and less heat tolerance than other fine fescues.

The lack of heat tolerance may have been due to a lack of endophytes in this species, but recently the variety Dawson has had an endophyte introduced into it to form Dawson (E). New germplasm have been identified with endophytes in them. In the 1998 NTEP tests, the slender creeping red fescues showed excellent performance in the high maintenance trials, and new experimentals have shown high performance in Fresno and Pomona, Calif., with heat stress. This species is used extensively in Europe for home lawns and golf courses. As new markets open up in the United States, more breeding will be done.

Hard fescues

The hard fescues are the low maintenance workhorses of the fine fescues.

Found extensively in low maintenance turf sites in the United States from the transition zone northward, they thrive on neglect. Low nitrogen, low water-use turfgrasses that require little mowing sound like the couch potato's dream grass. With too much nitrogen or water, however, they develop extensive thatch and will deteriorate.

They are ideal for shade, but do not like to be wet. They are also typically the slowest of the fine fescue to germinate and establish, although improvements have been made as was evident by increased establishment rates in new material in the 1998 NTEP trials.

Seed production problems include susceptibility to new disease and short lifespan of seed fields, producing a partial crop the first year, a full crop in year two and a lighter crop the third year.

Recently, breeders have been crossing this species with the blue fescues, which some taxonomists think may be just another form of the same species, to obtain varieties without the seed production disease problems and a longer seed field lifespan. These crosses have been selected both for those types that more closely resemble the blue fescues, one of the lowest maintenance turf species, and those types that resemble hard fescues.

Typically, hard fescues are less tolerant of

low mowing heights and traffic, due to low summer patch resistance. But one experimental, SRX 3961, did well in the fairway trial with traffic in Wisconsin.

Hard fescues are typically more resistant to leaf spot, brown patch and red thread than other fine fescues. They can be blended with other fine fescues and Kentucky bluegrass, but higher percentages of hard fescues must be used to obtain the benefits.

The blue fescues are ideal for the lowest maintenance turf sites, such as roadsides. They also add an attractive addition to blends with wildflowers, if seeded at a reduced rate. The individual plants remain smaller than the other fine fescues, so they leave room for the flowers. The seedheads are ornamental, and the blue color adds to the landscape.

The sheep fescues can also be used in similar areas as the blue fescues. Although additional varieties are sold as sheep fescues due to their appearance and low maintenance growth, only the variety Quatro is a true sheep fescue. The other varieties are other species.

Further exploration needs to be done on using other fine fescues for low maintenance turf. Native species such as Idaho fescue, native to the Pacific Northwest and California, have been looked at for their reclamation potential but need to be explored for potential turf usage, especially in the western United States.

Breeders are exploring other characteristics of fine fescues. Many of them can tolerate low rates of glyphosate naturally. Screening for improved salt tolerance is also being done by a number of programs, as well as screening for improved heat tolerance.

Higher disease resistance, in both turf and seed production, is always major emphasis of breeding programs. Perhaps as more people realize the true low maintenance potential of these species and the important breakthroughs that have already occurred, the increased use will enable more rapid improvements in these important species of turfgrass.

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