

# PRESENT AND FUTURE TALL FESCUE VARIETIES

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Tall fescue has played a key role in forage production over the past century in the USA. It has other uses besides forage applications, such as turf, mine reclamation, and highway rights-of-way, but in this presentation we will focus on forage varieties. Several hundred turf-type tall fescue varieties have been developed over the past 30 years, mainly by private seed companies using material from Reed Funk at Rutgers University in New Jersey. Forage varieties aren't as numerous. I will discuss some of the older and current forage tall fescue varieties, and finish by discussing the newest varieties, and those that are in the pipeline that you will be seeing in the next few years.

The first forage crop variety to be registered by the American Society of Agronomy was a tall fescue. It wasn't the variety that you may be thinking of, but was called Alta. Alta originated in Oregon from seed from Germany and Missouri that was sent to Oregon before 1918. Alta was released in 1940, but never was as important as the variety that was released in Kentucky in 1943. Kentucky 31 has a very interesting history, and its wide adaptation, persistence, and success is legendary. It is estimated that around 85% of all tall fescue seeded in the southeastern US was Kentucky 31. The third and last of the grandfathers of tall fescue is the variety Goar, released in 1946 in California. It was mainly used in the western US and Alabama, but never achieved widespread adoption like Kentucky 31 did.

Oregon was the source of another important early tall fescue variety, Fawn. Fawn traces back to eight parents and was released in 1964. It often has competed with Kentucky 31 as a lower-cost endophyte-free forage variety. It is earlier in maturity than Kentucky 31. Dr. Robert Buckner, the tall fescue breeder at U.K. (as a USDA-ARS employee), released two varieties of tall fescue in the 1960s, Kenwell and Kenmont. Kenwell resulted from selfing tall fescue parents, and was slightly less competitive than Kentucky 31, and was heavily infected with the endophyte. Reports from forage workers during that time suggest that Kenwell caused even more animal health problems than has been seen with endophyte-infected Kentucky 31. Kenmont was used mainly in Montana due to its tolerance to alkaline soils.

Another active breeding program produced tall fescue varieties in Missouri. Missouri-96, or Mo-96, was released in 1977. It was derived from French tall fescue. Mozark and Martin were released during the 1980s and have been successful varieties, even though they have only four and two parents, respectively.

Dr. Buckner developed and released two new varieties from his wide-hybridization work. He spent much of his career making crosses between tall fescue and related species such as annual and perennial ryegrass and giant fescue. Kenhy was released in 1976, and was actually the first endophyte-free variety, even though that happened accidentally. Johnstone was released in 1983, and includes seven of the 11 Kenhy parents (plus 29 other parents). It has much better digestibility than most tall fescue varieties, but suffers from a reputation of being slower to establish and less persistent than other tall fescue varieties.

Dr. Joe Bouton at the University of Georgia developed several tall fescue varieties, in addition to developing the first of the grazing-tolerant alfalfa varieties, Alfagraze. Georgia-5 was released in 1992 and was recommended as a perennial cool-season grass to use in bermudagrass and bahiagrass pastures instead of annual ryegrass overseeding each year. Jesup was released in 1995. These two varieties were the first American varieties to be infected with the novel endophytes from AgResearch of New Zealand, the MaxQ product.

Sam Stratton and Bret Winsett at Farmers Forage Research in Indiana have developed some excellent varieties of forage tall fescue. These include Penngrazer, Cattle Club, Phyter, Stargrazer, and Select. Because these varieties are bred near West Lafayette, IN, they generally have excellent winter-hardiness. Their varieties are consistently among the best performers in the U.K. forage variety trials.

Over the past decade, we have seen more and more tall fescue varieties coming from outside the USA. These are mostly European, but some have come from Australia, New Zealand, Canada, Poland, and Japan. Several large forage seed companies are involved in these varieties. These include Barenbrug from the Netherlands, AgResearch from New Zealand, Grasslands from Australia, and DLF-Trifolium from Denmark. Many of these companies are multinational in their reach, and all are entering their new experimental varieties in university forage performance trials in the USA. Many of the Barenbrug varieties begin with 'Bar' such as Barcel, Barolex, Bariance, Barcarella and Barvetia. They also market other European varieties in the USA. Dovey originated from Great Britain, and consistently has shown the best seedling vigor of all tall fescue varieties, and it is endophyte-free. Many varieties have been developed using material from France, including the variety Seine. Van der Have in The Netherlands developed several successful varieties; Festorina and Fuego are two examples. Stef is a Polish variety that showed up in tall fescue variety trials in the early 1990s. Courtenay and Kokanee both were developed in British Columbia, Canada.

During the 1990s, several Oregon breeding and seed producing companies also developed forage tall fescue varieties, or were involved with other breeders around the world to develop newer varieties. We have a good range of tall fescue varieties, but not the overwhelming number that the turf side has (see Table 1.).

Table 1. A Partial list of Commercial Tall Fescue Varieties from U.K. Variety Trials

Atlas	Carmine	Georgia-5	Martin II	Select
Barcarella	Cattle Club	Jesup	Maximize	Stargrazer
Bar 9 TMPO	Festival	Hoedown	Quincy	TF 33
Bronson	Festorina	Kokanee	Resolute	Tuscany II
Bull	Fuego	Martin	Seine	Vulcan

Several recent new directions have appeared in tall fescue varieties. One is the use of novel, non-toxic, or friendly endophytes. The first of these was MaxQ with AgResearch NZ's endophyte strains in Univ. of Georgia's varieties (Jesup and Georgia-5) marketed by Pennington Seed. The AgResearch strains are being deployed by other parties as well, including Univ. of Kentucky, The Noble Foundation, and Grasslands in Australia (Advance, Quantum, and Resolute varieties, called 'Max P' down under). Arkansas and Missouri co-released a competing version called ArkPlus. It is a natural strain of the endophyte that has been inserted into the variety HiMag from David Sleper at Missouri University. These varieties are sometimes called novel endophyte tall fescues (NETFs), and they combine the benefits of endophyte infection with the animal performance of endophyte-free tall fescue by using fungal strains that do not produce ergovaline. At the University of Kentucky, Dr. Chris Schardl in the Plant Pathology is developing 'knockout' mutants of the endophyte for use in future tall fescue varieties.

Other workers are selecting tall fescue varieties under grazing pressure with impressive results. Persistence under grazing can be dramatically increased with as few as two cycles of selection, even in orchardgrass and endophyte-free tall fescue. One of the sources of the grazing pressure/selection on varieties has been the forage variety trials like those started by Jimmy Henning in 1996 at U.K. Forage breeders are invited back after the study has concluded to retrieve any surviving plants to use in their breeding program. The U.K. Tall Fescue Breeding program is also taking advantage of this opportunity as well.

Other new directions include the continued use of wide hybridization to move more desirable genes into tall fescue from its relatives. A fairly new species has resulted from crosses between meadow fescue and perennial ryegrass, called *Festulolium braunii*. Festuloliums are intermediate between tall fescue and perennial ryegrass in how they grow, but with excellent quality and palatability as good as ryegrass. Some of these varieties will be familiar to you: Duo, Tandem, Spring Green, and Kemal. While not as persistent as tall fescue, these grasses offer excellent seedling vigor and forage quality, without any endophyte. Meadow fescue, as well, may become more common as new varieties are tested and developed for the North American market. Animal acceptance is excellent for meadow fescue, but it is similar in yield potential to Kentucky bluegrass.

The U.K. Tall Fescue Breeding project has over 100 new experimental tall fescue varieties in various stages of testing, so we should be seeing many of these over the next few years, as we sort out the outstanding from the average varieties. We also

have two varieties that have the MaxQ endophytes inserted into them. Table 2, from the 2001 Tall Fescue Variety Report, shows the newest variety released by the Kentucky Agricultural Experiment Station. KYFA9304 was approved for release on September 10, 2004. We hope to get this variety out to Oregon for seed increase, so Kentucky producers will be able to grow this new endophyte-free tall fescue. It traces back to old plantings of Kenhy and Johnstone in Breckinridge County. It has tested well in both the hay and grazing variety trials. It is shorter, denser, and later flowering than either of its parental varieties, or Kentucky 31. It has the same shiny, soft leaves as Kenhy and Johnstone, but is different from them in being more persistent under grazing pressure.

**Table 2. Dry matter yields (tons/acre) of tall fescue and festulolium (FL) varieties sown 23 August 1999 at Lexington, Kentucky. (From the 2001 Tall Fescue Report)**

Variety	Total 2000	Maturity May 10, 2001	2001 Harvests					Total 2001	2-yr Total
			May 11	Jun 21	Aug 2	Sep 4	Oct 18		
<b>Commercial Varieties - Available for Farm Use</b>									
Atlas	10.30	59.75	2.97	1.49	0.86	1.56	0.62	7.49	17.80*
Select	10.03	56.00	3.14	1.50	0.80	1.69	0.41	7.54	17.58*
Duo (FL)	11.04	41.75	2.56	1.70	0.36	1.27	0.38	6.27	17.30*
KY 31+ <sup>1</sup>	9.60	48.00	2.48	1.84	0.73	1.66	0.63	7.33	16.93*
Fuego	9.33	44.25	2.29	1.99	0.71	1.58	0.61	7.18	16.51*
Seine	8.93	51.25	2.49	1.97	0.65	1.68	0.78	7.57	16.51*
Maximize	8.88	54.00	2.40	1.63	0.72	1.84	0.56	7.15	16.04*
DLF-B	8.86	57.75	2.51	1.79	0.72	1.63	0.50	7.15	16.01*
BAR 9 TMPO	9.15	49.75	2.34	1.63	0.57	1.72	0.48	6.74	15.89*
Johnstone	8.89	51.50	2.65	1.78	0.56	1.53	0.37	6.89	15.78
<b>Experimental Varieties - Not Available for Farm Use</b>									
<b>KYFA 9304</b>	<b>10.39</b>	<b>52.75</b>	<b>2.94</b>	<b>1.64</b>	<b>0.83</b>	<b>1.74</b>	<b>0.62</b>	<b>7.77</b>	<b>18.16*</b>
BAR-FA-BTR7	10.75	56.75	3.00	1.28	0.94	1.54	0.60	7.35	18.11*
Jesup 584	10.11	56.00	2.76	1.59	0.93	1.74	0.53	7.55	17.67*
BAR-FA-BTR6	10.24	46.00	2.51	1.67	0.78	1.56	0.80	7.32	17.57*
Ampac pp7	10.41	61.50	2.91	1.45	0.86	1.17	0.35	6.74	17.15*
TF 9202	10.03	54.50	2.63	1.66	0.75	1.57	0.49	7.10	17.13*
GA 7CLONE-542	9.70	59.50	2.78	1.39	0.90	1.79	0.42	7.27	16.98*
GA 5-584	9.49	56.50	2.55	1.51	0.92	1.57	0.46	7.01	16.50*
Ampac-pp3	10.10	49.00	3.29	1.51	0.77	0.56	0.17	6.29	16.39*
Jesup 542	9.29	56.00	2.48	1.74	0.76	1.68	0.40	7.07	16.36*
KYTF 2	9.10	46.75	2.48	2.09	0.58	1.55	0.46	7.17	16.27*
Ampac pp8	9.78	50.25	3.00	1.39	0.80	0.87	0.27	6.32	16.10*
KY 31-	8.09	54.00	2.77	1.60	0.75	1.56	0.63	7.31	15.40
GA 153E-542	8.33	56.50	2.02	2.02	0.73	1.57	0.50	6.83	15.16
KYFA 9301	8.40	52.50	2.51	1.25	0.66	1.42	0.43	6.28	14.68
GA156L-542	7.64	48.00	1.95	2.10	0.44	1.67	0.48	6.64	14.28
Mean	9.50	52.71	2.63	1.66	0.73	1.53	0.50	7.05	16.55
CV, %	15.85	6.91	17.04	25.57	31.32	13.68	26.60	6.35	10.15
LSD, 0.05	2.12	5.13	0.63	0.60	0.32	0.29	0.19	0.63	2.36

\* Not significantly different from the highest value in the column, based on the 0.05 LSD.

<sup>1</sup> "+" indicates variety is endophyte infected, "-" indicates variety is endophyte free.