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2010 Tall Fescue and Bromegrass Report

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Introduction

Tall fescue (*Festuca arundinacea*) is a productive, well-adapted, persistent, soil-conserving, cool-season grass that is grown on approximately 5.5 million acres in Kentucky. This grass, used for both hay and pasture, is the forage base of most of Kentucky's livestock enterprises, particularly beef cattle.

Table 1. Temperature and rainfall at Lexington, Kentucky in 2007, 2008, 2009, and 2010.

	2007				2008				2009				2010[2]			
	Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	37	+6	2.93	+0.07	32	+2	3.91	+1.05	28	-3	2.45	-0.41	29	-2	2.40	-0.46
FEB	27	-8	1.83	-1.38	36	+1	6.11	+2.90	38	+3	2.86	-0.35	29	-6	1.38	-1.83
MAR	52	+8	1.97	-2.43	44	+1	6.51	+1.91	48	+4	2.19	-2.21	47	+3	1.05	-3.35
APR	53	-2	3.87	-0.01	55	0	5.89	+2.01	55	0	4.48	+0.60	59	+4	2.74	-1.14
MAY	68	+4	1.45	-3.02	62	-2	4.33	+0.14	64	0	5.05	+0.58	67	+3	7.84	+3.37
JUN	74	+2	1.77	-1.89	74	+2	3.59	-0.07	74	+2	5.41	-1.75	76	+4	4.61	+0.95
JUL	74	-2	6.90	+1.90	76	0	3.41	-1.59	71	-5	5.89	+0.89	78	+2	5.49	+0.49
AUG	80	+5	2.56	-1.37	75	0	2.18	-1.75	73	-2	5.38	+1.45	78	+3	1.54	-2.39
SEP	72	+4	1.15	-2.05	72	+4	1.42	-1.78	68	0	5.37	+2.17	71	+3	1.14	-2.06
OCT	63	+6	5.28	+2.71	57	0	1.53	-1.04	54	-3	4.83	+2.26	59	+2	1.22	-1.35
NOV	46	+1	2.86	-0.53	43	-2	2.53	-0.86	49	+4	0.94	-2.45				
DEC	40	+4	5.29	+1.31	35	-1	6.03	+2.05	36	0	3.86	-0.12				
Total			37.86	-6.69			47.24	+2.69			48.71	+4.16			29.41	-7.77

[1] DEP is departure from the long-term average.
[2] 2010 data is for 10 months through October.

Much of the tall fescue in Kentucky is infected with an internal fungus (endophyte) that produces ergot alkaloids and results in decreased weight gains in growing ruminants and lower pregnancy rates in breeding stock, especially in hot weather. Varieties are now available that are free of this fungal endophyte or infected with a nontoxic endophyte. Varieties in the latter group are also referred to as "novel" or "friendly" endophyte varieties, because their endophyte improves stand survival without creating animal production problems.

Smooth bromegrass (*Bromus inermis* Leyss) is a perennial pasture and hay grass imported from Europe. It has creeping underground stems or rootstocks from which the leafy stems arise. Smooth bromegrass is very palatable to all classes of livestock, from emergence to the heading stage. Meadow bromegrass (*Bromus biebersteinii* Roem. & Schult) is a native of southeastern Europe and the adjacent Near East. It resembles smooth bromegrass but has only short rhizomes or none at all. Meadow bromegrass is densely tufted and has a similar growth habit to tall fescue. Hybrid bromegrasses are a cross between smooth and meadow bromegrasses. Alaska bromegrass (*Bromus sitchensis*), also called Sitka bromegrass, is a long-lived perennial bunchgrass that will actively grow at moderate rates during the spring and summer season. It does not spread by rhizomes and is more suited to environments with harsh winters.

Prairie bromegrass (*Bromus wildenowii*) is a tall, cool-season, leafy short-lived, perennial, deep-rooted bunchgrass. It was introduced from South America. Seedheads are produced throughout the growing season, and to maintain productive stands for several years, it is necessary to manage at least one growth cycle each year for seed production and natural reseeding. Some prairie bromegrasses are susceptible to winterkill. Mountain bromegrass (*Bromus marginatus*) is native to North America from Alaska to northern Mexico, where it can be found in many types of habitat. It is a short -lived, perennial, cool-season, sod-forming grass. Leafy growth and a deep, well-branched root system give protection on erodible slopes. It is similar to California bromegrass (*Bromus carinatus*), and some consider them to be synonymous.

All bromegrasses have several advantages over tall fescue, including retaining quality as they mature and better growth during dry weather, but they are generally less well adapted in Kentucky.

This report provides current yield data on tall fescue varieties and similar grass species in trials in Kentucky as well as guidelines for selecting tall fescue varieties. Table 10 shows a summary of all tall fescue varieties tested in Kentucky for the past 10-plus years. The UK Forage Extension web site at <www.uky.edu/Ag/Forage> contains electronic versions of all forage variety testing reports from Kentucky and surrounding states and a large number of other forage publications.

Important Selection Considerations

Local Adaptation and Seasonal Yield. Before purchasing tall fescue seed, make sure that the variety is adapted to Kentucky, as indicated by good performance across years and locations in replicated yield trials such as those presented in this publication. Choose high-yielding persistent varieties and varieties that are productive during the desired season of use.

Tall fescues are often classified as either "Mediterranean" or "Continental" types according to the area from which the parental material for the variety originated. In general, the Mediterranean types (e.g., Cajun and Fawn) are more productive in the fall and winter than the Continental types such as Kentucky 31. Although they mature earlier in the spring, the Mediterranean types become dormant and nonproductive during the summer in Kentucky and are more susceptible than Continental varieties to leaf diseases such as helminthsporium and rhizoctonia. Therefore, Mediterranean varieties are less preferred for use in Kentucky than Continental types. Because Mediterranean varieties mature earlier in the spring, first-cutting yields are generally higher when the two types are harvested at the same time. However, the Continental types produce more in the summer, allowing for extended grazing.

Endophyte Level. Seed with infection levels of less than 5 percent is regarded as endophyte-free. A statement to that effect will be displayed prominently on a green tag attached to the seed bag. If no tag is present, assume the seed is infected with the toxic endophyte. Several varieties, both with and without the endophyte, are adapted for use in Kentucky. With the new "novel endophyte" tall fescues, the seed tag should specify the infection level. Also, seed of these varieties should be handled carefully to preserve this infection, which means keeping seed cool and planting as soon as possible. "Novel endophyte" varieties need a high infection level to improve stand survival.

Seed Quality. Buy premium-quality seed that is high in germination and purity levels and free from weed seed. Buy certified seed of improved varieties. An improved variety is one that has performed well in independent trials. The label also includes the test date (which must be within the previous nine months), the level of germination, and the amount of other crop and weed seed. Order seed well in advance of planting time to assure that it will be available when needed.

Table 2. Temperature and rainfall at Princeton, Kentucky in 2008, 2009 and 2010.

	2008				2009				2010[2]			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	37	+3	2.40	-1.40	33	-1	0.94	-2.86	31	-3	3.06	-0.74
FEB	39	+1	6.76	+2.33	42	+4	3.28	-1.15	33	-5	1.54	-2.89
MAR	48	+1	7.55	+2.61	53	+6	2.89	-2.05	48	+1	3.24	-1.7
APR	58	-1	6.56	+1.76	58	-1	5.35	+0.55	62	3	3.3	-1.54
MAY	65	-2	6.19	+1.23	67	0	6.14	+1.18	69	+2	10.41	+5.45
JUN	78	+3	1.24	-2.61	77	+2	7.97	+4.12	79	4	4.82	0.97
JUL	79	+1	5.12	+0.83	74	-4	7.45	+3.16	80	2	2.73	-1.56
AUG	77	0	0.69	-3.32	75	-2	2.44	-1.60	81	4	2.46	-1.55
SEP	74	+3	0.61	-2.72	71	0	4.61	+1.28	72	1	0.94	-2.39
OCT	60	+1	2.21	-0.84	55	-4	9.08	+6.03	60	+1	0.97	-2.08
NOV	46	-1	2.59	-2.04	52	+5	1.50	-3.13				
DEC	39	0	6.49	+1.95	36	-3	2.73	-2.31				
Total			48.95	-2.18			54.31	+3.22			33.47	-7.99

[1] DEP is departure from the long-term average.
[2] 2010 data is for 10 months through October.

Description of the Tests

Data from four studies are reported. Tall fescue varieties were sown at Lexington (2007 and 2009), and Princeton (2008). The bromegrass trial was sown in Lexington in 2008. The soils at Lexington (Maury), and Princeton (Crider) are well-drained silt loams. They are well suited for tall fescue and bromegrass production.

Seedings were made at the rate of 25 lb/A for tall fescue and 20 lb/A for bromegrass into a prepared seedbed with a disk drill. Plots were 5 by 20 feet in a randomized complete block design with four replications with a harvested plot area of 5 by 15 feet. Nitrogen was topdressed at 60 lb/A of actual N in March, after the first cutting, and again in late summer, for a total of 180 lb/A over the season. The tests were harvested using a sickle-type forage plot harvester to simulate a spring cut hay/summer grazing/fall stockpile management system. The first cutting was harvested at each location when all tall fescue varieties had reached at least the boot stage. Fresh weight samples were taken at each harvest to calculate dry matter production. Management practices for these tests regarding establishment, fertility, weed control, and harvest timing were in accordance with University of Kentucky recommendations.

Results and Discussion

Weather data for Lexington and Princeton are presented in Tables 1 and 2.

Ratings for maturity (see Table 3 for maturity scale), stand, and dry matter yields (tons/A) are reported in Tables 4 through 7. Yields are given by cutting date for 2010 and as total annual production. Stated yields are adjusted for percent weeds, therefore the tonnage given is for crop only. Varieties are listed by total yield in descending order. Experimental varieties are listed separately at the bottom of the tables.

Statistical analyses were performed on all data to determine if the apparent differences are truly due to varietal differences or just to chance. In the tables, varieties that are not significantly different from the top variety in the column for that characteristic are marked with one asterisk (*). To determine if two varieties are truly different, compare the difference between them and the LSD (Least Significant Difference) at the bottom of the column. If the difference is equal to or greater than the LSD, the varieties are truly different when grown under the conditions at the given locations. The Coefficient of Variation (CV) is a measure of the variability of the data and is included for each column of means. Low variability is desirable, and increased variability within a study results in higher CVs and larger LSDs.

Tables 8 and 9 summarize information about distributors, and yield performance across locations for all varieties currently included in tests discussed in this report. Varieties are listed in alphabetical order by species, with the experimental varieties at the bottom. Remember that experimental varieties are not available for farm use; commercial varieties can be purchased from agricultural distributors.

In Tables 8 and 9, an open block indicates that the variety was not in that particular test (labeled at the top of the column); an (x) in the block means that the variety was in the test but yielded significantly less than the top-yielding variety. A single asterisk (*) means that the variety was not significantly different from the top variety based on the 0.05 LSD. It is best to choose a variety that has performed well over several years and locations. Remember to consider the relative spring maturity and the distribution of yield across the growing season when evaluating productivity of tall fescue and bromegrass varieties (Tables 4 through 7).

Table 10 is a summary of yield data from 1999 to 2010 of commercial varieties that have been entered in the Kentucky trials. The data is listed as a percentage of the mean of the commercial varieties entered in each specific trial. In other words, the mean for each trial is 100 percent—varieties with percentages over 100 yielded better than average and varieties with percentages less than 100 yielded lower than average. Direct, statistical comparisons of varieties cannot be made using the Table 10 summary, but these comparisons do help to identify varieties for further consideration. Varieties that have performed better than average over many years and at several locations have very stable performance, while others may have performed very well in wet years or on particular soil types. These details may influence variety choice, and the information can be found in the yearly reports. See footnote in Table 10 to determine which yearly report to refer to.

Summary

Selecting a good variety of tall fescue and bromegrass is an important first step in establishing a productive stand of grass. Proper management, beginning with seedbed preparation and continuing throughout the life of the stand, is necessary for even the highest-yielding variety to produce to its genetic potential.

The following is a list of University of Kentucky Cooperative Extension publications related to tall fescue management available from your county Extension office and are listed in the "Publications" section of the UK Forage web site, www.uky.edu/Ag/Forage:

Table 3. Descriptive scheme for the stages of development in perennial forage grasses.

Code	Description	Remarks
	Leaf development	
11	First leaf unfolded	Applicable to regrowth of established (plants) and to primary growth of seedlings.
12	2 leaves unfolded	Further subdivision by means of leaf development index (see text).
13	3 leaves unfolded	
•	• • • •	
19	9 or more leaves unfolded	
	Sheath elongation	
20	No elongated sheath	Denotes first phase of new spring growth after overwintering. This character is used instead of tillering, which is difficult to record in established stands.
21	1 elongated sheath	
22	2 elongated sheaths	
23	3 elongated sheaths	
•	• • • •	
29	9 or more elongated sheaths	
	Tillering *(alternative to sheath elongation)*	Applicable to primary growth of seedlings or to single-tiller transplants.
21	Main shoot only	
22	Main shoot and 1 tiller	
23	Main shoot and 2 tillers	
24	Main shoot and 3 tillers	
•	• • • •	
29	Main shoot and 9 or more tillers	
	Stem elongation	
31	First node palpable	More precisely an accumulation of nodes. Fertile and sterile tillers distinguishable.
32	Second node palpable	
33	Third node palpable	
34	Fourth node palpable	
35	Fifth node palpable	
37	Flag leaf just visible	
39	Flag leaf ligule/collar just visible	
	Booting	
45	Boot swollen	
	Inflorescence emergence	
50	Upper 1 to 2 cm of inflorescence visible	
52	¼ of inflorescence emerged	
54	½ of inflorescence emerged	
56	¾ of inflorescence emerged	
58	Base of inflorescence just visible	
	Anthesis	Inflorescence-bearing internode is visible. No anthers are visible.
60	Preanthesis	
62	Beginning of anthesis	First anthers appear.
64	Maximum anthesis	Maximum pollen shedding.
66	End of anthesis	No more pollen shedding.
	Seed ripening	
75	Endosperm milky	Inflorescence green.
85	Endosperm soft doughy	No seeds loosening when inflorescence is hit on palm.
87	Endosperm hard doughy	Inflorescence losing chlorophyll; a few seeds loosening when inflorescence hit on palm.
91	Endosperm hard	Inflorescence-bearing internode losing chlorophyll; seeds loosening in quantity when inflorescence hit on palm.
93	Endosperm hard and dry	Final stage of seed development; most seeds shed.

Smith, J. Allan, and Virgil W. Hayes. 1981. pp. 416-418. 14th International Grasslands Conference Proc. 1981. June 14-24, 1981, Lexington, Kentucky.

- AGR-1—*Lime and Fertilizer Recommendations*
- AGR-18—*Grain and Forage Crop Guide for Kentucky*
- AGR-59—*Tall Fescue*
- AGR-64—*Establishing Forage Crops*
- AGR-108—*Tall Fescue in Kentucky*
- AGR-175—*Forage Identification and Use Guide*

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Table 4. Dry matter yields, seedling vigor, maturity, and stand persistence of tall fescue varieties sown September 6, 2007 at Lexington, Kentucky.																			
	Seedling Vigor[1]	Maturity[2]			Percent Stand							Yield (tons/acre)							
		2008	2009	2010	2007	2008		2009		2010		2008	2009	2010				3-year
Variety	Oct 25, 2007	May 12	May 15	May 6	Oct 25	Mar 26	Oct 21	Apr 6	Oct 30	Apr 13	Oct 15	Total	Total	May 6	Jun 22	Aug 12	Total[4]	Total
Commercial Varieties—Available for Farm Use																			
KY31+[3]	3.8	54.5	56.5	49.3	100	100	100	100	100	100	100	2.75	5.76	1.36	1.06	0.39	2.80	11.31*
Jesup MaxQ	2.3	57.0	57.0	54.5	97	99	100	100	100	100	100	2.56	5.73	1.48	1.13	0.38	2.99	11.27*
Select	2.0	56.5	56.8	53.0	97	100	100	100	100	100	99	2.91	5.16	1.43	1.14	0.41	2.98	11.05
BarOptimaPLUS E34	2.8	52.5	56.0	46.3	100	100	100	100	100	100	100	2.61	5.49	1.37	1.13	0.35	2.86	10.97
Noria	3.0	54.5	56.3	49.8	100	100	100	100	100	100	100	2.78	5.23	1.44	1.05	0.36	2.85	10.87
Bronson	3.0	56.5	57.3	54.5	100	100	100	100	100	100	100	2.61	5.01	1.79	1.06	0.30	3.15	10.77
Nanryo	2.8	58.0	58.5	58.0	100	100	100	100	100	100	99	2.55	5.07	1.71	1.05	0.35	3.11	10.74
BarElite	3.0	50.0	55.5	46.8	100	100	100	100	100	100	100	2.78	5.04	1.38	1.21	0.31	2.90	10.71
TF0203G	2.3	56.5	57.5	55.0	100	100	100	100	100	100	99	2.60	4.31	1.55	0.98	0.26	2.78	9.69
Experimental Varieties																			
KYFA 9821/AR584	4.0	55.0	57.0	52.5	100	100	100	100	100	100	100	3.49	6.08	1.54	1.28	0.48	3.30	12.87*
KYFA 9821	3.5	55.5	56.5	53.5	100	100	100	100	100	100	100	3.26	5.76	1.62	1.20	0.44	3.26	12.28*
KYFA 9908	3.0	53.0	55.5	50.0	100	100	100	100	100	100	100	3.32	5.63	1.43	1.37	0.40	3.20	12.15*
KYFA 9301/AR584	4.0	53.5	56.3	53.0	100	100	100	100	100	100	99	3.15	5.99	1.48	1.09	0.41	2.99	12.13*
RAD-ERF52	2.8	57.0	57.0	52.8	100	100	100	100	100	100	98	3.03	5.61	1.59	1.14	0.38	3.12	11.76*
RAD-MRF47	3.5	57.5	57.0	54.5	100	100	100	100	100	100	100	2.99	5.66	1.51	1.00	0.41	2.92	11.57*
KYFA 9905	2.3	54.5	55.5	49.3	99	100	100	100	100	100	98	3.05	5.52	1.27	1.25	0.43	2.95	11.52*
KYFA 9732	3.5	54.0	56.3	51.3	99	100	100	100	100	100	100	3.39	5.10	1.39	1.19	0.42	3.01	11.50*
RAD-MRF51	2.8	55.5	57.5	54.0	100	100	100	100	100	100	100	2.70	5.42	1.64	1.16	0.32	3.12	11.25*
KYFA 0303	3.8	51.5	55.0	49.8	100	100	100	100	100	100	98	2.89	4.98	1.38	1.26	0.48	3.12	10.99
KYFA 9611	3.5	50.0	54.0	45.0	100	100	100	100	100	100	100	2.93	5.09	1.06	1.35	0.42	2.82	10.84
KY31-[3]	3.0	54.5	56.5	53.5	100	100	100	100	100	100	100	2.93	5.10	1.29	1.07	0.40	2.77	10.80
KYFA 0006	2.8	51.0	55.8	46.8	99	100	100	100	100	100	100	2.87	5.15	1.10	1.15	0.48	2.73	10.75
KYFA 9301	3.0	54.0	56.0	52.5	100	100	100	100	100	100	100	2.94	4.91	1.10	1.12	0.44	2.66	10.51
KYFA 0008	1.8	55.0	56.0	53.0	96	99	100	100	100	100	100	2.66	4.91	1.31	1.09	0.37	2.77	10.33
BARFA MT9301	3.0	53.5	56.5	46.3	100	100	100	100	100	100	100	2.43	4.92	1.15	1.24	0.32	2.71	10.06
Mean	3.0	54.4	56.4	51.4	99.3	99.9	99.9	100.0	100.0	100.0	99.5	2.89	5.30	1.42	1.15	0.39	2.95	11.15
CV,%	21.1	2.5	1.6	4.2	1.2	0.6	0.4	0.0	0.0	0.0	1.3	12.20	11.72	15.74	14.35	23.11	12.92	10.84
LSD, 0.05	0.9	1.9	1.3	3.1	1.7	0.8	0.6	0.0	0.0	0.0	1.9	0.50	0.88	0.31	0.23	0.13	0.54	1.70

[1] Vigor score based on scale of 1 to 5, with 5 being the most vigorous seedling growth

[2] Maturity rating scale: 37=flag leaf emergence, 45=boot swollen, 50=beginning of inflorescence emergence, 58=complete emergence of inflorescence, 62=beginning of pollen shed. See Table 3 for complete scale.

[3] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.

[4] Due to very dry weather, there was not enough growth for a late summer or fall harvest.

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

Table 5. Dry matter yields, seedling vigor, maturity, and stand persistence of tall fescue varieties sown September 29, 2008 at Princeton, Kentucky.

Variety	Seedling Vigor[1] Oct 30, 2008	Maturity[2] 2009 May 11	Maturity[2] 2010 May 18	Percent Stand 2008 Oct 30	Percent Stand 2009 Apr 17	Percent Stand 2009 Nov 4	Percent Stand 2010 Mar 18	Percent Stand 2010 Oct 12	Yield (tons/acre) 2009 Total	Yield (tons/acre) 2010 May 18	Yield (tons/acre) 2010 Jun 16	Yield (tons/acre) 2010 Total[4]	2-year Total
Commercial Varieties—Available for Farm Use													
RAD-ERF50	4.3	56.7	66.7	99	99	99	95	90	5.98	2.01	0.54	2.55	8.53*
Select	3.5	56.0	68.0	98	99	99	95	90	5.45	2.06	0.38	2.44	7.89*
Cowgirl	3.8	56.5	68.0	94	93	95	92	89	5.14	2.24	0.42	2.66	7.80*
HyMark	3.3	55.5	67.5	98	100	100	95	91	5.19	2.03	0.48	2.51	7.70*
KY31+[3]	3.8	54.5	68.0	100	100	100	95	97	5.25	1.96	0.46	2.42	7.67*
Atlas Select	2.8	56.0	67.0	98	100	103	98	94	4.95	2.00	0.43	2.43	7.38*
Kentucky 32	4.0	54.5	68.0	100	100	98	96	93	5.04	1.73	0.49	2.22	7.26
Jesup MaxQ	3.7	56.0	66.7	100	100	97	90	85	4.91	1.64	0.42	2.06	6.97
Aprilia	3.8	55.0	67.5	95	98	97	88	81	4.76	1.72	0.45	2.16	6.92
Experimental Varieties													
TF0201	3.5	56.0	67.3	99	100	100	97	86	5.92	2.31	0.47	2.77	8.69*
KYFA9821/AR584	4.3	56.7	65.3	98	98	99	94	92	5.67	2.22	0.47	2.69	8.36*
GA186	5.0	56.0	66.5	99	100	98	95	94	5.69	1.97	0.48	2.45	8.14*
KYFA9301/AR584	4.5	54.5	67.0	99	99	98	97	91	5.64	2.06	0.42	2.48	8.11*
KY31-[3]	3.7	55.3	66.7	98	100	99	97	94	5.36	1.87	0.43	2.30	7.66*
GA 593R	4.5	54.0	68.0	98	100	99	98	97	4.34	2.31	0.46	2.77	7.12
Mean	3.9	55.6	67.2	98.0	98.8	98.7	94.8	90.5	5.31	2.00	0.45	2.45	7.76
CV,%	20.0	2.4	2.0	3.7	4.2	3.5	5.0	5.9	11.11	19.08	13.10	15.48	11.21
LSD, 0.05	1.2	2.3	2.1	5.6	6.4	5.3	7.3	8.3	0.91	0.59	0.09	0.59	1.34

[1] Vigor score based on scale of 1 to 5, with 5 being the most vigorous seedling growth
[2] Maturity rating scale: 37=flag leaf emergence, 45=boot swollen, 50=beginning of inflorescence emergence, 58=complete emergence of inflorescence, 62=beginning of pollen shed. See Table 3 for complete scale.
[3] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.
[4] Due to very dry weather, there was not enough growth for a late summer or fall harvest.
* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 6. Dry matter yields,seedling vigor, maturity, and stand persistence of tall fescue varieties sown September 11, 2009 at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 13, 2009	Maturity[2] 2010 May 6	Percent Stand 2009 Oct 13	Percent Stand 2010 Apr 13	Percent Stand 2010 Oct 15	Yield (tons/acre) 2010 May 6	Yield (tons/acre) 2010 Jun 22	Yield (tons/acre) 2010 Aug 10	Yield (tons/acre) 2010 Total[4]
Commercial Varieties—Available for Farm Use									
JesupMaxQ	3.8	57.0	98	100	99	2.03	1.08	0.47	3.58*
KY31+[3]	3.1	53.5	100	100	100	1.66	1.28	0.50	3.44*
Select	3.1	56.5	98	100	96	1.97	1.00	0.42	3.38*
Bronson	3.1	57.5	98	100	99	1.71	1.08	0.46	3.25*
Goliath	2.8	56.5	94	99	97	1.65	1.11	0.44	3.20
5CAN	1.0	57.0	53	93	97	1.29	0.77	0.31	2.37
Experimental Varieties									
AgR1502	3.4	54.5	93	100	100	1.70	1.28	0.54	3.52*
RAD-ERF58	2.5	58.0	93	98	92	1.99	1.08	0.40	3.47*
KYFA0701	4.0	57.0	100	100	98	1.73	1.21	0.53	3.47*
KY31-[3]	3.5	56.5	100	100	100	1.82	1.12	0.49	3.43*
RAD-MRF59	3.3	56.5	91	100	98	1.70	1.10	0.56	3.36*
AgR1521	3.0	55.0	96	100	99	1.74	1.10	0.46	3.30*
RAD-ERF57	3.0	56.5	96	98	96	1.71	0.99	0.47	3.17
GA-29	3.5	57.0	97	100	97	1.82	0.93	0.38	3.13
TF0202	3.0	53.0	94	100	92	1.42	1.11	0.47	3.00
Mean	3.1	56.1	93	99	97	1.73	1.08	0.46	3.27
CV,%	23.9	2.3	6	2	4	8.10	8.65	19.86	7.20
LSD, 0.05	1.0	1.8	8	3	6	0.20	0.13	0.13	0.34

[1] Vigor score based on scale of 1 to 5, with 5 being the most vigorous seedling growth
[2] Maturity rating scale: 37=flag leaf emergence, 45=boot swollen, 50=beginning of inflorescence emergence, 58=complete emergence of inflorescence, 62=beginning of pollen shed. See Table 3 for complete scale.
[3] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.
[4] Due to very dry weather, there was not enough growth for a late summer or fall harvest.
* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 7. Dry matter yields, seedling vigor, maturity and stand persistence of bromegrass varieties sown September 18, 2008 at Lexington, Kentucky.

Variety	Type	Seedling Vigor[1] Oct 22, 2008	Maturity[2] 2009 May 19	Maturity[2] 2010 May 6	Percent Stand 2008 Oct 22	Percent Stand 2009 Apr 10	Percent Stand 2009 Oct 30	Percent Stand 2010 Apr 13	Percent Stand 2010 Oct 15	Yield (tons/acre) 2009 Total	Yield (tons/acre) 2010 May 6	Yield (tons/acre) 2010 Jun 23	Yield (tons/acre) 2010 Aug 11	Yield (tons/acre) 2010 Total[3]	2-year Total
Commercial Varieties—Available for Farm Use															
MacBeth	meadow	3.8	60.0	55.0	96	98	98	98	98	4.37	1.38	1.12	0.56	3.05	7.42*
Bigfoot	meadow	2.5	59.0	56.0	94	96	92	95	95	3.20	1.43	1.10	0.49	3.02	6.22
Olga	smooth	3.0	58.0	50.3	95	94	95	94	96	3.10	1.44	0.94	0.42	2.80	5.91
Canerbury	mountain	4.3	57.5	51.0	95	99	90	89	14	3.33	1.40	0.92	0.10	2.43	5.76
Hakari	Alaska	2.0	55.5	45.0	89	90	95	94	26	3.71	1.01	0.83	0.14	1.98	5.70
Doina	smooth	2.8	58.0	53.5	95	94	96	96	97	3.02	1.34	0.94	0.39	2.67	5.68
Peak	smooth	2.0	57.0	54.0	78	53	64	74	88	1.85	1.22	1.09	0.41	2.73	4.57
Persister	prairie	3.0	59.0	56.0	84	13	39	36	43	1.54	1.21	0.91	0.38	2.50	4.04
RAD-BIX29	smooth	1.8	56.0	49.3	41	25	50	55	93	1.45	1.14	0.98	0.30	2.42	3.87
Experimental Varieties															
KYBI0101	smooth	1.5	58.0	53.5	75	44	56	78	89	2.43	1.43	0.80	0.35	2.58	5.01
GRL	smooth	3.8	57.5	51.0	96	93	94	95	99	2.25	1.28	0.90	0.40	2.59	4.83
RADBIX28	hybrid	1.0	57.5	55.5	15	16	38	33	58	1.11	1.07	0.71	0.39	2.18	3.29
VJ1	prairie	4.5	56.0	55.0	91	13	8	5	9	0.58	0.43	0.42	0.33	1.18	1.76
AGRBW105	prairie	2.8	–	57.0	80	8	9	8	18	0.34	0.45	0.47	0.21	1.12	1.46
RADCAV215	–	–	–	–	4	1	0	1	1	0.06	0.13	0.28	0.05	0.46	0.52
Mean		2.8	57.7	52.9	75.1	55.5	61.5	63.2	61.4	2.15	1.09	0.83	0.33	2.25	4.40
CV,%		21.8	2.3	3.2	12.2	20.1	21.4	16.8	15.9	28.11	18.36	18.93	33.32	15.94	17.36
LSD, 0.05		0.9	2.3	2.5	13.0	15.9	18.8	15.1	14.0	0.86	0.29	0.22	0.16	0.51	1.09

[1] Vigor score based on scale of 1 to 5, with 5 being the most vigorous seedling growth
[2] Maturity rating scale: 37=flag leaf emergence, 45=boot swollen, 50=beginning of inflorescence emergence, 58=complete emergence of inflorescence, 62=beginning of pollen shed. See Table 3 for complete scale.
[3] Due to very dry weather, there was not enough growth for a late summer or fall harvest.
* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 8. Performance of tall fescue varieties across years and locations.

Variety	Proprietor/KY Distributor	Lexington				Princeton	
		2007[1]			2009	2008	
		08[2]	09	10	10	09	10
Commercial Varieties—Available for Farm Use							
Aprilia	ProSeeds Marketing					x[3]	x
Atlas Select	ProSeeds Marketing					x	*
BarElite	Barenbrug USA	x	x	*			
BarOptima PLUS E34	Barenbrug USA	x	*	*			
Bronson	Ampac Seed	x	x	*	*		
Cowgirl	Rose-Agri Seeds					*	*
Goliath	Ampac Seed				x		
HyMark	Fraser Seeds					*	*
Kentucky 32	Oregro Seeds					x	*
KY31+[4]	Ky Agric. Exp. Station/ Public	x	*	*	*	*	*
Jesup MaxQ	Pennington Seed	x	*	*	*	x	x
Nanryo	Japanese Grassland Forage Seed/USDA-ARS, El Reno, OK	x	x	*			
Noria	ProSeeds Marketing	x	*	*			
RAD-ERF 50	Radix Research, Inc.					*	*
Select	FFR/Southern States	x	x	*	*	*	*
TF 0203G	Seed Research of Oregon	x	x	*			
5CAN	Brett Young				x		
Experimental Varieties							
AgR1502	AgResearch				*		
Agr1521	AgResearch				*		
BARFA MT9301	Barenbrug USA	x	x	x			
GA-29	Univ of Georgia				x		
GA 186	Univ of Georgia					*	*
GA 593R	Univ of Georgia					x	*
KY31-[4]	KY Agr. Exp. Sta.	x	x	*	*	*	*
KYFA 0006	KY Agr. Exp. Sta.	x	x	x			
KYFA 0008	KY Agr. Exp. Sta.	x	x	*			
KYFA 0303	KY Agr. Exp. Sta.	x	x	*			
KYFA 0701	KY Agr. Exp. Sta				*		
KYFA9301	KY Agr. Exp. Sta.	x	x	x			
KYFA9301/AR584	KY Agr. Exp. Sta.	*	*	*		*	*
KYFA9611	KY Agric. Exp. Station	x	x	*			
KYFA 9732	KY Agric. Exp. Station	*	x	*			
KYFA9821	KY Agric. Exp. Station	*	*	*			
KYFA9821/AR584	KY Agric. Exp. Station	*	*	*		*	*
KYFA9905	KY Agric. Exp. Station	*	*	*			
KYFA9908	KY Agric. Exp. Statiion	*	*	*			
RAD ERF52	Radix Research, Inc.	*	*	*			
RAD MRF47	Radix Research, Inc.	x	*	*			
RAD MRF51	Radix Research, Inc.	x	*	*			
RAD ERF57	Radix Research, Inc.				x		
RAD-ERF58	Radix Research, Inc.				*		
RAD-MRF59	Radix Research, Inc.				*		
TF 0201	Winfield Solutions/FFR					*	*
TF 0202	FFR/Southern States				x		

[1] Establishment year
[2] Harvest year.
[3] x in the box indicates the variety was in the test but yielded significantly less than the top-yielding variety in the test. Open boxes indicate the variety was not in the test.
[4] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.
* Not significantly different from the highest-yielding variety in the test.

Table 9. Performance of bromegrass varieties at Lexington.

Variety	Type	Proprietor/KY Distributor	2008[1]	
			2009[2]	2010
Commercial Varieties—Available for Farm Use				
Bigfoot	hybrid	Grassland Oregon	x[3]	*
Canterbury	mountain	Barenbrug	x	x
Doina	smooth	Barenbrug	x	*
Hakari	Alaska	Barenbrug	*	x
MacBeth	meadow	Cisco Seeds	*	*
Olga	smooth	Barenbrug	x	*
Peak	smooth	Allied Seed	x	*
Persister	prairie	–	x	x
RAD-BI29	smooth	Columbia Seeds	x	x
Experimental Varieties				
AGRBW 105	prairie	Ag Research	x	x
GRL	smooth	USDA-ARS/ Barenbrug	x	*
KYBI 0101	smooth	KY Agric. Exp. Station	x	*
RAD-BIx28	hybrid	Ampac Seed	x	x
RAD CAV 215	pasture	Radix Research	x	x
VJ 1	prairie	Ag Research	x	x

[1] Establishment year.
[2] Harvest year.
[3] x in the box indicates the variety was in the test but yielded significantly less than the top-yielding variety in the test. Open boxes indicate the variety was not in the test.
* Not significantly different from the highest-yielding variety in the test.

Table 10. Summary of Kentucky Tall Fescue Yield Trials 1999-2010 (yield shown as a percentage of the mean of the commercial varieties in the trial).

		Lexington					Princeton						Quicksand				
		1999[1,2]	2001	2003	2005	2007	1998	2000	2002	2004	2006	2008	1999	2001	2003	2005	Mean[3]
Variety	Proprietor	2-yr[4]	3-yr	2-yr	3-yr	3-yr	2-yr	2-yr	3-yr	3-yr	3-yr	2-yr	2-yr	2-yr	2-yr	4-yr	(#trials)
Atlas	ProSeeds Marketing	107											89				98(2)
Atlas Select	ProSeeds Marketing											98					–
Aprilia	ProSeeds Marketing											91					–
BarElite	Barenbrug USA					99											–
Bariane	Barenbrug USA			87	103											95	95(3)
Barolex	Barenbrug USA				94												–
BarOptima PLUS E34	Barenbrug USA					101											–
BAR 9 TMPO	Barenbrug USA	96											97				97(2)
Bronson	Ampac Seed				91	100										102	98(3)
Bull	Improved Forages			98	106			102	103						97		101(5)
Carmine	DLF International		99											97			98(2)
Cowgirl	Rose-AgriSeeds											103					–
DLF-B	DLF International	96															–
Enhance	Allied Seed									107							–
Festival	Pickseed West		107							102				107			105(3)
Fuego	Advanta Seeds	99															–
Hoedown	DLF International		104											106			105(2)
HyMark	Fraser Seeds											102					–
Jesup EF	Pennington Seed						106										–
Jesup MaxQ	Pennington Seed				102	104			98			92			100	102	99(6)
Johnstone	ProSeeds Marketing	95	108										95				99(3)
KENHY	KY Agr. Exp. Sta.									89							–
Kentucky 32	Oregro Seeds											96					–
Kokanee	Ampac Seed		89					86									88(2)
KY31+[5]	KY Agr. Exp. Sta.	102	118	113	112	105	122	108	104		106	101	107	124	98	110	109(14)
Maximize	Turf-Seed	96	95										105	93			97(4)
Nanryo	Jap. Grassland ForageSeed/USDA-ARS, El Reno, OK					99											–
Noria	ProSeeds Marketing					100											–
RAD-ERF50	Radix Research, Inc.											113					–
Resolute	Ampac Seed		90											65			78(2)
Savory	DLF International										93						–
Seine	Advanta Seeds	99								96							98(2)
Select	FFR/Sou. St.	106	106	94	103	102	105	105	95	105	103	104	107	112	102	91	103(15)
Stockman	Seed Research of OR			109						101	99				105		104(4)
TF0203G	Seed Research of OR					90											–
TF33	Barenbrug USA						70										–
Tuscany	Forage Genetics		112														–
Tuscany II	Seed Research of OR										100						–
Vulcan	International Seeds						97										–

[1] Year trial was established.
[2] Use this summary table as a guide in making variety decisions but refer to specific yearly reports to determine statistical differences in forage yield between varieties. To find actual yields, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in 1999 was harvested two years, so the final report would be "2001 Tall Fescue Report" archived in the KY Forage web site at <www.uky.edu/Ag/Forage>.
[3] Mean only presented when respective variety was included in two or more trials.
[4] Number of years of data.
[5] "+" indicates variety is endophyte infected.

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