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2009 Tall Fescue and Brome 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.

Much of the tall fescue in Kentucky is infected with an internal fungus (endophyte) that 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 brome (*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 brome is very palatable to all classes of livestock from emergence to the heading stage.

Meadow brome (*Bromus biebersteinii* Roem. & Schult) is a native of southeastern Europe and the adjacent near East. It resembles smooth brome but has only short or no rhizomes. Meadow brome is densely tufted and has a similar growth habit to tall fescue. Hybrid bromes are a cross between smooth and meadow bromes.

Alaska brome (*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 brome (*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 bromes are susceptible to winterkill.

Mountain brome (*Bromus marginatus*) is native to North America from Alaska to northern Mexico, where it can be found in many types of habitats. 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 brome** (*Bromus carinatus*); some consider them to be synonymous.

All brome grasses 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 12 shows a summary of all tall fescue varieties tested in Kentucky for the past ten 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 "European" 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 European 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 European varieties to leaf diseases such as helminthsporium and rhizoctonia. Therefore, Mediterranean varieties are less preferred for use in Kentucky than European 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 European 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. With "novel endophyte" varieties you want them to have 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 1. Temperature and rainfall at Lexington, Kentucky in 2006, 2007, 2008 and 2009.

	2006				2007				2008				2009[2]			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	42	+11	4.77	+1.91	37	+6	2.93	+0.07	33	+2	4.60	+1.74	28	-3	2.45	-0.41
FEB	36	+1	2.13	-1.08	27	-8	1.83	-1.38	36	+1	5.37	+2.16	38	+3	2.86	-0.35
MAR	44	0	3.05	-1.35	52	+8	1.97	-2.43	45	+1	6.28	+1.88	48	+4	2.19	-2.21
APR	59	+4	3.52	-0.36	53	-2	3.87	-0.01	55	0	5.72	+1.84	55	0	4.48	+0.60
MAY	62	-2	2.99	-1.48	68	+4	1.45	-3.02	62	-2	4.88	+0.41	64	0	5.05	+0.58
JUN	70	-2	1.82	-1.84	74	+2	1.77	-1.89	74	+2	3.30	-0.36	74	+2	5.41	+1.75
JUL	76	0	5.13	+0.13	74	-2	6.90	+1.90	76	0	2.54	-2.46	71	-5	5.89	+0.89
AUG	76	+1	3.23	-0.70	80	+5	2.56	-1.37	75	0	1.08	-2.85	73	-2	5.38	+1.45
SEP	64	-4	9.27	+6.07	72	+4	1.15	-2.05	72	+4	1.21	-1.99	68	0	5.37	+2.17
OCT	54	-3	4.88	+2.31	63	+6	5.28	+2.71	57	0	1.35	-1.22	54	-3	4.83	+2.26
NOV	47	+2	1.78	-1.61	46	+1	2.86	-0.53	43	-2	2.28	-1.11	49	+4	0.94	-2.45
DEC	42	+6	2.45	-1.53	40	+4	5.29	+1.31	35	-1	4.76	+0.78				
Total			45.02	+0.47			37.86	-6.69			43.37	-1.18			44.85	+4.28

[1] DEP is departure from the long-term average.
[2] 2009 data is for eleven months through November.

Description of the Tests

Data from six studies are reported. Tall fescue varieties were sown at Lexington (2007), Quicksand (2005), and Princeton (2006 and 2008). The brome trials were sown in Lexington in 2006 and 2008. The soils at Lexington (Maury), Quicksand (Pope), and Princeton (Crider) are well-drained silt loams. All are well suited for tall fescue and brome production.

Seedings were made at the rate of 25 lb/A for tall fescue and 20 lb/A for brome 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, Quicksand, and Princeton are presented in Tables 1 through 3.

Ratings for maturity, stand, and dry matter yields (tons/A) are reported in Tables 4 through 9. Yields are given by cutting date 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

Table 2. Temperature and rainfall at Princeton, Kentucky in 2006, 2007, 2008 and 2009.

	2006				2007				2008				2009[2]			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP	°F	DEP1	IN	DEP	°F	DEP	IN	DEP
JAN	46	+12	5.38	+1.58	40	+6	4.89	+1.09	37	+3	2.40	-1.40	33	-1	0.94	-2.86
FEB	38	0	2.66	-1.77	34	-4	2.99	-1.44	39	+1	6.76	+2.33	42	+4	3.28	-1.15
MAR	51	+4	4.22	-0.72	58	+11	1.85	-3.09	48	+1	7.55	+2.61	53	+6	2.89	-2.05
APR	63	+4	4.02	-0.78	58	-1	3.95	-0.85	58	-1	6.56	+1.76	58	-1	5.35	+0.55
MAY	66	-1	5.42	+0.46	71	+4	2.29	-2.67	65	-2	6.19	+1.23	67	0	6.14	+1.18
JUN	75	0	3.39	-0.46	76	+1	4.32	+0.47	78	+3	1.24	-2.61	77	+2	7.97	+4.12
JUL	79	+1	3.79	-0.50	77	-1	1.77	-2.52	79	+1	5.12	+0.83	74	-4	7.45	+3.16
AUG	80	+3	2.58	-1.43	85	+8	0.87	-3.14	77	0	0.69	-3.32	75	-2	2.44	-1.60
SEP	67	-4	9.80	+6.47	75	+4	3.52	+0.19	74	+3	0.61	-2.72	71	0	4.61	+1.28
OCT	57	-2	4.5	+1.45	65	+6	5.84	+2.79	60	+1	2.21	-0.84	55	-4	9.08	+6.03
NOV	49	+2	4.31	-0.32	49	+2	2.31	-2.32	46	-1	2.59	-2.04	52	+5	1.50	-3.13
DEC	44	+5	4.76	-0.28	42	+3	10.83	+5.79	39	0	6.49	+1.95				
Total			54.82	+3.69			47.92	-3.21			48.95	-2.18			51.62	+5.33

[1] DEP is departure from the long-term average.
[2] 2009 data is for eleven months through November.

Table 3. Temperature and rainfall at Quicksand, Kentucky in 2006, 2007, 2008 and 2009.

	2006				2007				2008				2009[2]			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP1	IN	DEP
JAN	44	+13	4.48	+1.19	38	+7	2.70	-0.59	34	+3	2.07	-1.22	30	-1	4.81	+1.52
FEB	37	+4	1.56	-2.04	31	-2	0.61	-2.99	38	+5	3.52	-0.08	40	+7	1.23	+2.37
MAR	47	+6	1.74	-2.60	54	+13	2.70	-1.64	46	+5	3.62	-0.72	49	+8	3.61	-0.73
APR	60	+7	2.95	-1.15	55	+2	1.71	-2.39	56	+3	3.99	-0.11	56	+3	3.34	-0.76
MAY	63	+1	3.45	-1.03	69	+7	1.82	-2.66	63	+1	3.69	-1.79	66	+4	8.81	+4.33
JUN	71	+1	3.00	-0.82	75	+5	1.95	-1.87	75	+5	3.96	+0.14	72	+2	4.84	+1.02
JUL	77	+3	3.85	-1.40	76	+2	4.00	-1.25	76	+2	5.88	+0.63	71	-3	4.02	-1.23
AUG	78	+5	3.55	-.046	82	+9	2.41	-1.60	74	+1	1.16	-2.85	73	0	1.86	-2.15
SEP	65	-1	5.56	+2.04	73	+7	2.49	-1.03	72	+6	0.64	-2.88	69	+3	4.08	+0.56
OCT	55	+1	6.00	+3.09	63	+9	3.80	+0.89	58	+4	1.28	-1.63	54	0	3.97	+1.06
NOV	48	+6	2.32	-1.56	47	+5	1.80	-2.08	44	+2	2.71	-1.17	48	+6	0.96	-1.67
DEC	43	+10	1.55	-2.59	42	+8	4.44	+0.30	37	+4	4.81	+0.67				
Total			40.07	-7.27			30.43	-16.91			36.33	-11.01			41.53	-1.67

[1] DEP is departure from the long-term average.
[2] 2009 data is for eleven months through November.

increased variability within a study results in higher CVs and larger LSDs.

Tables 10 and 11 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 10 and 11, 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 brome varieties (Tables 4 through 9).

Table 12 is a summary of yield data from 1999 to 2009 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 summary Table 12, 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 12 to determine which yearly report to refer to.

Table 4. Dry matter yields and stand persistence of tall fescue varieties sown September 30, 2005 at Quicksand, Kentucky.

	Percent Stand								Yield (tons/A)							
	2006		2007		2008		2009		2006	2007	2008	2009				4-year
Variety	Apr 18	Nov 3	Apr 12	Oct 17	Apr 10	Nov 5	Apr 8	Oct 16	Total	Total	Total	May 21	Jul 7	Nov 6	Total	Total
Commercial Varieties—Available for Farm Use																
KY31+[1]	100	97	97	97	96	99	99	99	7.38	4.18	4.17	2.52	1.60	1.38	5.50	21.24*
Bronson	100	98	98	93	95	97	98	98	7.50	3.50	3.59	2.57	1.47	1.18	5.21	19.80*
Jesup MaxQ	98	98	99	95	94	98	99	98	7.29	3.88	3.55	2.46	1.34	1.16	4.97	19.69*
Bariane	80	83	85	84	89	91	92	93	6.62	3.87	3.07	2.18	1.55	1.02	4.75	18.31
Select	100	100	100	100	98	100	100	98	6.68	3.09	3.01	2.22	1.47	1.14	4.83	17.61
Experimental Varieties																
KYFA 9821/AR584	100	99	98	95	93	95	96	97	8.28	4.40	3.80	2.84	1.65	1.12	5.61	22.09*
KYFA 9821	100	99	98	98	93	96	96	98	7.84	4.54	3.86	2.26	1.71	1.32	5.29	21.54*
KYFA 9301/AR542	98	98	99	99	99	100	98	98	7.83	4.22	4.03	2.64	1.64	1.17	5.44	21.52*
KY31-[1]	100	98	99	99	95	98	100	99	7.51	4.12	3.39	2.58	1.64	1.31	5.52	20.55*
KYFA 9301	100	96	97	97	97	99	98	97	8.10	3.67	3.33	2.30	1.81	1.29	5.41	20.50*
KYFA 9301/AR584	100	97	97	95	96	98	98	98	7.14	3.87	3.94	2.40	1.59	1.23	5.22	20.18*
KYFA 9821/AR542	99	99	97	97	96	98	99	99	6.18	3.61	3.72	2.40	1.35	1.00	4.74	18.25
Mean	97.8	96.7	96.8	95.6	94.8	97.2	97.5	97.6	7.36	3.91	3.62	2.44	1.57	1.19	5.21	20.11
CV,%	4.9	3.4	2.3	3.5	3.9	1.7	2.6	2.6	11.20	15.00	23.90	15.29	20.27	14.75	13.59	9.81
LSD,0.05	7.0	4.7	3.1	4.8	5.3	2.4	3.6	3.7	1.18	0.85	1.25	0.54	0.46	0.25	1.02	2.84

[1] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.
* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Summary

Selecting a good variety of tall fescue and brome 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 on the web at www.uky.edu/Ag/Forage:

- 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 5. Dry matter yields, seedling vigor, maturity and stand persistence of tall fescue varieties sown September 6, 2006 at Princeton, Kentucky.

	Seedling Vigor[1]	Maturity[2]			Percent Stand						Yield (tons/A)							
	2006	2007	2008	2009	2006	2007		2008		2009	2007	2008	2009					3-year
Variety	Oct 30	May 8	May 21	May 11	Oct 30	Apr 3	Oct 18	Apr 17	Oct 31	Apr 17	Nov 4	Total	Total	May 11	Jun 22	Aug 21	Nov 4	Total	Total
Commercial Varieties—Available for Farm Use																			
KY31+[3]	4.0	55.5	58.0	54.0	100	100	100	100	100	100	98	3.26	2.96	1.90	1.41	0.46	0.62	4.39	10.61*
Select	3.5	56.8	60.0	56.5	100	100	100	100	100	100	96	3.42	2.96	1.81	1.20	0.53	0.43	3.98	10.36*
Tuscany II	4.0	56.0	60.0	55.5	100	100	98	100	98	98	89	3.41	2.91	1.68	1.11	0.44	0.44	3.68	9.99*
Stockman	4.3	56.0	59.5	56.0	100	100	100	100	100	98	95	3.30	2.85	1.75	1.18	0.36	0.46	3.75	9.91
Savory	3.3	55.0	60.0	56.0	100	100	99	100	100	100	97	2.96	2.81	1.58	1.08	0.39	0.48	3.53	9.30
Experimental Varieties																			
IS FTF 31	3.8	56.3	60.0	57.5	100	99	97	100	100	100	96	3.20	3.19	2.01	1.20	0.60	0.57	4.39	10.77*
GO-TF	3.5	56.0	60.0	56.5	99	99	99	100	99	99	94	3.37	3.30	1.85	1.15	0.53	0.38	3.92	10.59*
TF4	3.8	55.8	60.0	56.5	100	75	100	100	100	100	91	3.31	2.97	1.98	1.18	0.59	0.49	4.24	10.52*
KYFA 9821/AR584	4.3	55.5	60.0	55.0	100	100	98	99	99	99	95	3.21	3.21	1.95	1.11	0.61	0.39	4.06	10.48*
KYFA 9801	4.8	56.0	60.0	56.0	100	100	99	100	99	100	96	3.41	3.08	1.72	1.12	0.57	0.56	3.97	10.46*
KYFA 9821/AR542	4.3	55.5	60.0	56.0	100	100	100	100	99	99	96	3.49	3.11	1.72	1.12	0.55	0.44	3.83	10.43*
KYFA 9821EF	4.3	56.3	60.0	56.0	100	100	98	100	100	99	91	3.11	3.22	1.83	1.21	0.60	0.40	4.03	10.36*
KYFA 9304	4.5	55.3	59.5	55.5	99	100	98	100	100	100	84	3.38	2.94	1.92	1.11	0.61	0.36	3.99	10.31*
RAD-ERF48	3.8	57.0	60.0	57.5	100	100	99	100	100	100	95	3.06	3.12	1.88	1.13	0.58	0.52	4.11	10.29*
KYFA 9301EF	3.8	56.0	60.0	56.0	100	100	100	100	99	100	97	3.30	2.97	1.74	1.14	0.58	0.51	3.97	10.25*
KYFA 9301/AR584	4.3	56.3	60.0	55.0	100	100	98	99	98	98	94	3.18	3.03	1.74	1.21	0.58	0.50	4.02	10.23*
KYFA 9301/AR542	4.3	55.0	59.3	55.5	100	100	100	100	100	100	94	3.03	3.07	1.80	1.15	0.57	0.43	3.95	10.05*
KY31-[3]	4.9	55.5	59.5	56.5	100	100	98	100	100	100	84	3.24	2.90	1.92	1.24	0.35	0.36	3.87	10.02*
KYFA 9905	4.8	55.0	60.0	55.0	100	100	99	100	100	99	79	3.47	2.87	1.61	1.26	0.35	0.38	3.60	9.94*
KYFA 9402	2.8	56.8	60.0	56.5	98	99	100	99	98	98	95	3.12	2.80	1.77	1.09	0.50	0.45	3.81	9.73
KYFA 9808	5.0	56.3	60.0	55.5	100	100	98	100	100	100	93	3.28	2.84	1.53	1.20	0.46	0.38	3.57	9.68
KYTF2	2.8	55.0	59.5	54.0	97	99	98	99	99	99	91	2.98	2.90	1.79	1.08	0.48	0.41	3.76	9.64
KYFA 9908	3.3	55.0	58.3	52.0	98	100	98	99	98	98	85	3.26	2.81	1.55	1.08	0.50	0.35	3.48	9.55
Verdant	2.8	56.0	60.0	56.0	97	98	97	100	100	100	85	3.01	2.86	1.72	1.19	0.31	0.36	3.58	9.46
KYFA 9401	2.5	55.5	60.0	56.0	97	98	99	99	100	100	94	2.81	2.78	1.80	1.13	0.48	0.44	3.84	9.43
Mean	3.9	55.8	59.7	55.7	99.2	98.6	98.6	99.6	99.3	99.3	92.0	3.22	2.98	1.78	1.16	0.50	0.44	3.89	10.09
CV,%	15.1	1.6	1.3	1.9	1.5	10.2	1.5	0.8	1.3	1.7	8.6	1.09	10.07	8.90	9.11	30.75	23.27	7.59	5.80
LSD,0.05	0.8	1.3	1.1	1.5	2.0	14.1	2.1	1.2	1.8	2.4	11.1	0.32	0.42	0.22	0.15	0.22	0.15	0.42	0.83

[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.

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

* 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 6, 2007 at Lexington, Kentucky.

	Seedling Vigor[1]	Maturity[2]		Percent Stand					Yield (tons/A)						
	2007	2008	2009	2007	2008		2009		2008	2009					2-year
Variety	Oct 25	May 12	May 15	Oct 25	Mar 26	Oct 21	Apr 6	Oct30	Total	May 15	Jun 24	Aug 11	Oct 20	Total	Total
Commercial Varieties—Available for Farm Use															
KY31+[3]	3.8	54.5	56.5	100	100	100	100	100	2.75	2.78	1.10	1.12	0.76	5.76	8.51*
Jesup MaxQ	2.3	57.0	57.0	97	99	100	100	100	2.56	2.73	1.02	1.15	0.83	5.73	8.29
BarOptima PLUS E34	2.8	52.5	56.0	100	100	100	100	100	2.61	2.53	1.05	1.10	0.81	5.49	8.11
Select	2.0	56.5	56.8	97	100	100	100	100	2.91	2.42	0.79	1.19	0.76	5.16	8.07
Noria	3.0	54.5	56.3	100	100	100	100	100	2.78	2.33	0.94	0.99	0.98	5.23	8.02
BarElite	3.0	50.0	55.5	100	100	100	100	100	2.78	2.25	1.03	0.79	0.97	5.04	7.81
Nanryo	2.8	58.0	58.5	100	100	100	100	100	2.55	2.01	1.17	1.03	0.85	5.07	7.63
Bronson	3.0	56.5	57.3	100	100	100	100	100	2.61	2.25	1.04	0.90	0.81	5.01	7.62
TF0203G	2.3	56.5	57.5	100	100	100	100	100	2.60	2.00	0.80	0.85	0.65	4.31	6.90
Experimental Varieties															
KYFA 9821/AR584	4.0	55.0	57.0	100	100	100	100	100	3.49	2.80	0.98	1.38	0.91	6.08	9.57*
KYFA 9301/AR584	4.0	53.5	56.3	100	100	100	100	100	3.15	2.93	0.97	1.24	0.85	5.99	9.14*
KYFA 9821	3.5	55.5	56.5	100	100	100	100	100	3.26	2.85	1.04	1.09	0.78	5.76	9.02*
KYFA 9908	3.0	53.0	55.5	100	100	100	100	100	3.32	2.53	1.15	1.12	0.83	5.63	8.95*
RAD-MRF 47	3.5	57.5	57.0	100	100	100	100	100	2.99	2.48	1.05	1.26	0.87	5.66	8.65*
RAD-ERF 52	2.8	57.0	57.0	100	100	100	100	100	3.03	2.33	1.07	1.19	1.02	5.61	8.64*
KYFA 9905	2.3	54.5	55.5	99	100	100	100	100	3.05	2.44	0.96	1.35	0.77	5.52	8.57*
KYFA 9732	3.5	54.0	56.3	99	100	100	100	100	3.39	2.23	0.92	1.10	0.84	5.10	8.49*
RAD-MRF 51	2.8	55.5	57.5	100	100	100	100	100	2.70	2.57	1.07	0.93	0.85	5.42	8.13
KY31-[3]	3.0	54.5	56.5	100	100	100	100	100	2.93	2.34	0.94	1.05	0.77	5.10	8.03
KYFA 9611	3.5	50.0	54.0	100	100	100	100	100	2.93	2.27	1.14	0.90	0.78	5.09	8.02
KYFA 0006	2.8	51.0	55.8	99	100	100	100	100	2.87	2.49	1.00	0.97	0.69	5.15	8.01
KYFA 0303	3.8	51.5	55.0	100	100	100	100	100	2.89	2.01	1.17	1.01	0.79	4.98	7.87
KYFA 9301	3.0	54.0	56.0	100	100	100	100	100	2.94	2.15	0.90	1.07	0.78	4.91	7.85
KYFA 0008	1.8	55.0	56.0	96	99	100	100	100	2.66	2.34	0.86	1.00	0.71	4.91	7.57
BARFA MT9301	3.0	53.5	56.5	100	100	100	100	100	2.43	2.15	1.00	0.91	0.86	4.92	7.35
Mean	3.0	54.4	56.4	99.3	99.9	99.9	100.0	100.0	2.89	2.41	1.01	1.07	0.82	5.30	8.19
CV,%	21.1	2.5	1.6	1.2	0.6	0.4	0.0	0.0	12.20	13.00	14.16	21.37	16.90	11.72	10.82
LSD,0.05	0.9	1.9	1.3	1.7	0.8	0.6	0.0	0.0	0.50	0.44	0.20	0.32	0.20	0.88	1.25

[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.
[3] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.
* 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 tall fescue varieties sown September 29, 2008 at Princeton, Kentucky.

	Seedling Vigor[1]	Maturity[2]	Percent Stand			Yield (tons/A)				
	2008	2009	2008	2009		2009				
Variety	Oct 30	May 11	Oct 30	Apr 17	Nov 4	May 11	Jun 22	Aug 21	Nov 4	Total
Commercial Varieties—Available for Farm Use										
RAD-ERF 50	4.3	56.7	99	99	99	2.15	1.61	1.23	0.99	5.98*
Select	3.5	56.0	98	99	99	2.29	1.31	1.07	0.79	5.45*
KY31+[3]	3.8	54.5	100	100	100	1.96	1.34	1.11	0.84	5.25*
HyMark	3.3	55.5	98	100	100	2.09	1.30	0.99	0.82	5.19*
Cowgirl	3.8	56.5	94	93	95	1.87	1.42	1.07	0.78	5.14*
Kentucky 32	4.0	54.5	100	100	98	2.08	1.38	0.91	0.66	5.04
Atlas Select	2.8	56.0	98	100	103	1.88	1.27	1.00	0.80	4.95
Jesup MaxQ	3.7	56.0	100	100	97	2.32	1.06	0.87	0.67	4.91
Aprilia	3.8	55.0	95	98	97	2.04	1.24	0.90	0.58	4.76
Experimental Varieties										
TF 0201	3.5	56.0	99	100	100	2.34	1.58	1.12	0.88	5.92*
GA 186	5.0	56.0	99	100	98	2.34	1.32	1.15	0.88	5.69*
KYFA 9821/AR584	4.3	56.7	98	98	99	2.40	1.49	0.97	0.81	5.67*
KYFA 9301/AR584	4.5	54.5	99	99	98	2.30	1.43	1.07	0.83	5.64*
KY31-[3]	3.7	55.3	98	100	99	2.01	1.55	1.08	0.71	5.36*
GA 593R	4.5	54.0	98	100	99	0.96	1.21	1.20	0.97	4.34
Mean	3.9	55.6	98.0	98.8	98.7	2.10	1.37	1.04	0.79	5.31
CV,%	20.0	2.4	3.7	4.2	3.5	15.37	13.37	18.98	17.98	11.11
LSD,0.05	1.2	2.3	5.6	6.4	5.3	0.50	0.28	0.31	0.22	0.91

[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.
[3] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.
* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 8. Dry matter yields, seedling vigor, maturity and stand persistence of brome grass varieties sown September 18, 2008 at Lexington, Kentucky.

		Seedling Vigor[1]	Maturity[2]	Percent Stand			Yield (tons/A)				
		2008	2009	2008	2009		2009				
Variety	Type	Oct 22	May 19	Oct 22	Apr 10	Oct 30	May 19	Jun 29	Aug 12	Oct 21	Total
Commercial Varieties—Available for Farm Use											
MacBeth	meadow	3.8	60.0	96	98	98	2.36	0.67	0.59	0.74	4.37*
Hakari	Alaska	2.0	55.5	89	90	95	1.87	0.73	0.59	0.52	3.71*
Canterbury	mountain	4.3	57.5	95	99	90	1.54	0.80	0.60	0.39	3.33
Bigfoot	meadow	2.5	59.0	94	96	92	1.39	0.69	0.53	0.59	3.20
Olga	smooth	3.0	58.0	95	94	95	1.16	0.85	0.46	0.63	3.10
Doina	smooth	2.8	58.0	95	94	96	1.54	0.58	0.42	0.47	3.02
Peak	smooth	2.0	57.0	78	53	64	0.42	0.49	0.52	0.41	1.85
Persister	prairie	3.0	59.0	84	13	39	0.24	0.42	0.42	0.46	1.54
RAD-BIX29	smooth	1.8	56.0	41	25	50	0.33	0.35	0.42	0.35	1.45
Experimental Varieties											
KYBI 0101	smooth	1.5	58.0	75	44	56	1.24	0.41	0.44	0.33	2.43
GRL	smooth	3.8	57.5	96	93	94	0.91	0.57	0.41	0.35	2.25
RAD-BIX28	hybrid	1.0	57.5	15	16	38	0.38	0.20	0.19	0.34	1.11
VJ 1	prairie	4.5	56.0	91	13	8	0.04	0.11	0.16	0.27	0.58
AGRBW 105	prairie	2.8	–	80	8	9	0.01	0.04	0.12	0.17	0.34
RAD CAV 215	–	–	–	4	1	0	0.00	0.00	0.01	0.06	0.06
Mean		2.8	61.5	75.1	55.5	61.5	0.90	0.46	0.39	0.41	2.15
CV,%		21.8	21.4	12.2	20.1	21.4	50.28	29.78	30.21	28.66	28.11
LSD,0.05		0.9	18.8	13.0	15.9	18.8	0.64	0.20	0.17	0.17	0.86

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

Table 9. Dry matter yields, maturity and stand persistence of brome grass varieties sown March 27, 2006 at Lexington, Kentucky.

		Maturity[1]			Percent Stand							Yield (tons/A)								
		2007	2008	2009	2006	2007		2008		2009		2006	2007	2008						4-year
Variety	Type	May 11	May 6	May 19	Oct 17	Mar 26	Oct 12	Apr 4	Oct 21	Apr 7	Oct 30	Total	Total	Total	May 19	Jun 30	Aug 14	Oct 22	Total	Total
Commercial Varieties—Available for Farm Use																				
Fleet	meadow	60.0	56.0	60.0	88	88	84	88	85	86	83	3.70	4.43	3.37	2.70	0.96	0.49	0.22	4.37	15.86*
Bigfoot	hybrid	60.0	55.0	60.0	81	91	81	90	88	88	79	3.66	4.28	3.38	2.44	0.95	0.57	0.30	4.27	15.58*
RAD-BI29	smooth	52.0	45.0	58.0	81	86	71	83	61	80	80	3.37	3.36	2.94	2.75	0.85	0.33	0.18	4.11	13.78
AC Knowles	hybrid	58.0	53.5	59.5	75	80	70	71	58	58	33	3.00	3.22	2.81	2.10	0.61	0.40	0.08	3.19	12.23
Experimental Varieties																				
KYBI 0101	smooth	55.0	51.5	58.5	66	86	59	86	38	84	71	3.22	3.30	3.22	2.94	1.05	0.34	0.18	4.51	14.26
RAD-BIX28	hybrid	57.0	53.5	59.0	80	86	74	84	68	83	83	3.28	3.42	3.04	2.29	0.81	0.38	0.24	3.73	13.47
Mean		57.0	52.4	59.2	78.5	86.1	73.1	83.5	66.0	79.6	71.3	3.37	3.67	3.13	2.54	0.87	0.42	0.20	4.03	14.20
CV,%		1.7	1.2	1.3	9.7	6.1	9.7	7.4	20.8	9.0	7.2	11.46	7.82	8.92	10.10	24.75	18.85	33.56	8.06	5.20
LSD,0.05		1.5	0.9	1.2	11.5	8.0	10.7	9.3	20.7	10.8	7.8	0.58	0.43	0.42	0.39	0.32	0.12	0.10	0.49	1.12

[1] 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.
* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 10. Performance of tall fescue varieties across years and locations.

		Lexington		Quicksand				Princeton			
		2007[1]		2005				2006			2008
Variety	**Proprietor/KY Distributor**	**08[2]**	**09**	**06**	**07**	**08**	**09**	**07**	**08**	**09**	**09**
Commercial Varieties—Available for Farm Use											
Aprilia	ProSeeds Marketing										x[3]
Atlas Select	ProSeeds Marketing										x
BarElite	Barenbrug USA	x	x								
Bariane	Barenbrug USA			x	*	*	*				
BarOptima PLUS E34	Barenbrug USA	x	*								
Bronson	Ampac Seed	x	x	*	x	*	*				
Cowgirl	Rose-Agri Seeds										*
HyMark	Fraser Seeds										*
Kentucky 32	Oregro Seeds							*	*	*	x
KY31+[4]	Ky Agric. Exp. Station/Public	x	*	*	*	*	*	*	*	*	*
Jesup MaxQ	Pennington Seed	x	*	*	*	*	*				x
Nanryo	Japanese Grassland Forage Seed/ USDA-ARS, El Reno, OK	x	x								
Noria	ProSeeds Marketing	x	*								
RAD-ERF 50	Radix Research, Inc.										*
Savory	DLF International Seed							x	x	x	
Select	FFR/Southern States	x	x	x	x	*	*	*	*	*	*
Stockman	Seed Research of Oregon							*	*	x	
TF 0203G	Seed Research of Oregon	x	x								
Tuscany II	Seed Research of Oregon							*	*	x	
Experimental Varieties											
BARFA MT9301	Barenbrug USA	x	x								
GA 186	Univ of Georgia										*
GA 593R	Univ of Georgia										x
GO TF	Grassland Oregon							*	*	x	
IS-FTF31	DLF International Seed							*	*	*	
KY31-[4]	KY Agric. Exp. Station	x	x	*	*	*	*	*	*	x	*
KYFA 0006	KY Agric. Exp. Station	x	x								
KYFA 0008	KY Agric. Exp. Station	x	x								
KYFA 0303	KY Agric. Exp. Station	x	x								
KYFA9301	KY Agric. Exp. Station	x	x	*	x	*	*	*	*	*	
KYFA9301/AR542	KY Agric. Exp. Station			*	*	*	*	x	*	x	
KYFA9301/AR584	KY Agric. Exp. Station	*	*	*	*	*	*	*	*	*	*
KYFA9304	KY Agric. Exp. Station							*	*	*	
KYFA9401	KY Agric. Exp. Statiion							x	x	x	
KYFA9402	KY Agric. Exp. Statiion							x	x	x	
KYFA9611	KY Agric. Exp. Station	x	x								
KYFA 9732	KY Agric. Exp. Station	*	x								
KYFA9801	KY Agric. Exp. Statiion							*	*	*	
KYFA9808	KY Agric. Exp. Statiion							*	x	x	
KYFA9821	KY Agric. Exp. Station	*	*	*	*	*	*	x	*	*	
KYFA9821/AR542	KY Agric. Exp. Station			x	x	*	*	*	*	x	
KYFA9821/AR584	KY Agric. Exp. Station	*	*	*	*	*	*	*	*	*	*
KYFA9905	KY Agric. Exp. Station	*	*					*	x	x	
KYFA9908	KY Agric. Exp. Statiion	*	*					*	x	x	
KYTF2	KY Agric. Exp. Station							x	*	x	
RAD ERF48	Radix Research, Inc.							x	*	*	
RAD ERF52	Radix Research, Inc.	*	*								
RAD MRF47	Radix Research, Inc.	x	*								
RAD MRF51	Radix Research, Inc.	x	*								
TF 0201	Winfield Solutions/FFR										*
Verdant	American Grass Seed Producers							x	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.
[4] "+" indicates variety is endophyte infected; "-" indicates variety is endophyte free.
* Not significantly different from the highest yielding variety in the test.

Table 11. Performance of brome grass varieties at Lexington.

Variety	Type	Proprietor/KY Distributor	2006[1]				2008
			2006[2]	2007	2008	2009	2009
Commercial Varieties—Available for Farm Use							
AC Knowles	hybrid	–	x[3]	x	x	x	
Bigfoot	hybrid	Grassland Oregon	*	*	*	*	x
Canterbury	mountain	Barenbrug					x
Doina	smooth	Barenbrug					x
Fleet	meadow	–	*	*	*	*	
Hakari	Alaska	Barenbrug					*
MacBeth	meadow	Cisco Seeds					*
Olga	smooth	Barenbrug					x
Peak	smooth	Allied Seed					x
Persister	prairie	–					x
RAD-BI29	smooth	Columbia Seeds	*	x	x	*	x
Experimental Varieties							
AGRBW 105	prairie	Ag Research					x
GRL	smooth	USDA-ARS/Barenbrug					x
KYBI 0101	smooth	KY Agric. Exp. Station	*	x	*	*	x
RAD-BIx28	hybrid	Ampac Seed	*	x	*	x	x
RAD CAV 215	pasture	Radix Research					x
VJ 1	prairie	Ag Research					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 12. Summary of Kentucky Tall Fescue Yield Trials 1999-2009 (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	1999	2001	2003	2005	Mean[3]
Variety	Proprietor	2-yr[4]	3-yr	2-yr	3-yr	2-yr	2-yr	2-yr	3-yr	3-yr	3-yr	2-yr	2-yr	2-yr	4-yr	(#trials)
Atlas	Proseeds	107										89				98(2)
BarElite	Barenbrug					99										–
Bariane	Barenbrug			87	103										95	95(3)
Barolex	Barenbrug				94											–
BarOptima PLUS E34	Barenbrug					103										–
BAR 9 TMPO	Barenbrug	96										97				97(2)
Bronson	Ampac Seed				91	97									102	97(3)
Bull	Improved Forages			98	106			102	103					97		101(5)
Carmine	DLF International		99										97			98(2)
DLF-B	DLF International	96														–
Enhance	Allied Seed									111						–
Festival	Pickseed West		107							106			107			107(3)
Fuego	Advanta Seeds	99														–
Hoedown	DLF International		104										106			105(2)
Jesup EF	Pennington Seed						106									–
Jesup MaxQ	Pennington Seed				102	105			98					100	102	101(5)
Johnstone	Proseeds	95	108									95				99(3)
KENHY	KY Agric Exp Sta.									92						–
Kokanee	Ampac Seed		89					86								88(2)
KY31+	KY Agric Exp Sta.	102	118	113	112	109	122	108	104	77	106	107	124	98	110	108(14)
Maximize	Turf-Seed	96	95									105	93			97(4)
Nanryo	Jap. Grassland Forage Seed/USDA-ARS, El Reno, OK					97										–
Noria	ProSeeds Marketing					102										–
Resolute	Ampac Seed		90										65			78(2)
Savory	DLF International										93					–
Seine	Advanta Seeds	99								100						99(2)
Select	FFR/Sou. St.	106	106	94	103	102	105	105	95	109	103	107	112	102	91	103(14)
Stockman	Seed Research of OR			109						104	99			105		104(4)
TF0203G	Seed Research of OR					88										–
TF33	Barenbrug						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 2 years, so the final report would be "2001 Tall Fescue Report" archived in the KY Forage website 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.

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