

2013 Tall Fescue and Bromegrass Report

G.L. Olson, S.R. Smith, T.D. Phillips, G.D. Lacefield, and D.C. Ditsch, Plant and Soil Sciences

Introduction

Tall fescue (*Festuca arundinacea*) is a productive, well-adapted, persistent, soil-conserving, cool-season grass grown on approximately 5½ 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 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 native of Europe. It has creeping underground stems or rootstocks from which the leafy stems arise. Smooth bromegrass is 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.

Table 1. Temperature and rainfall at Lexington, Kentucky, in 2011, 2012, and 2013.

	2011				2012				2013 ²			
	Temp		Rainfall		Temp		Rainfall		Temp		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	29	-2	2.10	-0.76	38	+7	4.80	+1.94	38	+7	4.50	+1.64
FEB	39	+4	6.34	+3.13	40	+5	5.39	+2.18	36	+1	1.78	-1.43
MAR	47	+3	4.76	+0.36	56	+12	5.64	+1.24	39	-5	5.47	+1.07
APR	58	+3	12.36	+8.48	56	+1	3.26	-0.62	55	0	4.46	+0.58
MAY	64	0	6.72	+2.25	69	+5	4.02	-0.45	65	+1	5.23	+0.76
JUN	74	+2	2.61	-1.05	73	+1	2.42	-1.24	72	0	7.32	+3.66
JUL	80	+4	6.29	1.29	81	+5	2.50	-2.50	72	-4	9.33	+4.33
AUG	75	0	2.89	-1.04	75	0	1.68	-2.25	72	-3	3.68	-0.25
SEP	66	-2	5.52	+2.32	67	-1	6.40	+3.20	67	-1	2.21	-0.99
OCT	55	-2	4.10	+1.53	55	-2	2.00	-0.57	55	-2	8.10	+5.53
NOV	50	+5	9.53	+6.14	43	-2	1.81	-0.65				
DEC	41	+5	5.58	+1.60	42	+6	9.57	+4.94				
Total			68.80	+24.25			49.49	+4.94			52.08	+14.90

¹ DEP is departure from the long-term average.

² 2013 data is for the ten months through October.

Table 2. Temperature and rainfall at Princeton, Kentucky, in 2010, 2011, and 2012.

	2011				2012				2013 ²			
	Temp		Rainfall		Temp		Rainfall		Temp		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	32	-2	2.35	-1.45	40	+6	3.01	-0.79	38	+4	6.31	+2.51
FEB	40	+2	5.71	+1.28	54	+6	1.73	-2.70	39	+1	3.09	-1.34
MAR	50	+3	5.54	+0.60	60	+13	3.27	-1.67	42	-5	4.34	-0.60
APR	61	+2	16.15	+11.35	60	+1	0.62	-4.18	57	-2	5.72	+0.92
MAY	66	-1	7.22	+2.26	71	+4	1.36	-3.60	66	-1	4.26	-0.70
JUN	77	+2	4.60	+0.75	74	-5	2.38	-1.47	74	-1	7.55	+3.70
JUL	81	+3	2.98	-1.31	83	+5	1.40	-2.89	75	-3	4.44	+0.15
AUG	77	0	3.95	-0.06	77	0	4.27	+0.26	75	-2	5.59	+1.58
SEP	68	-3	3.86	+0.53	69	-2	5.45	+1.82	71	0	5.37	+2.04
OCT	57	-2	1.35	-1.70	57	-2	2.94	-0.11	59	0	4.04	+0.99
NOV	51	+4	9.12	+4.49	45	-2	2.11	-2.52				
DEC	42	+3	6.13	+1.09	45	+6	4.77	-0.27				
Total			68.96	+17.83			33.01	-18.12			50.71	+9.25

¹ DEP is departure from the long-term average.

² 2013 data is for the ten months through October.

Table 3. Temperature and rainfall at Quicksand, Kentucky, in 2011, 2012, and 2013.

	2011				2012				2013 ²			
	Temp		Rainfall		Temp		Rainfall		Temp		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	32	+1	2.63	-0.66	40	+9	4.60	+1.31	38	+7	5.61	+2.37
FEB	42	+9	3.94	+0.34	42	+9	3.49	-0.16	38	+5	1.81	-1.79
MAR	48	+7	4.66	+0.32	57	+16	3.34	-1.40	40	-1	4.55	+0.21
APR	60	+7	11.65	+7.55	56	+3	2.02	-2.08	56	+3	3.55	-0.55
MAY	65	+3	6.49	+2.01	69	+7	4.29	-0.19	64	+2	3.98	-0.50
JUN	73	+3	3.73	-0.09	71	+1	0.82	-3.00	73	+3	6.44	+2.62
JUL	78	+4	4.92	-0.33	78	+4	5.20	+0.45	75	+1	5.24	-0.01
AUG	75	+2	4.09	+0.08	74	+1	3.82	-0.19	73	0	5.85	+1.84
SEP	67	+1	3.52	0	67	+1	10.05	+6.53	68	+2	1.71	-1.81
OCT	55	+1	4.16	+1.25	55	+1	4.21	+1.30	58	+4	2.07	-0.84
NOV	50	+8	5.15	+1.27	44	+2	0.77	-3.11				
DEC	42	+9	4.25	+0.11	44	+11	5.71	+1.57				
Total			59.19	+11.85			48.77	+1.43			40.81	+1.49

¹ DEP is departure from the long-term average.

² 2013 data is for the ten months through October.

Prairie bromegrass (*Bromus willdenowii*) 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. Tables 15 and 17 show a summary of all tall fescue and bromegrass 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 non-productive during the summer in Kentucky and are more susceptible than Continental varieties to leaf diseases such as helminthosporium 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

Table 4. 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)		
21	Main shoot only	Applicable to primary growth of seedlings or to single tiller transplants.
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		
60	Preanthesis	Inflorescence-bearing internode is visible. No anthers are visible.
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. p. 416-418. 14th International Grasslands Conference Proc. 1981. June 14-24, 1981, Lexington, Kentucky.

Table 5. Dry matter yields, seedling vigor, maturity and stand persistence of tall fescue varieties sown September 6, 2010, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 26, 2010	Maturity ²			Percent Stand							Yield (tons/acre)						3-year Total	
		2011	2012	2013	2010	2011		2012		2013		2011	2012	2013					
		May 9	Apr 25	May 22	Oct 26	Mar 16	Nov 7	Mar 21	Oct 23	Mar 22	Oct 21	Total	Total	May 23	Jun 25	Aug 5	Oct 21		Total
KY31- ³	3.3	56.0	46.8	60.0	97	97	98	99	98	97	97	4.74	2.49	2.66	0.85	1.02	1.65	6.17	13.40*
KYFA0701	3.3	56.0	49.3	60.0	98	99	100	100	100	99	99	5.05	2.44	2.47	0.73	0.98	1.56	5.74	13.23*
KYFA9732/E5	3.4	54.5	48.5	59.5	100	100	99	100	100	99	98	5.11	2.61	2.60	0.66	0.85	1.35	5.46	13.18*
KYFA9908/E1	3.0	52.0	45.0	58.0	100	97	97	97	97	97	97	5.22	2.30	2.37	0.65	0.86	1.53	5.41	12.92*
KYFA9908/E4	2.6	54.5	45.0	57.0	99	97	96	97	96	96	96	4.99	2.22	2.53	0.77	0.95	1.41	5.66	12.87*
KYFA9913EF	2.8	56.0	50.3	61.0	99	99	99	98	98	98	98	4.88	2.11	2.43	0.78	0.99	1.63	5.83	12.82*
KYFA0601	2.9	56.0	50.8	61.5	98	99	99	99	99	99	99	4.89	2.42	2.37	0.69	0.99	1.44	5.49	12.79*
AgR1521	2.1	55.5	52.0	62.0	94	95	97	97	98	98	98	4.32	2.49	2.93	0.67	0.99	1.36	5.95	12.75*
KYFA9908/E3	2.8	53.5	46.8	57.5	98	96	99	96	96	95	96	5.14	2.25	2.54	0.73	0.77	1.29	5.33	12.72*
KYFA9908/E5	2.3	54.0	48.0	60.0	98	88	94	97	96	96	96	4.60	2.50	2.73	0.71	0.73	1.42	5.60	12.70*
AgR1502	2.3	56.0	53.0	61.0	97	95	97	97	98	98	98	4.61	2.44	2.47	0.71	0.85	1.56	5.59	12.64*
KYFA9913/E5	3.0	54.5	46.3	59.0	97	95	97	97	98	97	98	4.67	2.38	2.49	0.66	0.97	1.47	5.59	12.64*
KYFA9732EF	2.5	54.5	49.3	59.5	99	95	96	95	96	95	95	5.35	1.98	2.42	0.65	0.78	1.36	5.21	12.54*
KYFA9732/E1	3.6	54.0	45.0	58.5	100	98	99	99	98	97	96	4.97	2.18	2.30	0.60	0.89	1.55	5.34	12.48*
KYFA9905/E5	3.0	54.0	46.3	59.0	100	99	100	100	99	99	99	4.62	2.27	2.42	0.64	0.92	1.55	5.53	12.42*
KYFA9905EF	3.0	55.0	45.0	59.5	97	97	97	98	98	98	98	4.76	2.14	2.25	0.65	0.87	1.50	5.27	12.18*
KY31+ ³	2.9	54.0	45.0	61.0	98	95	96	98	99	99	98	4.48	2.28	2.20	0.76	0.90	1.43	5.29	12.05*
KYFA9905/E2	3.9	54.5	46.8	58.0	98	100	100	100	99	99	99	4.81	2.17	2.37	0.54	0.81	1.34	5.06	12.04*
KYFA9732/E2	3.0	54.0	48.0	58.0	99	97	98	98	98	96	97	4.87	2.01	2.14	0.63	0.86	1.43	5.07	11.94*
KYFA9913/E1	3.3	53.5	48.0	60.0	97	95	97	97	96	96	97	4.68	2.05	2.43	0.58	0.87	1.28	5.15	11.89*
KYFA9905/E1	2.9	53.5	46.3	59.0	98	99	100	100	99	99	100	4.61	1.96	2.30	0.61	0.93	1.44	5.28	11.84*
KYFA9908EF	3.5	54.0	48.0	59.0	99	97	96	96	97	96	97	4.76	2.12	2.02	0.60	0.91	1.38	4.90	11.79
KYFA9913/E2	2.4	54.0	51.5	59.5	97	96	97	97	98	98	98	4.73	2.24	2.30	0.50	0.77	1.21	4.78	11.75
KYFA0901	2.9	56.0	53.5	61.5	98	95	96	96	96	95	95	4.39	1.98	2.48	0.65	0.71	1.29	5.13	11.50
Mean	2.9	54.6	48.1	59.5	98	96	97	98	98	97	97	4.80	2.25	2.43	0.67	0.88	1.44	5.41	12.46
CV,%	25.2	1.8	5.5	3.0	2	5	3	2	2	2	2	10.63	10.68	14.71	20.77	16.55	16.03	12.16	8.99
LSD,0.05	1.0	1.4	3.7	2.5	3	7	4	3	3	3	3	0.72	0.34	0.50	0.20	0.21	0.32	0.93	1.58

¹ Vigor score based on a 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 4 for complete scale.

³ KY31- is the variety KY31 from which the toxic endophyte has been removed. KY31+ contains the toxic endophyte. AgR1502 and AgR1521 contain a non-toxic endophyte. E1 through E5 are non-toxic endophytes. The other varieties do not contain an endophyte.

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

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.

Description of the Tests

Data from nine studies are reported. Tall fescue varieties were sown at Lexington (2010, 2011 and 2012), Princeton (2010 and 2012) and Quicksand (2010). The bromegrass trials were sown in Lexington in 2010 and 2012. The soils at Lexington (Maury), Princeton (Crider) and Quicksand (Nolin) are well-drained silt loams. They are well suited for tall fescue and bromegrass production.

Seedlings were made at the rate of 25 pounds per acre for tall fescue and 20 pounds per acre for bromegrass into a prepared seedbed with a disk drill. Plots were 5 feet by 20 feet in a randomized

complete block design with four replications with a harvested plot area of 5 feet by 15 feet. Nitrogen was topdressed at 60 pounds per acre of actual nitrogen in March, after the first cutting, and again in late summer, for a total of 180 pounds per acre 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 when all tall fescue and bromegrass 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.

Table 6. Dry matter yields, seedling vigor, maturity and stand persistence of tall fescue varieties sown September 16, 2010, at Princeton, Kentucky.

Variety	Seedling Vigor ¹ Nov 19, 2010	Maturity ²		Percent Stand							Yield (tons/acre)							
		2012	2013	2010	2011		2012		2013		2011	2012	2013				3-year Total	
		Apr 18	May 14	Nov 19	Apr 8	Oct 24	Mar 14	Oct 29	Mar 19	Oct 25	Total	Total	May 14	Jun 19	Aug 14	Oct 25		Total
Commercial Varieties—Available for Farm Use																		
KY31+ ³	4.3	46.0	54.5	100	100	100	100	100	98	98	2.60	2.26	2.05	1.60	0.82	1.59	6.05	10.92*
Jesup EF	3.5	55.0	56.5	100	100	100	100	98	98	97	2.42	2.13	1.99	1.47	0.73	1.30	5.49	10.04*
Cajun II	3.5	54.0	57.0	100	100	100	100	100	100	100	2.34	2.21	1.94	1.43	0.76	1.15	5.27	9.82
Bronson	3.6	52.5	56.0	100	100	100	100	100	98	98	2.03	2.11	2.13	1.38	0.88	1.26	5.64	9.78
Cowgirl	3.9	52.5	57.0	100	100	100	100	100	99	99	2.15	1.97	1.98	1.46	0.79	1.38	5.62	9.74
JesupMaxQ	3.4	52.5	57.0	100	100	100	100	100	99	99	2.26	2.05	1.90	1.41	0.81	1.27	5.39	9.70
Goliath	3.3	52.0	56.3	100	100	100	100	99	98	99	2.18	2.10	1.81	1.47	0.77	1.32	5.37	9.65
BarOptimaPLUS E34	2.6	46.0	53.0	100	100	100	98	95	94	94	2.10	1.99	1.83	1.47	0.78	1.46	5.53	9.62
Select	2.6	51.3	56.5	100	100	100	100	99	98	97	2.08	1.97	2.00	1.45	0.82	1.28	5.55	9.59
Kentucky 32	3.4	48.3	56.0	100	100	100	100	100	98	98	2.31	1.80	1.74	1.40	0.74	1.12	5.00	9.10
BarElite	3.3	39.0	52.5	100	100	99	98	97	95	96	1.72	1.85	1.88	1.41	0.80	1.27	5.35	8.92
Experimental Varieties																		
TF 0402	4.3	50.0	56.5	100	100	100	100	100	99	99	2.58	2.09	1.99	1.55	0.82	1.43	5.79	10.46*
RAD-ERF61	4.0	53.0	56.0	100	100	100	100	97	97	97	2.48	2.15	1.93	1.56	0.76	1.36	5.62	10.26*
RAD-ERF62	4.0	55.0	57.0	100	100	100	100	98	97	97	2.47	2.16	1.98	1.52	0.71	1.21	5.42	10.05*
KY31- ³	3.5	50.3	56.5	100	100	100	100	99	99	99	2.36	2.14	1.87	1.54	0.68	1.26	5.35	9.85
Mean	3.5	50.5	55.9	100	100	100	100	99	98	98	2.27	2.07	1.93	1.47	0.78	1.31	5.50	9.83
CV,%	20.4	5.7	1.8	0	1	1	1	1	2	2	11.90	7.94	11.05	7.78	17.16	16.12	8.43	6.84
LSD,0.05	1.0	4.1	1.4	0	1	1	1	1	3	3	0.39	0.23	0.30	0.16	0.19	0.30	0.66	0.96

¹ Vigor score based on a 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 4 for complete scale.

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 16, 2010, at Princeton, Kentucky.

Variety	Seedling Vigor ¹ Nov 19, 2010	Maturity ²		Percent Stand							Yield (tons/acre)							
		2012	2013	2010	2011		2012		2013		2011	2012	2013				3-year Total	
		Apr 18	May 14	Nov 19	Apr 8	Oct 24	Mar 14	Oct 29	Mar 19	Oct 25	Total	Total	May 14	Jun 19	Aug 14	Oct 25		Total
KY31+ ³	4.1	44.8	55.3	100	100	100	100	100	99	99	2.78	1.94	2.06	1.50	0.59	1.11	5.26	9.99*
KYFA9732/E5	3.6	46.3	55.5	100	99	100	100	100	100	100	2.64	2.11	2.17	1.22	0.57	1.01	4.97	9.72*
KYFA9908/E3	3.5	47.5	55.0	100	100	100	100	97	95	95	2.58	1.93	1.94	1.34	0.69	1.05	5.03	9.54*
KYFA9905/E5	4.1	50.0	55.8	100	100	100	100	98	98	97	2.63	1.69	2.00	1.36	0.58	1.11	5.05	9.37*
KYFA0701	3.8	49.8	56.3	100	100	100	100	99	96	96	2.64	1.82	2.06	1.24	0.59	0.94	4.82	9.28*
AgR1502	2.6	51.0	55.0	100	98	100	99	99	96	97	2.38	1.81	2.26	1.33	0.59	0.84	5.02	9.21*
KY31- ³	3.5	48.8	56.3	100	100	100	100	100	99	99	2.46	1.86	2.11	1.19	0.55	1.00	4.84	9.16*
KYFA9908/E4	3.6	48.0	55.3	100	100	100	100	98	97	96	2.34	1.90	2.01	1.39	0.63	0.87	4.89	9.13
KYFA9908/E5	3.5	46.3	55.5	100	100	100	100	100	99	98	2.49	1.90	1.91	1.28	0.55	0.98	4.73	9.12
KYFA9732EF	3.9	46.3	54.8	100	100	100	100	98	98	98	2.42	1.75	2.13	1.29	0.55	0.96	4.93	9.10
AgR1521	2.8	51.0	56.5	100	99	100	100	100	96	97	2.32	1.84	2.20	1.28	0.60	0.80	4.89	9.04
KYFA9913/E2	2.9	46.8	56.3	100	99	100	100	99	99	98	2.42	1.84	2.12	1.23	0.52	0.90	4.78	9.04
KYFA9913EF	3.0	51.0	56.5	100	100	100	99	97	97	96	2.33	1.78	2.19	1.28	0.57	0.83	4.87	8.97
KYFA9908EF	3.1	48.5	55.3	100	98	100	100	96	93	95	2.42	1.77	2.14	1.30	0.49	0.81	4.73	8.93
KYFA9913/E5	2.5	49.3	55.0	100	99	100	100	99	99	99	2.46	1.89	1.90	1.25	0.59	0.82	4.57	8.92
KYFA9908/E1	4.1	42.8	54.0	100	100	100	99	97	95	96	2.47	1.74	1.74	1.31	0.70	0.94	4.68	8.89
KYFA0601	4.1	50.3	56.5	100	100	100	100	99	99	99	2.20	1.76	2.20	1.15	0.59	0.99	4.93	8.89
KYFA9905EF	3.6	49.3	55.5	100	100	100	100	98	97	97	2.22	1.55	2.25	1.37	0.55	0.88	5.05	8.83
KYFA9905/E1	3.9	46.3	55.8	100	98	100	100	100	99	98	2.25	1.69	2.19	1.24	0.55	0.88	4.86	8.80
KYFA9732/E1	3.3	46.3	54.8	100	100	100	100	97	95	94	2.42	1.87	1.97	1.30	0.48	0.71	4.46	8.75
KYFA9732/E2	4.1	43.5	54.5	100	99	100	100	94	92	92	2.44	1.79	1.77	1.29	0.50	0.86	4.41	8.64
KYFA0901	3.5	50.8	57.0	100	100	100	100	98	96	96	2.01	1.79	2.22	1.18	0.52	0.88	4.81	8.61
KYFA9905/E2	3.8	47.5	55.3	100	100	100	100	99	99	99	2.39	1.61	1.94	1.17	0.55	0.86	4.52	8.52
KYFA9913/E1	3.0	47.5	55.3	100	97	98	98	100	98	98	2.26	1.91	1.77	1.29	0.53	0.72	4.31	8.48
Mean	3.5	47.9	55.5	100	99	100	100	98	97	97	2.42	1.81	2.05	1.28	0.57	0.91	4.81	9.04
CV,%	21.0	5.4	1.8	0	1	1	1	3	3	3	12.69	10.09	10.82	13.12	18.61	13.18	7.68	6.51
LSD,0.05	1.0	3.7	1.4	0	2	1	1	4	4	4	0.43	0.26	0.31	0.24	0.15	0.17	0.52	0.83

¹ Vigor score based on a 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 4 for complete scale.

³ KY31- is the variety KY31 from which the toxic endophyte has been removed. KY31+ contains the toxic endophyte. AgR1502 and AgR1521 contain a non-toxic endophyte. E1 through E5 are non-toxic endophytes. The other varieties do not contain an endophyte.

Results and Discussion

Weather data for Lexington, Princeton and Quicksand are presented in tables 1, 2 and 3.

Ratings for maturity (see Table 4 for maturity scale), stand, and dry matter yields (tons/A) are reported in tables 5 through 13. Yields are given by cutting date for 2013 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 14 and 16 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

14 and 16, 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 grass varieties (tables 5 through 13).

Tables 15 and 17 are summaries of yield data from 1999 to 2012 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 per-

Table 8. Dry matter yields, seedling vigor, maturity and stand persistence of tall fescue varieties sown September 24, 2010, at Quicksand, Kentucky.

Variety	Seedling Vigor ¹ Nov 11, 2010	Maturity ²		Percent Stand						Yield (tons/acre)						3-year Total
		2011	2010	2011		2012		2013		2011	2012	2013				
		May 13	Nov 11	Mar 29	Nov 8	Mar 20	Nov 1	Mar 15	Oct 3	Total	Total	May 14	Aug 16	Oct 8	Total	
KY31+ ³	3.1	53.3	100	99	100	100	100	100	100	5.31	4.96	2.17	1.62	1.57	5.37	15.64*
AgR1502	2.4	58.0	100	97	99	99	99	98	98	4.53	4.67	2.51	1.45	1.35	5.30	14.50*
AgR1521	1.5	53.5	99	96	99	100	100	99	99	4.31	4.34	2.41	1.10	1.42	4.94	13.59*
KYFA9905/E5	3.1	54.5	100	100	100	100	100	100	100	4.56	4.64	1.83	1.24	1.29	4.35	13.56*
KYFA9732/E5	3.5	57.0	100	98	100	100	100	100	100	4.83	4.02	2.04	1.33	1.25	4.62	13.48*
KYFA0601	3.1	58.5	100	99	100	100	100	100	100	4.43	4.38	1.97	1.21	1.28	4.47	13.27*
KYFA9913/E5	2.8	56.0	99	95	98	96	97	97	97	4.46	4.05	1.97	1.43	1.26	4.66	13.17*
KYFA9908EF	2.8	52.3	100	96	96	97	97	96	96	4.72	3.76	1.88	1.35	1.41	4.63	13.11*
KY31- ³	3.5	54.5	100	99	98	99	100	100	100	4.56	4.32	1.91	1.19	1.11	4.21	13.09*
KYFA9905EF	3.1	55.0	100	99	100	99	99	98	98	5.12	3.75	1.67	1.16	1.13	3.95	12.83*
KYFA9913/E2	2.8	57.5	100	96	95	95	95	92	92	4.56	3.80	1.73	1.31	1.15	4.19	12.54
KYFA9908/E4	2.9	53.8	100	96	98	98	99	97	97	4.49	3.84	1.77	1.21	1.19	4.17	12.50
KYFA0701	2.8	56.5	100	98	100	100	100	100	100	4.88	3.65	1.87	1.00	1.08	3.96	12.48
KYFA9908/E5	2.6	53.8	100	97	99	99	99	98	98	4.29	3.99	1.95	1.16	1.07	4.18	12.46
KYFA9908/E3	2.5	55.5	100	95	95	95	96	94	94	3.94	3.78	1.93	1.48	1.24	4.64	12.37
KYFA9913EF	2.8	57.5	99	93	96	97	98	98	98	4.25	3.76	1.78	1.36	1.18	4.31	12.32
KYFA9732/E2	2.8	56.5	100	98	99	98	98	95	95	4.54	3.86	1.68	1.18	1.04	3.90	12.31
KYFA9908/E1	2.9	55.5	100	96	99	98	98	97	97	4.25	3.86	1.87	1.16	1.09	4.12	12.23
KYFA9905/E2	3.1	56.0	100	99	99	98	99	98	98	4.29	3.60	1.34	1.44	1.09	3.87	11.75
KYFA0901	2.4	54.5	100	92	94	95	97	97	97	3.82	3.59	1.98	1.03	1.07	4.07	11.49
KYFA9732EF	2.5	57.0	100	99	100	100	100	100	100	4.24	3.63	1.50	1.11	0.95	3.56	11.43
KYFA9732/E1	3.3	54.8	100	100	100	100	99	99	99	4.56	3.35	1.51	0.93	0.90	3.34	11.25
KYFA9905/E1	3.5	53.0	100	99	100	100	100	100	100	4.13	3.41	1.37	1.03	0.95	3.36	10.90
KYFA9913/E1	2.9	57.5	100	97	96	95	95	91	91	3.99	2.89	1.16	1.06	0.93	3.16	10.03
Mean	2.8	55.5	100	97	98	98	98	98	98	4.46	3.91	1.82	1.23	1.17	4.22	12.60
CV,%	26.0	5.9	1	2	2	2	2	2	2	20.22	17.16	21.15	23.08	24.58	20.07	16.46
LSD,0.05	1.0	4.6	1	3	3	3	3	3	3	1.27	0.95	0.54	0.40	0.40	1.20	2.93

¹ Vigor score based on a 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 4 for complete scale.

³ KY31- is the variety KY31 from which the toxic endophyte has been removed. KY31+ contains the toxic endophyte. AgR1502 and AgR1521 contain a non-toxic endophyte. E1 through E5 are non-toxic endophytes. The other varieties do not contain an endophyte.

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

Table 9. Dry matter yields, seedling vigor, maturity and stand persistence of tall fescue varieties sown September 14, 2011, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 11, 2011	Maturity ²		Percent Stand					Yield (tons/acre)						2-year Total	
		2012	2013	2011	2012		2013		2012	2013						
		Apr 25	May 23	Oct 11	Mar 21	Oct 24	Mar 22	Oct 22	Total	May 23	Jun 28	Aug 5	Oct 22	Total		
Commercial Varieties—Available for Farm Use																
BarOptimaPLUS E34	4.8	45.0	59.0	100	100	100	100	100	100	3.03	2.56	1.22	0.79	1.08	5.65	8.68*
JesupMaxQ	4.6	54.0	62.0	100	100	100	100	100	100	3.21	2.16	1.13	0.85	1.07	5.20	8.41*
Martin2/647	4.0	53.5	62.0	100	100	100	100	100	100	2.73	2.54	1.00	0.86	1.08	5.48	8.21*
DuraMaxGOLD	5.0	54.0	62.0	100	100	100	100	100	100	3.20	2.03	1.06	0.81	0.99	4.88	8.08*
Bronson	4.6	54.0	62.0	100	100	100	100	100	100	3.10	2.10	1.06	0.77	1.04	4.98	8.08*
Tower/647	5.0	45.0	58.0	100	100	100	100	100	100	3.07	2.00	1.10	0.73	1.10	4.93	7.99*
BarElite	5.0	45.0	58.0	100	100	100	100	100	100	2.81	2.24	1.06	0.71	1.02	5.04	7.85*
Jesup EF	4.8	55.5	61.5	100	100	100	100	100	100	2.77	2.15	1.01	0.87	0.95	4.97	7.74
Enhance	4.0	45.0	59.0	100	100	100	100	100	100	2.95	1.79	1.00	0.89	1.07	4.75	7.70
Cajun II	4.6	54.0	62.0	100	100	100	100	100	100	2.73	1.92	0.95	0.90	1.10	4.88	7.60
Kentucky 32	4.3	56.0	61.5	100	100	100	100	100	100	2.97	1.90	1.05	0.75	0.92	4.62	7.58
KY31+ ³	5.0	46.3	58.0	100	100	100	100	100	100	2.75	1.87	1.21	0.72	1.00	4.80	7.55
HyMark	5.0	52.5	62.0	100	100	100	100	100	100	2.58	1.67	1.09	0.82	1.08	4.66	7.24
Select	4.8	53.5	61.5	100	100	100	100	100	100	2.70	1.86	0.98	0.72	0.93	4.49	7.19
Experimental Varieties																
AGRFA 148	5.0	52.0	61.5	100	100	100	100	100	100	3.32	2.44	1.10	0.84	1.19	5.57	8.89*
NFTF 1411	4.9	55.0	62.0	100	100	100	100	100	100	3.02	2.50	1.12	0.87	1.16	5.65	8.68*
PPG-FTF 101	4.5	54.5	61.5	100	100	100	100	100	100	3.09	1.91	1.18	0.87	1.36	5.32	8.42*
KYFA0804	4.8	57.0	60.0	100	100	100	100	100	100	3.32	1.80	1.25	0.84	1.19	5.08	8.40*
IS-FTF 53/HAPPE	4.3	49.3	59.5	100	100	100	100	100	100	3.07	2.02	1.24	0.73	1.03	5.02	8.09*
KY31- ³	5.0	48.0	61.0	100	100	100	100	100	100	3.00	1.98	1.10	0.82	1.05	4.94	7.94*
B-11.BC	4.6	53.5	62.0	100	100	100	100	100	100	2.90	2.27	1.09	0.75	0.92	5.03	7.93*
KYFA0905	4.6	45.0	58.0	100	100	100	100	100	100	2.61	2.06	0.99	0.84	1.12	5.02	7.64
IS-FTF 54	3.9	57.5	61.0	100	100	100	100	100	100	2.76	2.03	1.09	0.72	0.99	4.84	7.60
XLFTF	4.5	49.8	60.5	100	100	100	100	100	100	2.79	1.70	1.01	0.81	1.05	4.57	7.36
KYFA0902	4.6	45.0	58.0	100	100	100	100	100	100	2.48	1.74	0.93	0.66	0.88	4.22	6.70
Mean	4.6	51.2	60.5	100	100	100	100	100	100	2.92	2.05	1.08	0.80	1.06	4.98	7.90
CV,%	7.7	3.8	1.8	0	0	0	0	0	0	13.07	15.13	10.77	15.86	15.53	9.58	9.39
LSD,0.05	0.5	2.7	1.5	0	0	0	0	0	0	0.54	0.44	0.16	0.18	0.23	0.67	1.05

¹ Vigor score based on a 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 4 for complete scale.

³ KY31- is the variety KY31 from which the toxic endophyte has been removed. KY31+ contains the toxic endophyte. Jesup MaxQ contains a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. HAPPE, GOLD and 647 are non-toxic endophytes. The other varieties do not contain an endophyte.

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

centages 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 15 and 17 summaries, 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 the footnotes in tables 15 and 17 to determine to which yearly report to refer.

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:

- Lime and Fertilizer Recommendations (AGR-1)
- Grain and Forage Crop Guide for Kentucky (AGR-18)

- Tall Fescue (AGR-59)
- Establishing Forage Crops (AGR-64)
- Tall Fescue in Kentucky (AGR-108)
- Forage Identification and Use Guide (AGR-175)
- Rotational Grazing (ID-143)

About the Authors

G.L. Olson is a research specialist and S.R. Smith and G.D. Lacefield are Extension professors in Forages. T.D. Phillips is an associated professor in Tall Fescue Breeding, and D.C. Ditsch is an Extension professor in Feed Production.

Table 10. Dry matter yields, seedling vigor, maturity and stand persistence of tall fescue and festulolium (FL) varieties sown September 7, 2012 at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 16, 2012	Maturity ²		Percent Stand			Yield (tons/acre)				
		2013	2012	2013			2013				
		May 20	Oct 16	Mar 20	Oct 22	May 20	Jun 28	Aug 6	Oct 22	Total	
Commercial Varieties—Available for Farm Use											
BarOptimaPLUS E34	2.4	56.0	89	91	92	3.62	1.94	1.30	1.67	8.53*	
Jesup EF	2.5	58.0	95	97	96	3.91	1.85	1.27	1.47	8.51*	
Select	2.9	57.0	94	95	96	3.99	1.61	1.21	1.34	8.14*	
KY31+ ³	4.3	56.0	99	99	99	3.90	1.74	1.16	1.33	8.13*	
Tuscany II	3.3	57.0	97	95	96	3.85	1.74	1.09	1.41	8.08*	
Jesup MaxQ	1.8	57.5	94	95	96	3.71	1.72	1.15	1.32	7.90*	
Flourish	2.0	56.5	91	92	93	3.40	1.73	1.14	1.39	7.66	
Kentucky 32	2.0	58.5	92	92	92	3.44	1.72	1.19	1.30	7.65	
Estancia	3.4	56.0	96	97	97	3.33	1.68	1.16	1.43	7.60	
Bronson	2.9	56.5	93	97	97	3.08	1.62	1.28	1.56	7.54	
Bull	2.1	58.5	91	91	92	3.09	1.74	1.27	1.43	7.53	
Cowgirl	2.6	57.5	96	96	96	3.23	1.68	1.08	1.27	7.25	
Fojtan(FL)	2.5	56.5	90	90	92	3.41	1.49	0.96	1.22	7.08	
Mahulena(FL)	1.9	59.5	84	88	91	2.91	1.58	1.04	1.11	6.65	
Experimental Varieties											
KYFA0906	3.4	56.0	95	97	96	3.96	1.78	1.19	1.50	8.43*	
IS-FTF 70	3.1	56.0	96	96	97	3.74	1.78	1.26	1.53	8.32*	
TF 0401	2.9	58.0	95	96	96	3.52	1.92	1.24	1.41	8.09*	
KYFA0905	2.6	56.5	92	92	94	3.71	1.81	1.12	1.39	8.03*	
PPG-FTF 101	2.6	58.5	93	93	94	3.54	1.78	1.27	1.41	8.00*	
PPG-FTF 104	2.0	56.0	89	90	93	3.43	1.81	1.25	1.48	7.97*	
KYFA0901	3.5	56.5	96	96	96	3.39	1.68	1.22	1.37	7.65	
KY31- ³	3.5	56.5	99	99	99	3.64	1.61	1.13	1.25	7.63	
Mean	2.7	57.0	93	94	95	3.54	1.73	1.18	1.39	7.84	
CV,%	20.7	2.1	3	3	2	9.50	11.14	12.29	12.47	7.37	
LSD,0.05	0.8	1.7	4	4	3	0.47	0.27	0.21	0.24	0.82	

¹ Vigor score based on a 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 KY 31- is the variety KY31 from which the toxic endophyte has been removed. Jesup MaxQ and Estancia contain a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. KY31+ contains the toxic endophyte. The other fescue varieties in this test do not contain an endophyte.

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

Table 11. Dry matter yields, seedling vigor, maturity and stand persistence of tall fescue and festulolium (FL) varieties sown September 12, 2012, at Princeton, Kentucky.

Variety	Seedling Vigor ¹ Oct 29, 2012	Maturity ²		Percent Stand		Yield (tons/acre)				
		2013	2012	2013		2013				
		May 14	Oct 29	Mar 19	Oct 25	May 14	Jun 19	Aug 14	Oct 25	Total
Commercial Varieties—Available for Farm Use										
Tuscany II	3.6	56.5	100	100	100	3.91	1.60	0.86	1.40	7.78*
Mahulena(FL)	2.5	59.0	100	100	100	3.77	1.68	0.80	1.47	7.72*
Flourish	2.3	55.0	97	99	99	3.52	1.77	0.94	1.44	7.66*
Jesup MaxQ	3.6	57.5	100	100	100	3.77	1.58	0.75	1.34	7.44*
BarOptima PLUS E34	3.0	53.5	100	100	100	3.55	1.56	0.75	1.51	7.37
KY31+ ³	5.0	54.5	100	100	100	3.50	1.67	0.73	1.47	7.37
Select	3.1	56.5	99	100	100	3.81	1.41	0.77	1.32	7.31
Jesup EF	4.0	57.5	100	100	100	3.69	1.40	0.68	1.48	7.25
Kentucky 32	2.3	57.0	99	99	99	3.71	1.53	0.76	1.23	7.23
Bull	3.4	58.0	99	100	100	3.26	1.66	0.79	1.50	7.21
Estancia	4.6	57.5	100	100	100	3.57	1.44	0.78	1.42	7.21
Fojtan(FL)	2.5	53.5	100	100	100	3.60	1.54	0.73	1.30	7.17
Cowgirl	3.0	56.5	100	100	100	3.36	1.43	0.74	1.51	7.03
Bronson	3.4	56.5	100	100	100	3.22	1.40	0.71	1.26	6.59
Experimental Varieties										
TF 0401	3.3	57.0	100	100	100	3.84	1.66	0.94	1.77	8.22*
IS-FTF 70	2.8	53.0	100	100	100	3.83	1.59	0.86	1.42	7.70*
KY31- ³	4.6	55.5	100	100	100	3.73	1.62	0.86	1.48	7.70*
PPG-FTF 101	2.8	57.5	100	100	100	3.68	1.59	0.83	1.40	7.49*
KYFA0905	3.8	54.5	100	100	100	3.44	1.64	0.73	1.57	7.38*
KYFA0906	4.1	54.5	100	100	100	3.59	1.63	0.73	1.40	7.35
KYFA0901	3.8	57.0	100	100	100	3.35	1.59	0.79	1.55	7.28
PPG-FTF 104	2.5	55.0	99	99	99	3.49	1.54	0.70	1.40	7.13
Mean	3.4	56.0	100	100	100	3.60	1.57	0.78	1.44	7.39
CV,%	18.7	2.0	1	0	0	8.94	9.38	16.16	14.17	7.93
LSD,0.05	0.9	1.6	2	1	1	0.45	0.21	0.18	0.29	0.82

¹ Vigor score based on a 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 KY 31- is the variety KY31 from which the toxic endophyte has been removed. Jesup MaxQ and Estancia contain a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. KY31+ contains the toxic endophyte. The other fescue varieties in this test do not contain an endophyte.

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

Table 12. Dry matter yields, seedling vigor, maturity and stand persistence of bromegrass varieties sown September 6, 2010, at Lexington, Kentucky.

Variety	Type	Seedling Vigor ¹ Oct 14, 2010				Maturity ²				Percent Stand				Yield (tons/acre)										
		2011		2012		2013		2010		2011		2012		2013		2013		2013		3-year Total				
		May 13	Jun 20	Apr 30	Jun 7	May 22	Oct 14	May 7	Jun 14	Mar 17	Nov 7	Mar 21	Oct 23	Mar 22	Oct 21	2011 Total	2012 Total	2013 Total	May 22	Jun 28	Aug 5	Oct 21	Total	
Commercial Varieties—Available for Farm Use																								
MacBeth	meadow	2.5	62.0	29.0	56.5	58.0	60.0	70	70	89	90	94	94	94	4.19	2.97	3.09	0.95	0.73	0.91	0.91	0.91	5.69	12.85*
Dolina	smooth	3.8	55.5	29.0	54.0	36.3	58.0	90	88	88	91	94	92	93	3.97	2.35	3.06	0.89	0.68	0.76	0.76	0.76	5.39	11.70*
Bigfoot	meadow	2.3	60.0	29.0	56.0	36.3	60.0	85	85	93	92	92	93	92	3.65	2.55	2.59	1.09	0.59	0.92	0.92	0.92	5.18	11.38*
Olga	smooth	2.8	55.0	29.0	52.5	58.0	58.0	86	87	92	92	94	94	92	3.67	1.92	2.91	0.86	0.64	0.90	0.90	0.90	5.30	10.89*
Hakari	Alaska	4.0	53.5	53.0	39.0	58.0	—	90	96	89	88	77	70	67	4.83	1.99	1.25	0.69	0.33	0.17	0.17	0.17	2.43	9.24
AC Knowles	hybrid	2.8	55.0	60.5	55.5	58.0	58.5	86	81	91	89	91	91	89	2.96	1.86	2.27	0.70	0.56	0.49	0.49	0.49	4.03	8.84
Experimental Varieties																								
BARBcF1FRRL	meadow	2.5	59.0	29.0	57.0	58.0	60.0	76	74	91	90	93	91	92	4.40	2.75	2.90	0.89	0.65	0.87	0.87	0.87	5.32	12.47*
BAR B1F1GR	smooth	4.5	55.0	29.0	53.0	36.3	58.0	93	94	93	95	95	95	95	3.91	2.52	3.34	0.92	0.73	0.90	0.90	0.90	5.89	12.32*
KYB10101	smooth	—	56.5	29.0	53.0	29.0	57.5	6	10	29	35	49	50	48	2.59	1.84	2.14	0.79	0.62	0.50	0.50	0.50	4.05	8.48
BARPAL16	hybrid	—	57.5	60.5	59.0	29.0	59.0	6	6	25	28	33	30	26	2.14	1.95	0.43	0.30	0.42	0.63	0.63	0.63	1.78	5.87
Mean		3.3	56.7	36.9	53.4	46.1	58.7	71	71	79	80	82	81	80	3.59	2.28	2.47	0.83	0.60	0.71	0.71	0.71	4.60	10.47
CV%		22.7	2.5	2.3	2.5	19.6	1.8	10	11	7	5	13	14	15	21.90	17.96	24.53	19.74	21.66	34.44	34.44	34.44	19.94	16.35
LSD,0.05		1.1	2.1	1.2	1.2	13.0	1.6	11	12	8	6	16	16	17	1.14	0.59	0.87	0.24	0.19	0.35	0.35	0.35	1.37	2.47

¹ Vigor score based on a 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 4 for complete scale.

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

Table 13. Dry matter yields, seedling vigor, maturity and stand persistence of bromegrass varieties sown September 7, 2012, at Lexington, Kentucky.

Variety	Type	Seedling Vigor ¹ Oct 16, 2012		Maturity ²		Percent Stand				Yield (tons/acre)						
		2013		2013		2013		2013		2013		2013		2013		3-year Total
		May 20	Oct 16	May 20	Oct 22	Mar 20	Oct 16	Mar 20	Oct 22	May 20	Jun 28	Aug 6	Oct 24	Total		
Commercial Varieties—Available for Farm Use																
Macbeth	meadow	2.6	62.0	94	91	92	2.76	0.92	0.83	1.35	5.86*					
Fleet	meadow	1.7	62.0	72	71	87	2.53	0.90	1.02	1.21	5.66*					
AC Knowles	hybrid	2.5	60.5	95	87	92	2.57	0.83	0.77	1.39	5.56*					
Peak	smooth	4.0	58.0	91	86	86	2.50	0.99	0.76	0.93	5.18*					
Carlton	smooth	3.3	56.0	92	75	86	1.98	0.86	0.75	0.87	4.46					
Experimental Varieties																
BARBcF1FRRL	meadow	3.8	61.5	98	94	94	2.74	1.01	0.95	1.20	5.90*					
BARB1F1GR	smooth	4.5	57.5	99	98	98	2.83	0.97	0.78	1.09	5.67*					
MSB	—	3.9	56.5	96	92	93	2.58	0.83	0.88	1.04	5.32*					
Mean		3.3	59.3	93	87	91	2.56	0.91	0.84	1.14	5.46					
CV%		26.0	1.5	7	10	5	14.51	15.89	16.83	23.26	13.86					
LSD,0.05		1.3	1.3	10	12	7	0.55	0.22	0.21	0.39	1.12					

¹ Vigor score based on a 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 4 for complete scale.

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

Table 14. Performance of tall fescue varieties across years and locations.

Variety	Proprietor/KY Distributor	Lexington						Princeton						Quicksand			
		2010 ¹			2011			2010			2012			2010			
		11 ²	12	13	12	13	13	11	12	13	11	12	13	13	11	12	13
Commercial Varieties—Available for Farm Use																	
BarElite	Barenbrug USA				*	*		x ³	x	x							
BarOptima PLUS E34	Barenbrug USA				*	*	*	x	x	*				x			
Bronson	Ampac Seed				*	*	x	x	*	*				x			
Bull	Caudill seed						x							x			
Cajun II	Smith Seed Services				x	x		*	*	x							
Cowgirl	PureSeed						x	x	x	*				x			
DuraMax GOLD	DLF International Seeds				*	x											
Enhance	Allied Seed				*	x											
Estancia	Mountain View Seeds						x							x			
Flourish	Allied Seed						x							*			
Goliath	Ampac Seed							x	*	x							
HyMark	Fraser Seeds				x	x											
Kentucky 32	Oregro Seeds				*	x	x	*	x	x				x			
KY31+ ⁴	Ky Agric. Exp. Station/Public	x	*	*	x	x	*	*	*	*	*	*	*	x	*	*	*
Jesup EF	Pennington Seed				x	x	*	*	*	*				x			
Jesup MaxQ	Pennington Seed				*	*	*	*	*	*				*			
Martin 2 647	DLF International Seeds				x	*											
Select	FFR/Southern States				x	x	*	x	x	*				x			
Tower 647	DLF International Seeds				*	x											
Tuscany II	Seed Research of Oregon						*							*			
Experimental Varieties																	
AGRFA 148	AgResearch				*	*											
AgR1502	AgResearch	x	x	*								*	x	*		*	*
AgR1521	AgResearch	x	*	*								x	x	*		*	*
B-11.BC	Ampac Seed				*	*											
IS FTF 53 HAPPE	DLF International Seeds				*	*											
IS FTF 54	DLF International Seeds				*	x											
IS-FTF 70	DLF International Seeds						*							*			
KY31- ⁴	KY Agric. Exp. Station	*	*	*	*	x	x	*	*	x	*	*	*	*	*	*	*
KYFA0601	KY Agric. Exp. Station	*	x	*							x	x	*		*	*	*
KYFA0701	KY Agric. Exp. Station	*	x	*							*	x	*		*	x	x
KYFA0804	KY Agric. Exp. Station				*	*											
KYFA0901	KY Agric. Exp. Station	x	x	x			x				x	x	*	x	x	x	x
KYFA0902	KY Agric. Exp. Station				x	x											
KYFA0905	KY Agric. Exp. Station				x	*	*							*			
KYFA0906	KY Agric. Exp. Station						*							x			
KYFA9732 EF	KY Agric. Exp. Station	*	x	x							*	x	x		*	x	x
KYFA9732/E1	KY Agric. Exp. Station	*	x	*							*	*	x		*	x	x
KYFA9732/E2	KY Agric. Exp. Station	*	x	x							*	x	x		*	x	x
KYFA9732/E5	KY Agric. Exp. Station	*	*	*							*	*	*		*	*	*
KYFA9905 EF	KY Agric. Exp. Station	*	x	*							x	x	*		*	x	x
KYFA9905/E1	KY Agric. Exp. Station	x	x	*							x	x	*		*	x	x
KYFA9905/E2	KY Agric. Exp. Station	*	x	x							*	x	x		*	x	x
KYFA9905/E5	KY Agric. Exp. Station	x	x	*							*	x	*		*	*	*
KYFA9908 EF	KY Agric. Exp. Station	*	x	x							*	x	x		*	x	*
KYFA9908/E1	KY Agric. Exp. Station	*	x	*							*	x	x		*	x	x
KYFA9908/E3	KY Agric. Exp. Station	*	x	*							*	*	*		x	x	*
KYFA9908/E4	KY Agric. Exp. Station	*	x	*							x	*	*		*	x	*
KYFA9908/E5	KY Agric. Exp. Station	x	*	*							*	*	x		*	x	*
KYFA9913 EF	KY Agric. Exp. Station	*	x	*							x	x	*		*	x	*
KYFA9913/E1	KY Agric. Exp. Station	*	x	x							x	*	x		x	x	x
KYFA9913/E2	KY Agric. Exp. Station	*	x	x							*	x	*		*	x	*
KYFA9913/E5	KY Agric. Exp. Station	*	x	*							*	*	x		*	*	*
NFTF 1411	Noble Foundation				*	*											
PPG-FTF 101	Mountain View Seeds				*	*	*							*			
PPG-FTF 104	Mountain View Seeds						*							x			
RAD-ERF61	Radix Research, Inc.							*	*	*							
RAD-ERF62	Radix Research, Inc.							*	*	*							
TF 0401	Brett Young						*							*			
TF 0402	FFR/Southern States						*	*	*								
XLFTF	ProSeeds Marketing				*	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 KY31- is the variety KY31 from which the toxic endophyte has been removed. KY31+ contains the toxic endophyte. Jesup MaxQ, Estancia, AgR1502 and AgR1521 contain a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. E1 through E5, AR584, HAPPE, GOLD and 647 are non-toxic endophytes. The other varieties do not contain an endophyte.

*Not significantly different from the highest yielding variety in the test.

Table 15. Summary of Kentucky tall fescue yield trials 1999-2013 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietary	Lexington						Princeton						Quicksand					Mean ³ (#trials)			
		99 ^{1,2} 2-yr ⁴	01 3-yr	03 2-yr	05 3-yr	07 3-yr	09 3-yr	11 2-yr	98 2-yr	00 2-yr	02 3-yr	04 3-yr	06 3-yr	08 3-yr	10 3-yr	99	01 2-yr	03 2-yr		05 4-yr		
Atlas	ProSeeds Marketing	107																			98(2)	
Atlas Select	ProSeeds Marketing													96								–
Aprilia	ProSeeds Marketing												94									–
BarElite	Barenbrug USA		87			99		100														97(3)
Barlane	Barenbrug USA																			95		94(3)
Barolex	Barenbrug USA																					–
BarOptima PLUS E34	Barenbrug USA																					108(4)
BAR9 TIMPO	Barenbrug USA	96			122	101		111														97(2)
Bronson	Ampac Seed																			102		100(6)
Bull	Improved Forages																			101		101(5)
Cajun II	Smith Seed Services							97														99(2)
Carmine	DLF International	99																		97		98(2)
Cowgirl	Rose-Agriseeds													102								100(2)
DLF-B	DLF International	96																				–
DuraMax GOLD	DLF International							103				106										105(2)
Enhance	Allied Seed							98														103(2)
Estancia/ArkShield	Mountain View Seeds																					102(2)
Festival	Pickseed West		107																			105(3)
Fuego	Advanta Seeds	99																		107		–
Goliath	Ampac Seed																					100(2)
Hoedown	DLF International																			106		105(2)
HyMark	Fraser Seeds																					97(2)
Jesup EF	Pennington Seed							92						102								103(3)
Jesup MaxQ	Pennington Seed							99												100		101(9)
Johnstone	ProSeeds Marketing	95	108			98	104	110	107			94		95	100							99(3)
KENHY	KY Agric Exp Sta.																					–
Kentucky 32	Oregro Seeds												89									–
Kokanee	Ampac Seed		89					97														97(3)
KY31+ ⁵	KY Agric Exp Sta.	102	118	112	108	105	102	96	122	86				122	108	104				124	98	88(2)
Maximize	Turf Seed	96	95																		105	107(17)
Martin2/647	DLF International																			100	102	97(4)
Nanryo	Jap. Grassland ForageSeed/ USDA-ARS, El Reno, OK																					–
Noria	ProSeeds Marketing																					–
RAD-ERF50	Radix Research, Inc.																					–
Resolute	Ampac Seed		90																			78(2)
Savory	DLF International																			65		–
Seine	Advanta Seeds	99																				–
Select	FFR/Sou. St.	106	106	94	99	102	98	92	105	105	105	97	105	102	105	99	107	112	102	102	91	98(2)
Stockman	Seed Research of OR																					102(18)
Texoma MaxQ II	Pennington Seed																					103(4)
TF0203G	Seed Research of OR																					–
TF33	Barenbrug USA																					–
Tower/647	DLF International																					–
Tuscany	Forage Genetics																					–
Tuscany II	Seed Research of OR																					–
Vulcan	International Seeds																					–
5CAN	Brett Young							86														–

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 KY31+ contains the toxic endophyte. Jesup MaxQ, Texoma MaxQ II, DuraMax GOLD, Martin2/647, Tower/647 and Estancia/Arkshield contain a non-toxic endophyte. BarOptima PLUS E34 contains a beneficial endophyte. The other fescue varieties in this table do not contain an endophyte.

Table 16. Performance of bromegrass varieties at Lexington, Kentucky.

Variety	Type	Proprietor/KY Distributor	2010 ¹			2012
			2011 ²	2012	2013	2013
Commercial Varieties—Available for Farm Use						
AC Knowles	hybrid	—	x ³	x	x	*
Bigfoot	hybrid	Grassland Oregon	x	*	*	
Carlton	smooth	Pickseed USA				x
Doina	smooth	Barenbrug USA	*	x	*	
Fleet	meadow	—				*
Hakari	Alaska	Barenbrug USA	*	x	x	
MacBeth	meadow	Cisco Seeds	*	*	*	*
Olga	smooth	Barenbrug USA	x	x	*	
Peak	smooth	Allied seed				*
Experimental Varieties						
BAR BcF1FRRL	meadow	Barenbrug USA	*	*	*	*
BAR BiF1GRL	smooth	Barenbrug USA	*	*	*	*
BAR PAL 16	hybrid	Barenbrug USA	x	x	x	
KYBI0101	smooth	KY Agric. Exp. Station	x	x	x	
MSB	—	Pickseed USA				*

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 17. Summary of Kentucky bromegrass yield trials 2006-2013 (yield shown as a percentage of the mean of the commercial varieties in the trial.)

Variety	Type	Proprietor/KY Distributor	Lexington			
			2006 ^{1,2} 4-yr ⁴	2008 3-yr	2010 3-yr	Mean ³ (#trials)
AC Knowles	hybrid	—	85		82	84(2)
Bigfoot	hybrid	Grassland Oregon	108	116	105	110(3)
Canterbury	mountain	Barenbrug USA		79		—
Doina	smooth	Barenbrug USA		114	108	111(2)
Fleet	meadow	—	110			—
Hakari	Alaska	Barenbrug USA		85	85	85(2)
MacBeth	meadow	Cisco Seeds		136	119	128(2)
Olga	smooth	Barenbrug USA		116	101	109(2)
Peak	smooth	Allied Seed		97		—
Persister	prairie	—		72		—
RAD-BI29	smooth	Columbia Seeds	96	86		91(2)

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 2006 was harvested 4 years, so the final report would be "2009 Tall Fescue and Brome 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



Mention or display of a trademark, proprietary product, or firm in text or figures does not constitute an endorsement and does not imply approval to the exclusion of other suitable products or firms.