



2018 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 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 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 that combine the vigorous growth of smooth bromegrass with the leafiness and good regrowth of meadow bromegrass. 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 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 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 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 13 and 14 show a summary of all tall fescue and bromegrass varieties tested in Kentucky for the past 17 years. The UK Forage Extension website at forages.ca.uky.edu contains electronic versions of all forage variety testing reports from Kentucky and surrounding states and a large number of other forage publications.

Table 1. Temperature and rainfall at Lexington, Kentucky in 2016, 2017 and 2018.

	2016				2017				2018 ²			
	Temp		Rainfall		Temp		Rainfall		Temp		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	32	+1	0.80	-2.06	40	+9	6.81	+3.95	31	0	2.01	-0.85
FEB	38	+3	6.09	+2.88	47	+12	4.46	+1.25	45	+10	9.77	+6.56
MAR	52	+8	4.07	-0.33	48	+4	3.34	-1.06	42	-2	5.16	+0.76
APR	57	+2	3.97	+0.09	62	+7	4.17	+0.29	50	-5	5.52	+1.64
MAY	64	0	9.17	+4.70	66	+2	7.74	+3.27	73	+9	8.39	+3.92
JUN	76	+4	5.09	+1.43	73	+1	7.68	+4.02	76	+4	6.42	+2.76
JUL	79	+3	7.43	+2.43	76	0	4.49	-0.51	77	+1	6.15	+1.15
AUG	79	+4	4.37	+0.44	74	-1	6.66	+2.73	77	+2	6.45	+2.52
SEP	74	+6	2.18	-1.02	69	+1	4.72	+1.52	74	+6	12.88	+9.68
OCT	64	+7	0.37	-2.20	60	+3	6.06	+3.49	59	+2	6.54	+3.97
NOV	51	+6	1.94	-1.45	47	+2	3.09	-0.30				
DEC	37	+1	9.4	+5.42	35	-1	2.66	-1.32				
Total			54.88	+10.33			61.88	+17.33			69.29	+32.11

¹ DEP is departure from the long-term average.

² 2018 data is for ten months through October.

Table 2. Temperature and rainfall at Quicksand, Kentucky in 2017 and 2018.

	2017				2018 ²			
	Temp		Rainfall		Temp		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP
JAN	43	+12	4.61	+1.32	31	0	1.71	-1.58
FEB	46	+13	2.27	-1.33	48	+15	7.56	+3.96
MAR	48	+7	4.13	-0.21	44	+3	5.90	+1.56
APR	62	+9	4.23	+0.13	52	-1	4.07	-0.03
MAY	65	+3	6.33	+1.85	71	+9	5.28	+0.80
JUN	71	+1	5.82	+2.00	75	+5	5.47	+1.65
JUL	76	+2	5.76	+0.51	76	+2	5.39	+0.14
AUG	73	0	6.59	+2.58	75	+2	3.23	-0.78
SEP	68	+2	2.57	-0.95	74	+8	8.70	+5.18
OCT	59	+5	5.56	+2.65	59	+5	4.54	+1.63
NOV	47	+5	1.33	-2.55				
DEC	37	+4	3.28	-0.86				
Total			52.48	+5.14			51.85	+12.53

¹ DEP is departure from the long-term average.

² 2018 data is for the ten months through October.

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 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 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. Look for Alliance for Grassland Renewal seed quality assurance printed on each bag of novel fescue seed.

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 seven studies are reported. Tall fescue varieties were sown at Lexington (2015, 2016, and 2017), and Quicksand (2016). The bromegrass trials were sown in Lexington in 2015, 2016, and 2017. The soils at Lexington (Maury), and Quicksand (Nolin) are well-drained silt loams. They are well suited for tall fescue and bromegrass production.

Seedings 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 ran-

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. Further subdivision by means of leaf development index (see text).	
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.	

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

Table 4. Dry matter yields, seedling vigor, maturity, and stand persistence of tall fescue varieties sown September 4, 2015, at Lexington, Kentucky.

Variety	Endophyte Status ¹	Seedling Vigor ² Oct 15, 2015	Maturity ³			Percent Stand						Yield (tons/acre)							
			2016	2017	2018	2016		2017		2018		2016		2017		2018			
			May 2	May 2	May 18	Mar 18	Oct 15	Mar 18	Oct 17	Mar 24	Oct 31	Mar 19	Oct 18	May 20	Jun 25	Aug 6	Oct 18	Total	
Commercial Varieties-Available for Farm Use																			
Drover	free	4.5	56.5	57.5	57.5	100	100	100	100	99	99	99	5.53	5.13	1.30	0.73	0.54	1.07	3.65
BarOptima PLUS E34	novel	4.5	45.0	52.0	56.0	100	100	100	100	98	98	94	5.46	4.83	1.48	0.33	0.23	1.16	3.20
HyMark	free	4.4	54.0	56.5	55.5	100	100	100	100	100	100	96	5.28	4.26	1.35	0.50	0.25	0.76	2.86
Jesup MaxQ	novel	4.6	55.0	55.0	57.0	100	100	100	100	95	95	90	5.39	4.01	1.27	0.37	0.24	0.92	3.10
KY31+	toxic	4.6	45.0	52.5	56.5	100	100	100	100	100	100	96	4.75	4.01	1.27	0.50	0.25	1.08	3.10
SS-0705TFLS	free	4.8	52.0	56.0	56.5	100	100	100	100	98	94	93	5.37	3.61	1.13	0.46	0.18	1.03	2.80
Cajun II	free	3.9	56.0	55.5	56.0	100	100	100	100	96	96	91	4.80	4.26	1.16	0.43	0.23	0.88	2.70
Select	free	4.4	54.5	56.0	57.5	100	100	100	100	98	98	90	5.49	3.63	0.92	0.31	0.34	0.86	2.43
Lacefield MaxQII	novel	5.0	47.5	55.0	56.0	100	100	100	100	100	100	94	4.61	3.89	1.12	0.32	0.14	1.03	2.60
Baguala	free	4.8	56.0	57.0	56.0	100	100	100	97	98	96	91	4.48	3.80	1.10	0.43	0.22	1.00	2.74
FSG 402TF	free	4.9	49.8	55.5	57.0	100	100	100	100	99	99	91	4.67	3.79	1.01	0.37	0.23	0.85	2.46
Dominate	free	4.8	55.0	55.5	57.0	100	95	97	99	89	84	83	4.28	4.12	0.91	0.27	0.28	0.91	2.37
Experimental Varieties																			
KYFA1103	free	4.6	52.8	56.0	57.0	100	100	100	100	100	100	98	5.79	4.85	1.28	0.55	0.58	1.24	3.65
DLFPS-FTF-89	free	4.9	56.5	56.5	57.0	100	100	100	100	98	98	100	5.62	4.86	1.60	0.66	0.35	1.04	3.65
KYFA1113	free	4.9	51.3	55.5	56.0	100	100	100	93	95	94	5.59	4.83	1.52	0.42	0.34	1.13	3.41	
KYFA1104	free	4.8	49.8	56.0	56.5	100	100	100	99	98	94	5.30	4.33	1.10	0.50	0.34	1.30	3.24	
DLFPS-FTF-93	free	4.1	57.5	57.5	57.0	100	100	100	94	99	95	5.30	4.00	1.30	0.67	0.40	0.96	3.32	
KYFA1102	free	5.0	55.5	57.5	57.0	100	100	100	95	98	71	5.39	3.96	1.41	0.44	0.28	0.81	2.94	
DLFPS-FTF-96	free	4.4	50.0	53.5	56.0	100	100	100	100	100	98	4.76	4.08	1.51	0.55	0.24	0.95	3.26	
KY31-	free	4.3	48.5	55.0	57.0	100	100	100	95	99	93	4.89	3.99	1.19	0.64	0.28	1.11	3.21	
KYFA1109	free	4.3	48.0	54.5	56.0	100	100	100	100	98	93	4.96	4.24	1.28	0.32	0.15	1.13	2.89	
DLFPS-FTF-73	free	4.4	46.3	53.0	55.5	100	100	100	95	95	88	4.74	4.46	1.27	0.36	0.27	0.71	2.61	
Drover+E34	novel	4.0	55.5	56.5	56.5	100	100	100	99	98	94	4.57	4.23	1.27	0.42	0.19	0.99	2.88	
KYFA1110	free	4.6	51.8	56.0	57.0	100	100	100	96	93	91	4.56	3.90	1.26	0.34	0.28	1.10	2.98	
KYFA1114	free	4.9	48.8	54.0	56.5	100	100	100	100	98	93	4.39	3.75	1.44	0.51	0.20	1.07	3.23	
KYFA1311	free	4.6	49.8	55.5	57.0	100	100	100	99	99	95	4.86	3.68	1.22	0.44	0.25	0.89	2.80	
KYFA9821/ARS84	novel	4.8	52.0	54.5	56.0	100	100	100	98	100	93	4.45	3.83	1.34	0.37	0.21	0.95	2.88	
BARFaF13131	free	3.8	52.0	56.5	56.0	100	100	100	100	99	91	4.03	3.84	1.15	0.22	0.22	1.06	2.65	
Mean		4.5	51.9	55.4	56.5	100	100	100	97	97	92	4.98	4.15	1.26	0.44	0.28	1.00	2.97	
CV,%		9.2	4.8	2.2	1.7	0	1	1	6	5	10	14.36	16.48	22.84	34.17	54.07	26.18	18.61	
LSD,0.05		0.6	3.5	1.7	1.4	0	1	1	8	6	13	1.01	0.96	0.40	0.21	0.21	0.37	0.78	

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

³ 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.

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

Results and Discussion

Weather data for Lexington and Quicksand 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 10. Yields are given by cutting date for 2018 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

Table 5. continued

Variety	Endophyte Status ¹	Seedling Vigor ²		Maturity ³			Percent Stand						Yield (tons/acre)						2-year Total	
		Oct 15, 2016		2017		2018		2017		2018		2017		2018		2017		2018		
		May 3	May 11	May 3	May 11	May 3	May 11	May 3	May 11	May 3	May 11	May 3	May 11	May 3	May 11	May 3	May 11	May 3		May 11
KYFP0901 (MF)	free	4.4	50.0	35.3	100	100	100	99	97	97	97	4.26	0.55	0.32	0.39	0.38	1.64	5.90		
15610912	free	2.8	52.5	50.8	98	98	68	63	63	63	2.26	0.36	0.33	0.22	0.61	1.52	3.78			
Mean		3.8	54.0	50.2	99	100	99	99	99	99	5.53	0.71	0.66	0.63	0.86	2.86	8.39			
CV%		12.9	3.2	7.5	1	0	4	3	3	3	17.22	34.27	28.32	27.88	28.32	17.84	10.69			
LSD0.05		0.7	2.4	5.3	1	1	6	5	5	1.33	0.34	0.26	0.25	0.34	0.71	1.72				

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle.
² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
³ 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.

*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 and meadow fescue (MF) varieties sown September 8, 2017, at Lexington, Kentucky.

Variety	Endophyte Status ¹	Seedling Vigor ²		Maturity ³			Percent Stand						Yield (tons/acre)								
		Oct 12, 2017		2018		2018		2017		2018		2017		2018		2017		2018			
		Oct 12, 2017	Oct 12, 2017	May 8	May 8	Mar 8	Mar 14	Mar 14	Oct 12	Oct 12	Mar 8	Mar 14	Mar 14	Oct 12	Oct 12	Mar 8	Mar 14	Mar 14	Oct 12	Oct 12	
Commercial Varieties-Available for Farm Use																					
SS0705TF5L	free	4.0	51.0	100	100	99	99	99	99	99	1.30	1.65	1.12	1.34	1.34	5.42*					
Jesup MaxQ	novel	4.0	54.0	100	100	100	100	100	100	1.35	1.92	1.03	1.09	1.09	5.38*						
KY31+	toxic	4.3	46.3	100	100	100	100	100	100	1.46	1.80	0.75	1.30	1.30	5.32*						
Cajun II	free	3.9	52.5	99	99	99	99	99	99	1.25	1.79	1.02	1.24	1.24	5.29*						
Lacefield MaxQII	novel	4.0	46.3	100	100	100	100	100	100	1.07	1.66	1.01	1.03	1.03	4.77*						
BarOptima PLUS E34	novel	3.3	45.0	99	99	95	98	98	98	1.08	1.58	0.75	1.17	1.17	4.59*						
Pradel (MF)	free	3.9	45.0	100	100	100	100	100	100	1.36	1.21	0.74	0.82	0.82	4.13						
Experimental Varieties																					
KYFA1305	free	4.0	45.0	100	100	100	100	100	100	1.22	1.96	1.14	1.23	1.23	5.54*						
KYFA1306	free	3.8	49.3	78	100	100	100	100	100	1.38	1.87	1.11	1.09	1.09	5.44*						
KYFA1304	free	2.9	49.8	91	90	91	91	91	91	1.14	1.61	1.08	1.24	1.24	5.07*						
KYFA1405	free	2.8	46.3	83	83	83	87	87	87	1.16	1.63	0.95	1.11	1.11	4.85*						
KYFA9304	free	4.0	48.5	99	99	99	99	99	99	1.14	1.71	0.94	1.06	1.06	4.85*						
FTF94	free	2.1	52.5	86	86	86	89	89	89	1.09	1.46	0.98	1.24	1.24	4.78*						
KYFA1404	free	2.9	45.0	98	98	98	98	98	98	0.93	1.81	0.77	1.09	1.09	4.60*						
STF50	free	2.3	52.5	93	91	91	93	93	93	1.08	1.45	0.90	1.06	1.06	4.49*						
RAD-ERF37	free	3.3	51.5	97	96	96	97	97	97	0.88	1.55	1.02	1.03	1.03	4.48*						
KYFP1301 (MF)	free	3.8	45.0	98	98	98	98	98	98	1.30	1.46	0.66	0.99	0.99	4.42*						
KY31-	free	3.5	50.3	100	100	100	100	100	100	1.04	1.71	0.72	0.92	0.92	4.38*						
BARFA68TR179	free	3.3	45.0	98	98	98	99	99	99	0.84	1.17	0.89	0.96	0.96	3.86						
KYFA1606	free	1.0	45.0	63	51	51	53	53	53	0.30	0.98	0.58	0.92	0.92	2.78						
Mean		3.3	48.3	94	94	94	95	95	95	1.12	1.60	0.91	1.10	1.10	4.72						
CV%		18.4	4.5	14	10	10	8	8	8	35.04	18.16	30.01	24.85	24.85	17.66						
LSD0.05		0.9	3.0	19	13	13	11	11	11	0.56	0.41	0.39	0.39	0.39	1.18						

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle.
² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
³ 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.

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

Table 7. Dry matter yields, seedling vigor, and stand persistence of tall fescue varieties sown September 2, 2016, at Quicksand, Kentucky.

Variety	Endophyte Status ¹	Seedling Vigor ² Nov 3, 2016	Percent Stand					Yield (tons/acre)					2-year Total	
			2016		2017		2018	2017	2018					
			Nov 3	Mar 24	Nov 8	Apr 4	Oct 5	Total	May 4	Jul 10	Sep 7	Nov 8		Total
Commercial Varieties-Available for Farm Use														
BarOptima PLUS E34	novel	4.9	100	100	100	100	100	6.90	1.15	1.13	0.77	0.67	3.72	10.63*
Jesup MaxQ	novel	4.1	99	99	99	99	100	6.88	1.26	0.96	0.71	0.49	3.42	10.30*
Payload	free	4.0	98	98	98	98	98	6.19	1.19	1.11	0.81	0.71	3.82	10.01*
Martin2 Protek	novel	4.1	98	98	98	98	98	6.65	1.24	0.76	0.72	0.40	3.12	9.77*
KY31+	toxic	3.3	98	97	98	98	98	5.87	1.18	0.91	0.78	0.63	3.51	9.38*
Estancia Arkshield	novel	4.4	100	100	100	99	99	6.14	1.10	0.81	0.66	0.58	3.15	9.29*
SS0705TFSL	free	2.4	95	95	95	96	96	6.25	1.02	0.74	0.66	0.56	2.98	9.23*
Lacefield MaxQII	novel	4.3	100	100	100	100	100	5.67	1.28	0.75	0.71	0.59	3.33	9.00*
Cajun II	free	3.0	97	96	97	97	97	5.99	0.97	0.67	0.61	0.37	2.62	8.61*
Tower	free	2.0	91	90	94	93	93	5.54	0.99	0.86	0.67	0.40	2.92	8.47*
Teton II	free	3.3	99	98	98	97	98	5.44	0.91	0.72	0.62	0.49	2.75	8.18
Kora Protek	novel	4.4	100	100	100	100	100	5.57	0.69	0.81	0.58	0.31	2.39	7.96
Select	free	2.8	96	96	96	96	96	5.12	0.95	0.49	0.53	0.42	2.40	7.53
Tower Protek	novel	2.8	99	96	98	98	98	5.09	0.68	0.50	0.55	0.39	2.13	7.22
Experimental Varieties														
TF0503	free	3.6	98	97	98	98	98	6.62	1.40	1.06	0.87	0.62	3.95	10.57*
KY31-	free	3.5	98	97	98	98	99	5.94	1.11	0.89	0.83	0.70	3.53	9.47*
PPG-FTF112	free	2.6	90	89	91	94	94	5.01	0.95	0.62	0.53	0.35	2.46	7.47
SLTF10-3	free	3.5	97	96	96	95	95	5.02	0.70	0.52	0.53	0.27	2.02	7.04
Mean		3.5	97	97	97	97	97	5.88	1.04	0.80	0.68	0.50	3.01	8.90
CV,%		28.0	3	4	3	2	2	18.01	28.10	36.88	27.45	36.09	25.19	17.94
LSD,0.05		1.4	4	5	4	3	3	1.50	0.42	0.42	0.26	0.26	1.08	2.27

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

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

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 11 and 12 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 11 and 12, 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 4 through 10).

Tables 13 and 14 are summaries of yield data from 2000 to 2018 for tall fescue and from 2006 to 2018 for brome grass 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 13 and 14 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 13 and 14 to determine the yearly report that should be referenced.

Summary

Selecting a good variety of tall fescue and brome grass 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 website, forages.ca.uky.edu:

- 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

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Table 8. Dry matter yields, seedling vigor, maturity, and stand persistence of bromegrass varieties sown September 4, 2015, at Lexington, Kentucky.

Variety	Type	Seedling Vigor ¹				Maturity ²				Percent Stand								Yield (tons/acre)								
		2016		2017		2018		2015		2016		2017		2018		2016		2017		2018		2018		3-year Total		
		Oct 15, 2015	May 3	Jun 14	May 2	May 9	May 9	Oct 15	Mar 18	Oct 17	Mar 24	Oct 31	Mar 19	Oct 24	Total	Total	Total	May 9	Jun 15	Aug 3	May 9	Jun 15	Aug 3	Oct 17	Total	
Commercial Varieties-Available for Farm Use																										
MacBeth	meadow	5.0	56.0	58.5	58.0	55.5	100	100	100	100	100	97	95	95	5.61	3.74	3.74	0.46	0.79	0.64	0.46	0.79	0.64	0.55	2.44	11.78*
Peak	smooth	4.8	51.5	29.0	49.3	46.3	99	99	98	97	97	81	80	80	4.94	3.37	3.37	0.63	0.73	0.17	0.63	0.73	0.17	0.37	1.90	10.21*
Experimental Varieties																										
GO135BF	smooth	3.5	52.5	54.0	53.3	49.0	96	96	96	94	94	93	90	90	4.50	3.05	3.05	0.24	0.96	0.48	0.24	0.96	0.48	0.58	2.25	9.81
Mean		4.4	53.5	47.2	53.5	50.3	98	98	98	97	97	91	88	88	5.02	3.39	3.39	0.44	0.82	0.43	0.44	0.82	0.43	0.50	2.20	10.60
CV,%		11.3	2.9	7.8	5.2	5.5	2	2	3	4	4	8	6	6	9.79	16.25	16.25	37.87	7.00	51.09	37.87	7.00	51.09	44.47	18.62	9.81
LSD,0.05		0.9	2.6	4.0	4.9	4.8	3	3	6	7	7	12	10	10	0.85	0.95	0.95	0.29	0.10	0.38	0.29	0.10	0.38	0.38	0.71	1.80

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.

*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 bromegrass varieties sown September 8, 2016, at Lexington, Kentucky.

Variety	Type	Seedling Vigor ¹				Maturity ²				Percent Stand								Yield (tons/acre)								
		2016		2017		2018		2017		2018		2017		2018		2017		2018		2018		2-year Total				
		Oct 15, 2016	Apr 20	May 9	Jun 15	Oct 5	Mar 14	Oct 31	Mar 15	Oct 18	Total	Total	May 9	Jun 15	Aug 13	Oct 18	Total	Total	Total	May 9	Jun 15	Aug 13	Oct 18	Total		
Commercial Varieties-Available for Farm Use																										
MacBeth	meadow	4.1	56.0	54.5	60.0	97	99	99	99	99	99	99	99	99	5.75	0.97	0.83	0.83	0.84	0.90	0.83	0.90	0.75	3.44	9.19*	
Admiral	meadow	4.6	56.0	55.5	60.0	97	98	98	98	98	98	98	98	98	5.73	0.83	0.83	0.84	1.00	0.77	0.83	1.00	0.77	3.45	9.18*	
ARID	meadow	3.8	48.5	52.0	29.0	94	94	96	96	96	96	96	96	96	4.98	1.12	0.81	1.12	0.81	0.93	0.72	0.81	0.72	3.58	8.56*	
Peak	smooth	3.4	45.0	52.5	59.5	93	92	93	94	86	86	94	86	86	4.87	0.95	0.82	0.85	0.82	0.85	0.82	0.85	0.89	3.51	8.38*	
Mean		4.0	51.4	53.6	52.1	95	96	96	96	95	95	96	95	95	5.33	0.97	0.83	0.83	0.92	0.78	0.83	0.92	0.78	3.49	8.83	
CV,%		20.6	4.2	3.1	1.4	4	2	2	2	9	10.19	32.71	14.13	20.38	33.09	12.59	9.61	14.13	20.38	33.09	12.59	9.61	14.13	20.38	33.09	12.59
LSD,0.05		1.3	3.5	2.6	0.8	6	4	4	4	3	14	0.87	0.51	0.19	0.30	0.41	0.70	0.51	0.19	0.30	0.41	0.70	0.41	0.70	1.36	

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.

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

Table 10. Dry matter yields, seedling vigor, maturity, and stand persistence of bromegrass varieties sown September 8, 2017, at Lexington, Kentucky.

Variety	Type	Seedling Vigor ¹ Oct 12, 2017	Maturity ²		Percent Stand			Yield (tons/acre)				
			2018	2017	2018			May 8	Jun 15	Aug 9	Oct 18	Total
			May 8	Oct 12	Mar 14	Oct 18						
Commercial Varieties-Available for Farm Use												
Admiral	meadow	4.0	55.0	100	96	99	1.90	1.22	1.42	1.17	5.71*	
Macbeth	meadow	2.9	55.0	98	92	97	2.08	1.08	1.59	0.94	5.70*	
Peak	smooth	2.9	48.0	98	95	97	1.19	1.09	1.42	0.88	4.58	
ARID	meadow	2.1	46.3	94	88	92	1.19	1.08	1.41	0.69	4.38	
Experimental Varieties												
MB1302	meadow	3.0	54.5	98	95	97	2.09	1.24	1.46	1.07	5.86*	
MB1303	meadow	3.1	56.0	99	98	99	2.19	1.21	1.41	0.95	5.77*	
Mean		3.0	52.5	98	94	97	1.77	1.16	1.45	0.95	5.33	
CV,%		17.0	3.4	1	6	3	15.02	11.37	22.10	19.63	10.70	
LSD,0.05		0.8	2.7	2	9	4	0.40	0.20	0.48	0.28	0.86	

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.

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

Table 11. Performance of tall fescue varieties across years and locations in Kentucky.

Variety	Endophyte Status ¹	Proprietor/KY Distributor	Lexington						Quicksand	
			2015 ²			2016		2017	2016	
			16 ³	17	18	17	18	18	17	18
Commercial Varieties-Available for Farm Use										
Baguala	free	Allied Seed	x ⁴	x	x					
BarOptima PLUS E34	novel	Barenbrug USA	*	*	*	*	*	*	*	*
Bronson	free	Ampac Seed				*	*			
Cajun II	free	Smith Seed Services	*	*	x	x	*	*	*	x
Dominate	free	Allied Seed	x	x	x					
Drover	free	Barenbrug USA	*	*	*					
Estancia Arkshield	novel	Mountain View Seeds				x	*		*	*
FSG 402TF	free	Farm Science Genetics	x	x	x					
Hymark	free	Fraser Seed	*	*	*					
Kora Protek	novel	DLF-Pickseed				*	*		*	x
KY31+	toxic	Ky Agric. Exp. Station/Public	x	x	*	*	*	*	*	*
Jesup MaxQ	novel	Pennington Seed	*	x	x	*	*	*	*	*
Lacefield MaxQ II	novel	Pennington Seed	x	x	x	x	*	*	*	*
Martin 2 Protek	novel	DLF-Pickseed				*	*		*	*
Payload	free	Brett Young				x	x		*	*
Select	free	Southern States	*	x	x	*	*		x	x
SS-0705TFSL	free	Southern States	*	x	x	*	*	*	*	*
Teton II	free	Mountain View Seeds				*	*		*	*
Tower	free	DLF-Pickseed				*	x		*	*
Tower Protek	novel	DLF-Pickseed				*	*		x	x
Experimental Varieties										
BARFAF13131	free	Barenbrug USA	x	x	x					
BARFA6BTR179	free	Barenbrug USA						x		
DLFPS-FTF-73	free	DLF-Pickseed	x	*	x					
DLFPS-FTF-89	free	DLF-Pickseed	*	*	*					
DLFPS-FTF-93	free	DLF-Pickseed	*	*	*	x	x			
DLFPS-FTF-96	free	DLF-Pickseed	x	x	*	x	x			
Drover+E34	novel	Barenbrug USA	x	*	*					
FTF94	free	DLF-Pickseed						*		
IS-FTF 54 Protek	novel	DLF-Pickseed				x	x			
IS-FTF 70	free	DLF-Pickseed				*	*			
IS-FTF 73	free	DLF-Pickseed				x	x			
KY31- ⁴	free	KY Agric. Exp. Station	*	x	*	x	*	*	*	*
KYFA1102	free	KY Agric. Exp. Station	*	x	*					
KYFA1103	free	KY Agric. Exp. Station	*	*	*					
KYFA1104	free	KY Agric. Exp. Station	*	*	*					
KYFA1109	free	KY Agric. Exp. Station	*	*	*					
KYFA1110	free	KY Agric. Exp. Station	x	x	*					
KYFA1113	free	KY Agric. Exp. Station	*	*	*					

continued

Table 11. continued

Variety	Endophyte Status ¹	Proprietor/KY Distributor	Lexington						Quicksand	
			2015 ²			2016		2017	2016	
			16 ³	17	18	17	18	18	17	18
KYFA1114	free	KY Agric. Exp. Station	x	x	*					
KYFA1201	free	KY Agric. Exp. Station				*	*			
KYFA1303	free	KY Agric. Exp. Station				*	*			
KYFA1304	free							*		
KYFA1305	free	KY Agric. Exp. Station						*		
KYFA1306	free	KY Agric. Exp. Station						*		
KYFA1311	free	KY Agric. Exp. Station	*	x	x					
KYFA1404	free	KY Agric. Exp. Station						*		
KYFA1405	free	KY Agric. Exp. Station						*		
KYFA1531	free	KY Agric. Exp. Station				*	*			
KYFA1532	free	KY Agric. Exp. Station				*	*			
KYFA1533	free	KY Agric. Exp. Station				*	*			
KYFA1534	free	KY Agric. Exp. Station				*	*			
KYFA1535	free	KY Agric. Exp. Station				*	*			
KYFA1536	free	KY Agric. Exp. Station				*	*			
KYFA1537	free	KY Agric. Exp. Station				*	*			
KYFA1606	free	KY Agric. Exp. Station						x		
KYFA9304	free	KY Agric. Exp. Station				*	*	*		
KYFA9611	free	KY Agric. Exp. Station				*	x			
KYFA9732/AR584	novel	KY Agric. Exp. Station				*	*			
KYFA9821/AR584	novel	KY Agric. Exp. Station	x	x	*					
PPG-FTF 112	free	Mountain View Seeds				*	x		x	x
RAD-ERF37	free	Radix Research						*		
RAD-HAN19	free	Radix Research				x	*			
RAD-HAN33	free	Radix Research				*	*			
SLTF10-3	free	Oregro Seeds				x	x		x	x
STF50	free	Smith Seed Services						*		
TFCB1bC2	free	USDA-ARS				*	*			
TFCB3C2	free	USDA-ARS				*	*			
TFCB4C2	free	USDA-ARS				*	*			
TFCB5C2	free	USDA-ARS				*	*			
TF Soft	free	USDA-ARS				*	*			
TF0503	free	USDA-ARS				*	x		*	*

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle.

² Establishment year.

³ Harvest year.

⁴ 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. Performance of bromegrass varieties across years at Lexington.

Variety	Type	Proprietor/KY Distributor	2015 ¹			2016		2017
			2016 ²	2017	2018	2017	2018	2018
Commercial Varieties-Available for Farm Use								
Admiral	meadow	Cisco Seeds				*	*	*
ARID	smooth	Mountain View Seeds				*	*	x ³
MacBeth	meadow	Cisco Seeds	*	*	*	*	*	*
Peak	smooth	Allied Seed	*	*	*	x	*	x
Experimental Varieties								
GO-13SBF	smooth	Grassland Oregon	x	*	*			
MB1302	meadow	Allied Seed						*
MB1303	meadow	Allied Seed						*

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 13. continued

Variety	Endophyte Status ¹	Proprietor	Lexington										Princeton					Quicksand				Mean ⁴ (#trials)							
			03 ^{2,3} 2-yr ⁵	05 3-yr	07 3-yr	09 3-yr	11 3-yr	12 3-yr	13 3-yr	14 3-yr	15 3-yr	16 2-yr	02 3-yr	04 3-yr	06 3-yr	08 3-yr	10 3-yr	12 3-yr	15 2-yr	03 2-yr	05 4-yr		13 3-yr	16 2-yr					
Tuscany	free	Forage Genetics																											
Tuscany II	free	Seed Research of OR									97																		
5CAN	free	Brett Young						86																					100(3)

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle.

² Year trial was established.

³ 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 2012 was harvested 2 years, so the final report would be "2015 Tall Fescue Report" archived in the KY Forage website at <forages.ca.uky.edu>.

⁴ Mean only presented when respective variety was included in two or more trials.

⁵ Number of years of data.

Table 14. Summary of Kentucky bromegrass yield trials at Lexington 2006-2018 (yield shown as a percentage of the mean of the commercial varieties in the trial.)

Variety	Type	Proprietor/KY Distributor	2006 ^{1,2}	2008	2010	2012	2014	2015	2016	Mean ³
			4-yr ⁴	3-yr	3-yr	3-yr	3-yr	3-yr	2-yr	(#trials)
AC Knowles	hybrid	Agriculture Canada	85		82	102	89			89(4)
Admiral	meadow	Cisco Seeds							104	-
ARID	meadow	Mountain View Seeds							97	-
Bigfoot	hybrid	Grassland Oregon	108	116	105					110(3)
Canterbury	mountain	Barenbrug USA		79						-
Carlton	smooth	Pickseed USA				82	95			91(2)
Doina	smooth	Barenbrug USA		114	108					111(2)
Fleet	meadow	Agriculture Canada	110			109				110(2)
Hakari	Alaska	Barenbrug USA		85	85					85(2)
MacBeth	meadow	Cisco Seeds		136	119	107	116	107	104	115(6)
Olga	smooth	Barenbrug USA		116	101					109(2)
Peak	smooth	Allied Seed		97		100		93	95	96(4)
Persister	prairie	DLF Pickseed		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 2012 was harvested 3 years, so the final report would be "2015 Tall Fescue and Brome Report" archived in the KY Forage website at <forages.ca.uky.edu>.

³ Mean only presented when respective variety was included in two or more trials.

⁴ Number of years of data.



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