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Agricultural Experiment Station

2023 Tall Fescue, Bromegrass, and Meadow Fescue 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 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 contain 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*) is a perennial pasture and hay grass native to Europe. Smooth bromegrass has creeping underground stems or rootstocks from which the leafy stems arise. This grass is palatable to all classes of livestock, from emergence to the heading stage. Meadow bromegrass (*Bromus biebersteinii*) 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 and has the advantage of greater seedling vigor than smooth bromegrass. Hybrid bromegrass is a cross between smooth and meadow bromegrasses that combines 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 grows at moderate rates during the spring and summer season. It does not spread by rhizomes and is more suited to environments with harsh winters.

Prairie bromegrass (*Bromus wildenowii*) is a tall, cool-season, leafy, short-lived, perennial, deep-rooted bunchgrass. It was introduced from South America. Seedheads are produced throughout the growing season. 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 different habitats. It is a short-lived, perennial, cool-season, sod-forming grass. Mountain bromegrass' leafy growth and deep, well-branched root system give erosion protection on sloping ground. It is similar to California bromegrass (*Bromus carinatus*), and some consider them to be synonymous. Compared to tall fescue, the bromegrasses retain quality better as they mature and grow better during dry weather. However they are generally less well adapted to Kentucky conditions.

Meadow fescue (Festuca pratensis) is a semibunch type cool season European grass that has great winter hardiness. It will yield slightly less than tall fescue and orchardgrass, but has better digestability and palatability for grazing applications.

This report provides Kentucky yield trial data on varieties of tall fescue and similar grass species as well as guidelines for selecting tall fescue varieties. Consult the UK Forage Extension website (https://forages.ca.uky.edu) to access all forage variety testing reports from Kentucky and surrounding states as well as a large number of other forage publications.

Important Selection Considerations

Local adaptation and seasonal yield. Select a variety that is well 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). Compared to continental types, Mediterranean types mature earlier in spring and become dormant and nonproductive during the summer in Kentucky. They are also more susceptible to leaf diseases such as helminthsporium and rhizoctonia. Therefore, Mediterranean varieties are less preferred for use in Kentucky than continental types. Because Mediterranean varieties mature earlier in the spring, first-cutting yields are generally higher when the two types are harvested at the same time. However, the continental types produce more in the summer.

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. Seed of novel tall fescues 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 (grasslandrenewal.org)..

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. Please check label for 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 ensure that it will be available when needed.

Description of the Tests

Data from eleven studies are reported. Tall fescue varieties were sown at Lexington (2020, 2021, and 2022), Princeton (2021) and Quicksand (2021). Bromegrass varieites were sown in Lexington in 2020, 2021, and 2022. Meadow fescue varieties were sown in Lexington in 2020, 2021, and 2022. The soils at Lexington (Maury), Princeton (Crider) and Quicksand (Nolin) are well-drained silt loams and are well suited for tall fescue and bromegrass production.

Seedings were made at the rate of 25 pounds per acre for tall fescue and meadow 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 were at the boot stage or later. Fresh weight samples were taken at each harvest to calculate dry matter production. Management practices for these tests regarding establishment, fertility (P, K, and lime based on regular soil tests), 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 (see Table 4 for maturity scale), stand, and dry matter yields (tons/A) are reported in tables 5 through 15. Yields are given by cutting date for 2023 and as total annual production for all years of the trial. 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. 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.

Table 1. Temperature and rainfall at Lexington, Kentucky, in 2021, 2022, and 2023.

	2021				2022				2023[2]			
	Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	34	+3	4.51	+1.65	29	-2	4.93	+2.07	44	+13	6.28	+3.42
FEB	31	-4	4.60	+1.39	38	+3	7.69	+4.48	47	+12	3.73	+0.52
MAR	50	+6	5.12	+0.72	49	+5	4.27	-0.13	48	+4	4.45	+0.05
APR	54	-1	2.72	-1.16	55	0	3.71	-0.17	58	+3	2.36	-1.52
MAY	62	-2	4.34	-0.13	69	+5	3.84	-0.63	65	+1	2.53	-1.94
JUN	73	+1	6.26	+2.60	76	+4	2.10	-1.56	72	0	6.75	+3.09
JUL	75	-1	5.90	+0.90	80	+4	6.46	+1.46	78	+2	5.32	+0.32
AUG	76	+1	6.16	+2.23	77	+2	4.27	+0.34	76	+1	2.40	-1.53
SEP	69	+1	3.03	-0.17	70	+2	1.50	-1.70	71	+3	0.99	-2.21
OCT	62	+5	4.64	+2.10	57	0	0.96	-1.61	61	+4	2.30	-0.27
NOV	43	-2	2.13	-1.26	49	+4	2.1	-1.29				
DEC	47	+11	4.41	+0.43	40	+4	3.46	-0.52				
Total			53.85	+9.30			45.29	+0.74			37.11	-0.07

[1] DEP is departure from the long-term average.
[2] 2023 data is for ten months through October.

Table 2. Temperature and rainfall at Princeton, Kentucky, in 2022 and 2023.

	2022				2023[2]			
	Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP
JAN	32	-2	5.04	+1.24	43	+9	5.11	+1.31
FEB	39	+1	7.44	+3.01	46	+8	3.27	-1.16
MAR	51	+4	4.85	-0.09	48	+1	6.89	+1.95
APR	56	-2	6.41	+1.61	57	-2	2.14	-2.66
MAY	68	+1	2.54	-2.42	67	0	4.47	-0.49
JUN	75	0	3.46	-1.39	72	-3	1.59	-2.26
JUL	80	+2	4.75	+0.46	77	-1	11.23	+6.54
AUG	76	-1	5.85	+1.84	75	-1	8.87	+4.86
SEP	69	-2	0.32	-3.01	71	0	2.77	-0.56
OCT	57	-2	1.19	-1.86	59	0	3.82	+0.77
NOV	47	0	1.45	-3.18				
DEC	38	-1	3.95	-1.09				
Total			46.25	-4.88			50.16	+8.70

[1] DEP is departure from the long-term average.
[2] 2023 data is for the ten months through October.

Table 3. Temperature and rainfall at Quicksand, Kentucky, in 2022 and 2023.

	2022				2023[2]			
	Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP
JAN	32	+1	7.18	+3.89	42	+11	3.8	+0.51
FEB	40	+7	5.5	+1.90	46	+13	5.1	+1.50
MAR	49	+8	2.04	-2.30	47	+6	4.1	-0.24
APR	55	+2	3.44	-0.66	56	+3	3.0	-1.10
MAY	67	+5	7.67	+3.19	62	0	4.3	-0.18
JUN	72	+2	2.81	-1.01	68	-2	3.7	-0.12
JUL	77	+3	15.02	+10.17	74	0	3.9	-1.02
AUG	74	+1	2.16	-1.85	73	0	4.7	+0.69
SEP	67	+1	3.29	-0.23	67	+1	2.0	-1.52
OCT	56	+2	0.85	-2.06	57	+3	1.0	-1.91
NOV	50	+8	2.40	-1.48				
DEC	40	+7	2.96	-1.18				
Total			55.72	+8.38			35.6	-3.72

[1] DEP is departure from the long-term average.
[2] 2023 data is for the ten months through October.

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	1/4 of inflorescence emerged	
54	1/2 of inflorescence emerged	
56	3/4 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.

Tables 16, 17 and 18 show information about proprietors/distributors for all varieties studied 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. Remember to consider the relative spring maturity and the distribution of yield across the growing season when evaluating productivity of tall fescue and bromegrass varieties.

How to Interpret the Summary Tables

Summaries of yield data from 2004 to 2023 for tall fescue and from 2006 to 2023 for bromegrass commercial varieties are presented in Tables 19 and 20, respectively. The value for each variety in these tables is listed as a percentage of the mean of the commercial varieties entered in each specific trial. 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 19 and 20 summaries, but these comparisons can 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 more information from past years can be found in the appropriate annual reports. See the footnotes in Tables 19 and 20 to determine the yearly report that should be referenced.

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.

For more information, consult the following University of Kentucky Cooperative Extension publications related to tall fescue management. These resources are available from your county Extension office and may be accessed in the "Publications" section of the UK Forage website (https://forages.ca.uky.edu).

- Lime and Fertilizer Recommendations (AGR-1)
- Grain, Forage and Cover 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)
- Tall Fescue Novel Endophyte Varieties and Establishment for Livestock and Horse Farms (AGR-275)

About the Authors

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Table 5. Dry matter yields, seedling vigor, and stand persistence of tall fescue varieties sown August 28, 2020, at Lexington, Kentucky.

Variety	Endophyte Status[1]	Seedling Vigor[2] Sep 24, 2020	Maturity[3]			Percent Stand							Yield (tons/acre)						
			2021	2022	2023	2020	2021		2022		2023		2021	2022	2023				3-year Total
			May 7	May 9	May 10	Sep 24	Mar 24	Oct 22	Mar 22	Oct 19	Mar 20	Oct 17	Total	Total	May 10	Jun 26	Aug 15	Total	
Commercial Varieties-Available for Farm Use																			
Jesup MaxQ	novel	4.1	53.5	55.0	56.5	100	100	100	100	100	100	100	5.93	3.22	1.11	0.47	0.98	2.56	11.71*
Ranchero	free	3.6	53.5	54.5	56.5	100	100	100	100	100	100	100	5.95	2.86	1.11	0.41	0.98	2.50	11.31*
Texoma MaxQII	novel	3.5	53.5	55.5	57.0	100	100	100	100	100	100	100	5.66	3.03	1.11	0.49	1.01	2.61	11.30*
Cajun II	free	4.1	55.5	54.5	56.0	100	100	100	100	100	100	100	5.57	2.95	1.07	0.48	0.95	2.49	11.01*
SS0705TFSL	free	4.4	50.8	53.5	55.0	100	100	100	100	100	100	100	5.72	2.91	0.86	0.49	0.86	2.21	10.84*
Fillmore(FTF70)	novel	4.1	49.8	51.5	53.0	100	100	100	100	100	100	100	5.59	2.81	1.03	0.46	0.94	2.43	10.83*
Palatine	free	3.9	53.5	52.5	55.0	100	100	100	100	100	100	100	5.44	3.01	0.88	0.51	0.88	2.26	10.71*
BarOptima PLUS E34	novel	3.8	47.5	48.0	51.5	100	100	100	100	100	100	100	5.67	2.72	0.91	0.47	0.87	2.26	10.65*
Lacefield MaxQII	novel	3.4	52.5	55.0	56.0	100	100	100	100	100	100	100	5.41	2.86	0.93	0.43	0.88	2.25	10.51*
Estancia Arkshield	novel	3.6	54.0	54.0	56.0	100	100	100	100	100	100	100	5.37	2.79	0.91	0.45	0.99	2.35	10.51*
Armory	free	3.4	51.3	53.0	55.5	100	100	100	100	100	100	100	5.46	2.62	1.11	0.40	0.90	2.40	10.48*
Greendale Protek	novel	4.1	48.0	46.3	50.3	100	100	100	100	100	100	100	5.56	2.60	0.78	0.49	0.85	2.12	10.28
Martin2 Protek	novel	3.6	55.5	54.0	54.5	100	100	100	100	100	100	100	5.44	2.68	0.90	0.42	0.83	2.15	10.26
Triumphant Protek	novel	3.8	53.0	54.0	55.0	100	100	100	100	100	100	100	5.56	2.51	0.82	0.43	0.78	2.04	10.11
KY31+	toxic	3.6	52.0	53.0	55.5	100	100	100	100	100	100	100	5.04	2.44	0.91	0.47	0.95	2.33	9.81
STF43	free	3.4	45.0	46.3	49.8	100	100	100	100	100	100	100	5.17	2.61	0.65	0.44	0.77	1.86	9.65
Tower Protek	novel	3.6	45.0	45.0	48.0	100	100	100	100	100	100	100	5.03	2.31	0.67	0.58	0.87	2.12	9.46
Experimental Varieties																			
KY31-	free	4.3	50.8	52.5	55.0	100	100	100	100	100	100	100	6.29	3.43	1.17	0.59	1.12	2.88	12.60*
B-18.1788	free	3.1	57.5	56.0	58.0	100	100	100	100	100	100	100	5.89	2.81	1.09	0.46	0.96	2.50	11.21*
FTF120	free	4.3	53.5	54.5	55.5	100	100	100	100	100	100	100	5.71	2.79	0.94	0.53	0.98	2.45	10.95*
FTF100 Protek	novel	4.1	53.5	54.5	56.5	100	100	100	100	100	100	100	5.49	2.87	1.05	0.44	0.95	2.44	10.80*
BARBTR7NEA23	novel	3.0	49.8	53.5	55.0	100	100	100	100	100	100	100	5.41	2.93	1.05	0.37	0.86	2.28	10.61*
B-18.1790	free	3.5	56.0	56.0	56.0	100	100	100	100	100	100	100	5.93	2.67	0.79	0.45	0.78	2.01	10.61*
FTF117	free	3.5	54.5	55.0	56.0	100	100	100	100	100	100	100	5.42	2.89	1.01	0.47	0.81	2.30	10.61*
BARBTR7NEA21	novel	2.6	48.0	53.0	55.5	99	100	100	100	100	100	100	5.30	2.71	0.98	0.47	0.89	2.34	10.36
SETFN97	free	3.4	51.8	53.5	56.0	100	100	100	100	100	100	100	5.51	2.63	0.90	0.48	0.82	2.20	10.34
KYFA9611	free	4.0	45.0	46.3	49.3	100	100	100	100	100	100	100	5.60	2.60	0.72	0.54	0.86	2.12	10.32
B-18.1789	free	3.9	57.5	56.0	57.5	100	100	100	100	100	100	100	5.14	2.76	0.98	0.42	0.84	2.25	10.14
RAD-ERFH82	free	3.4	46.3	52.0	54.0	100	100	100	100	100	100	100	4.86	2.72	0.85	0.45	0.86	2.15	9.73
GALA16029	free	3.3	52.3	54.0	54.5	100	100	100	100	100	100	100	4.98	2.64	0.82	0.38	0.86	2.06	9.67
BAR9301BTR1	novel	3.4	46.8	47.5	52.5	100	100	100	100	100	100	100	4.96	2.33	0.76	0.45	0.76	1.97	9.27
BARFAF137	free	2.9	46.3	46.3	48.8	100	100	100	100	100	100	100	5.02	2.24	0.70	0.45	0.84	1.98	9.24
BARFA6BTR179	novel	3.4	45.0	45.0	50.8	100	100	100	100	100	100	100	4.66	2.20	0.72	0.39	0.81	1.93	8.79
BARFAF135	free	3.0	46.8	45.0	46.3	100	100	100	100	100	100	100	4.40	2.19	0.63	0.41	0.82	1.86	8.44
Mean		3.6	51.0	51.9	54.1	100	100	100	100	100	100	100	5.42	2.71	0.91	0.46	0.89	2.26	10.39
CV,5		14.7	4.5	3.1	3.1	0	0	0	0	0	0	0	16.45	16.57	18.88	19.95	16.73	14.11	14.65
LSD,0.05		0.7	3.2	2.2	2.3	1	0	0	0	0	0	0	1.25	0.63	0.24	0.13	0.21	0.45	2.13

[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 4 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, and stand persistence of tall fescue varieties sown September 10, 2021, at Lexington, Kentucky.

Variety	Endophyte Status[1]	Seedling Vigor[2] Oct 4, 2021	Maturity[3]		Percent Stand					Yield (tons/acre)					
			2022	2023	2021	2022		2023		2022	2023				2 year Total
			May 5	May 3	Oct 4	Mar 22	Oct 19	Mar 20	Oct 17	Total	May 3	Jun 22	Aug 15	Total	
Commercial Varieties-Available for Farm Use															
Texoma MaxQII	novel	3.6	54.5	53.0	99	99	99	100	100	4.49	1.41	0.66	1.06	3.13	7.62*
SS0705TFSL	free	4.3	53.0	52.0	99	99	99	100	100	4.60	1.27	0.66	1.08	3.00	7.60*
KY31+	toxic	4.0	52.5	50.5	99	99	99	99	99	4.47	1.27	0.59	1.01	2.87	7.35*
Dominate	free	4.0	55.5	54.5	100	98	98	98	98	4.43	1.25	0.51	1.03	2.80	7.23*
Greendale	free	4.3	50.5	45.0	100	100	100	100	100	4.53	1.01	0.66	1.01	2.68	7.22*
Triumphant	free	4.1	57.5	56.0	100	99	99	99	99	4.35	1.28	0.60	0.95	2.82	7.17*
Estancia Arkshield	novel	3.9	53.0	50.8	100	99	99	99	99	4.28	1.20	0.60	1.04	2.83	7.11*
Lacefield MaxQII	novel	4.1	53.5	52.0	99	99	99	99	99	4.26	1.15	0.56	1.12	2.83	7.10*
BarOptima PLUS E34	novel	4.5	51.0	46.3	100	100	100	100	100	4.39	1.01	0.57	0.96	2.54	6.93*
Cajun II	free	3.9	55.0	53.5	99	99	99	99	99	4.23	1.09	0.56	0.99	2.63	6.86*
Ranchero	free	4.1	55.0	53.5	100	100	100	100	100	4.27	1.09	0.48	0.96	2.53	6.80*
Jesup MaxQII	novel	4.0	55.0	51.5	100	100	100	100	100	4.04	1.10	0.50	0.95	2.54	6.57
Experimental Varieties															
SETFPC-5BK	free	4.0	54.5	53.5	100	100	100	100	100	4.30	1.43	0.60	0.96	3.00	7.30
SETFN97	free	3.8	52.5	52.0	99	99	99	99	99	4.29	1.19	0.59	1.16	2.94	7.23*
RAD-2030E	free	3.9	54.0	53.0	100	98	98	99	99	4.23	1.25	0.53	0.99	2.77	6.99*
KYFA9611	free	2.9	50.5	46.7	99	99	99	99	99	4.39	0.85	0.72	1.08	2.64	6.97*
KY31-	free	4.6	51.5	50.5	100	100	100	100	100	4.13	1.10	0.61	1.12	2.83	6.96*
FTF96	free	3.6	51.5	46.3	98	98	98	98	98	3.85	1.02	0.61	0.92	2.54	6.39
Mean		4.0	53.4	51.2	99	99	99	99	99	4.31	1.17	0.59	1.02	2.78	7.08
CV,%		11.4	1.9	3.3	1	1	1	1	1	9.98	15.52	15.35	17.35	12.52	9.76
LSD,0.05		0.6	1.4	2.4	2	2	2	1	1	0.61	0.26	0.13	0.25	0.50	0.99

[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 4 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 9, 2022, at Lexington, Kentucky.

Variety	Endophyte Status[1]	Seedling Vigor[2] Oct 25, 2022	Maturity[3]	Percent Stand			Yield (tons/acre)			
			2023	2022	2023		2023			
			May 3	Oct 25	Mar 20	Oct 17	May 3	Jun 15	Aug 8	Total
Commercial Varieties-Available for Farm Use										
Triumphant	free	3.6	57.0	100	100	100	3.25	1.44	1.89	6.59*
Estancia Arkshield	novel	2.5	54.5	96	97	97	2.80	1.51	2.20	6.51*
Cowgirl	free	3.3	53.5	100	99	99	2.86	1.39	2.03	6.20*
Greendale	free	3.8	50.0	100	100	100	2.65	1.69	1.84	6.18*
SS0705TFSL	free	3.5	54.5	100	98	98	2.79	1.44	1.93	6.16*
Lacefield MaxQII	novel	3.8	53.5	100	99	99	2.92	1.26	1.69	5.88*
Cajun II	free	3.6	56.0	100	100	100	2.95	1.19	1.60	5.74*
KY31+	toxic	3.9	55.0	100	99	99	2.66	1.18	1.58	5.41*
Jesup MaxQII	novel	2.5	56.0	97	96	97	2.65	1.15	1.60	5.40*
Ranchero	free	2.9	55.0	99	98	98	2.23	1.27	1.57	5.07*
BarOptima PLUS E34	novel	2.4	47.5	98	96	97	2.09	1.20	1.60	4.89*
Texoma MaxQII	novel	2.3	54.5	95	86	94	1.94	1.06	1.28	4.29
Experimental Varieties										
GTC16081/T11044	novel	3.0	56.0	96	97	97	2.99	1.42	2.16	6.57*
PST-5FDS	free	3.0	54.0	99	99	99	2.99	1.35	1.96	6.31*
RAD-TF119	free	2.1	54.5	97	96	96	2.73	1.28	1.73	5.74*
KYFA9732/AR584	novel	3.5	49.0	99	97	98	2.32	1.44	1.91	5.67*
KY31-	free	3.8	52.5	99	98	98	2.56	1.32	1.71	5.59*
GTC16077/T10942	free	3.1	56.0	98	96	97	2.47	1.25	1.84	5.57*
GTC16082/T10947	free	3.4	55.0	98	99	99	2.54	1.21	1.79	5.55*
PST-5FMP	free	1.5	45.0	93	93	94	1.85	1.41	2.20	5.45*
GTC16076/T10941	free	2.6	54.5	97	97	97	2.01	1.32	1.99	5.32*
GTC16078/T10943	free	2.6	55.5	97	97	97	2.28	1.22	1.75	5.25*
FTF96	free	2.5	49.8	96	97	96	2.16	1.32	1.73	5.21*
GTC16079/T10944	free	2.8	55.5	99	98	98	2.18	1.12	1.59	4.89*
PST-5FEDS	free	2.1	56.0	93	91	91	2.19	1.12	1.50	4.81*
GTC19068	novel	2.1	56.0	95	95	95	1.73	1.11	1.36	4.20
Mean		2.9	53.7	98	97	97	2.49	1.30	1.77	5.56
CV,%		23.3	3.4	2	4	3	28.17	25.66	25.74	24.60
LSD,0.05		1.0	2.6	3	6	4	0.99	0.47	0.64	1.93

[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 4 for complete scale.
* 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 tall fescue varieties sown September 3, 2021, at Princeton, Kentucky.

Variety	Endophyte Status[1]	Seedling Vigor[2] Oct 26, 2021	Maturity[3]		Percent Stand				Yield (tons/acre)					
			2022	2023	2021	2022		2023	2022	2023				2-year Total
			May 10	May 10	Oct 26	Apr 14	Nov 9	Nov 6	Total	May 10	Jul 11	Nov 2	Total	
Commercial Varieties-Available for Farm Use														
Triumphant	free	5.0	58.0	58.0	100	100	99	100	5.89	1.78	1.03	1.07	3.88	9.76*
SS0705TFSL	free	4.8	57.0	57.0	100	100	100	98	5.35	1.81	1.13	1.18	4.11	9.46*
Dominate	free	4.8	57.5	58.5	100	100	99	99	5.02	1.98	0.99	1.34	4.31	9.32*
Greendale	free	4.6	55.0	54.5	100	100	99	99	5.41	1.59	1.15	1.05	3.79	9.19*
Estancia Arkshield	novel	4.3	57.0	57.5	100	100	100	100	5.04	1.95	1.01	1.05	4.01	9.04*
Armory	free	4.4	56.5	57.0	100	100	100	100	4.99	1.91	1.11	0.99	4.01	9.01*
BarOptima PLUS E34	novel	4.5	54.5	54.0	100	100	99	97	5.09	1.56	0.97	1.10	3.63	8.72
Lacefield MaxQII	novel	4.9	56.5	57.5	100	100	100	100	4.67	1.81	1.00	1.10	3.91	8.58
KY31+	toxic	4.8	57.0	57.5	100	100	100	100	5.03	1.36	1.13	1.05	3.54	8.57
Experimental Varieties														
FTF96	free	3.9	55.5	55.0	100	100	100	99	5.12	1.60	1.10	1.24	3.93	9.05*
KYFA9611	free	4.6	52.5	53.0	100	100	100	98	4.75	1.49	1.15	1.31	3.95	8.70
KY31-	free	4.8	56.5	56.5	100	100	100	100	4.96	1.66	1.04	1.00	3.71	8.67
Mean		4.6	56.1	56.3	100	100	100	99	5.11	1.71	1.07	1.12	3.90	9.01
CV,%		7.5	1.7	2.4	0	0	1	2	9.05	13.04	8.80	16.81	10.05	7.54
LSD,0.05		0.5	1.3	1.9	0	0	1	2	0.66	0.32	0.14	0.27	0.56	0.98

[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 4 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, and stand persistence of tall fescue varieties sown September 13, 2021, at Quicksand, Kentucky.

Variety	Endophyte Status[1]	Seedling Vigor[2] Oct 12, 2021	Percent Stand					Yield (tons/acre)					
			2021	2022		2023		2022	2023				2-year Total
			Oct 12	Apr 11	Nov 2[3]	Mar 9	Oct 25	Total	Apr 26	Jun 20	Oct 12	Total	
Commercial Varieties-Available for Farm Use													
Cajun II	free	4.9	100	100	100	100	100	5.21	1.49	1.04	1.14	3.67	8.88*
KY31+	toxic	4.9	100	100	100	100	100	5.06	1.15	0.95	1.21	3.31	8.37*
Lacefield MaxQII	novel	4.6	100	100	100	100	100	4.77	1.08	0.89	1.29	3.26	8.03*
Ranchero	free	5.0	100	100	100	100	100	4.63	1.24	0.83	1.03	3.10	7.73
Jesup MaxQII	novel	4.8	100	100	100	100	100	4.66	1.17	0.78	1.02	2.98	7.64
SS0705TFSL	free	5.0	100	100	100	100	100	4.87	0.86	0.64	1.10	2.59	7.46
Texoma MaxQII	novel	4.8	100	100	100	100	100	4.38	0.96	0.73	0.98	2.67	7.05
Estancia Arkshield	novel	4.9	100	100	100	100	100	4.12	1.07	0.71	0.84	2.62	6.74
Palatine	free	5.0	100	100	100	100	100	4.18	0.97	0.62	0.81	2.39	6.58
BarOptima PLUS E34	novel	5.0	100	100	100	100	100	4.23	0.76	0.57	0.68	2.00	6.23
Experimental Varieties													
RAD-2030E	free	4.9	100	100	100	100	100	4.73	1.37	0.83	0.90	3.10	7.83*
KY31-	free	5.0	100	100	100	100	100	4.28	1.01	0.71	0.92	2.65	6.93
Mean		4.9	100	100	100	100	100	4.59	1.10	0.78	0.99	2.87	7.45
CV,%		4.1	0	0	0	0	0	12.91	15.11	21.14	28.05	14.24	9.98
LSD,0.05		0.3	0	0	0	0	0	0.86	0.24	0.24	0.41	0.60	1.09

[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] Survived historic flood at this location on July 28, 2022. The entire trial was under water for three days.
* 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 August 28, 2020, at Lexington, Kentucky.

Variety	Type	Seedling Vigor[1] Sep 24, 2020	Maturity[2]			Percent Stand							Yield (tons/acre)						
			2021	2022	2023	2020	2021		2022		2023		2021	2022	2023				3-year Total
			Apr 30	May 16	May 5	Sep 24	Mar 24	Oct 22	Mar 22	Oct 18	Mar 20	Oct 17	Total	Total	May 5	Jun 8	Aug 9	Total	
Commercial Varieites-Available for Farm Use																			
Macbeth	meadow	3.5	55.5	58.0	56.0	100	100	100	100	99	99	99	5.65	2.67	0.50	0.63	0.88	2.01	10.33*
Arsenal	meadow	3.0	56.0	58.0	57.0	100	100	100	100	98	98	97	5.71	2.48	0.58	0.52	0.94	2.04	10.24
Admiral	meadow	3.6	56.0	58.0	57.0	100	100	100	100	99	96	96	5.46	2.47	0.58	0.60	0.90	2.08	10.01*
Peak	smooth	4.1	46.3	54.5	50.0	100	100	100	100	100	99	99	4.91	2.62	0.57	0.72	0.92	2.21	9.73*
Artillery	smooth	4.0	45.0	57.0	48.8	100	100	100	100	100	100	100	4.16	2.39	0.68	0.72	0.80	2.21	8.76*
Experimental Varieties																			
MB1302	meadow	3.4	55.0	57.5	56.0	100	100	100	100	97	98	98	5.17	2.20	0.48	0.53	0.83	1.84	9.20*
Mean		3.6	52.3	57.2	54.1	100	100	100	100	99	98	98	5.18	2.47	0.56	0.62	0.88	2.06	9.71
CV,%		18.9	2.5	2.0	2.3	1	0	0	1	2	2	2	19.15	9.41	24.95	8.66	16.54	13.18	14.37
LSD,0.05		1.0	1.9	1.7	1.8	1	0	0	1	3	3	3	1.49	0.35	0.21	0.08	0.22	0.41	2.10

[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 11. Dry matter yields, seedling vigor, maturity, and stand persistence of bromegrass varieties sown September 10, 2021, at Lexington, Kenyucky.

Variety	Type	Seedling Vigor[1] Oct 4, 2021	Maturity[2]		Percent Stand					Yield (tons/acre)					
			2022	2023	2021	2022		2023		2022	2023				2-year Total
			May 5	May 5	Oct 4	Mar 22	Oct 19	Mar 20	Oct 17	Total	May 6	Jun 8	Aug 9	Total	
Commercial Varieties-Available for Farm Use															
Arsenal	meadow	4.9	58.0	56.0	99	99	99	99	98	4.53	0.96	0.72	0.94	2.62	7.15*
Macbeth	meadow	4.6	57.0	56.0	100	99	99	99	98	4.43	0.73	0.77	0.76	2.26	6.70
Admiral	meadow	4.6	56.0	57.0	100	99	99	99	99	4.19	0.78	0.64	0.87	2.29	6.48*
Stratus	meadow	4.5	56.5	56.0	96	96	96	97	97	4.21	0.76	0.71	0.72	2.19	6.40*
Artillery	smooth	4.9	52.0	50.0	100	98	99	99	99	3.62	1.01	0.62	0.74	2.37	5.99
Peak	smooth	4.5	53.0	50.5	97	94	96	97	97	3.33	0.66	0.83	0.78	2.27	5.60
Experimental Varieties															
MB1302	meadow	4.8	57.5	56.5	98	99	99	99	99	4.36	0.76	0.66	0.73	2.16	6.52*
MB1303	meadow	4.6	58.0	56.0	100	100	100	99	99	3.76	0.80	0.68	0.82	2.29	6.05
Mean		4.7	56.0	54.8	99	98	98	98	98	4.05	0.81	0.70	0.79	2.31	6.36
CV,%		7.0	2.0	1.5	1	1	1	1	1	9.90	17.44	8.36	19.00	12.77	8.94
LSD,0.05		0.5	1.7	1.2	2	2	2	2	2	0.59	0.21	0.09	0.22	0.43	0.84

[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 12. Dry matter yields, seedling vigor, maturity, and stand persistence of bromegrass varieties sown September 9, 2022, at Lexington, Kentucky.

Variety	Type	Seedling Vigor[1] Oct 25, 2022	Maturity[2]	Percent Stand			Yield(tons/acre)			
			2023	2022	2023		2023			
			May 5	Oct 25	Mar 20	Oct 17	May 5	Jun 8	Aug 8	Total
Commercial Varieties-Available for Farm Use										
Stratus	meadow	3.6	57.0	90	90	91	3.89	0.97	1.87	6.72*
Arsenal	meadow	4.1	57.5	95	94	96	3.90	0.90	1.90	6.70*
CDC Torsion	meadow	3.1	56.5	95	89	90	3.37	1.01	1.62	6.26*
Admiral	meadow	4.1	57.5	98	96	96	3.67	0.90	1.65	6.20*
ARID	smooth	4.4	50.3	96	94	88	3.83	0.73	1.58	6.14*
Macbeth	meadow	4.3	57.0	95	94	94	3.45	0.83	1.62	5.90*
Artillery	smooth	5.0	53.0	98	97	95	3.74	0.68	1.43	5.85*
Champaign	meadow	2.0	56.0	63	53	60	2.76	0.85	2.02	5.62
Peak	smooth	3.6	50.3	96	81	81	2.73	0.86	1.75	5.31
AAC Torque	hybrid	2.9	55.5	87	74	71	2.21	0.81	1.71	4.80
Mean		3.7	55.1	91	86	86	3.40	0.86	1.71	5.98.
CV,%		20.7	3.4	5	9	8	14.81	13.56	16.89	10.88
LSD,0.05		1.1	2.7	7	12	10	0.78	0.17	0.42	1.01

[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 meadow fescue varieties sown August 28, 2020, at Lexington, Kentucky.

Variety	Seedling Vigor[1] Sep 24, 2020	Maturity[2]			Percent Stand							Yield (tons/acre)					3-year Total
		2021	2022	2023	2020	2021		2022		2023		2021	2022	2023			
		May 13	May 16	May 16	Sep 24	Mar 24	Oct 22	Mar 22	Oct 18	Mar 20	Oct 17	Total	Total	May 17	Aug 16	Total	
Commercial Varieties-Available for Farm Use																	
BARFFHDR	3.9	48.8	50.3	55.0	100	100	100	100	98	90	53	4.87	1.35	0.42	0.62	1.04	7.26*
Raskila	4.0	45.0	49.8	49.5	100	100	100	100	91	43	18	5.27	1.35	0.19	0.07	0.25	6.87*
Pradel	4.8	49.3	50.3	54.0	100	99	98	95	88	45	13	4.40	1.18	0.14	0.18	0.32	5.90
Experimental Varieties																	
KYFF1301	4.3	50.0	51.0	52.5	100	100	100	100	96	56	14	4.55	1.34	0.11	0.20	0.31	6.20*
Mean	4.2	48.3	50.3	52.7	100	100	99	99	93	56	24	4.77	1.31	0.22	0.27	0.48	6.56
CV,%	11.9	4.4	5.4	5.6	0	1	1	2	5	43	55	8.32	18.05	53.06	44.26	41.14	10.49
LSD,0.05	0.8	3.4	4.4	5.0	0	2	2	3	7	40	22	0.64	0.38	0.18	0.19	0.32	1.10

[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. Dry matter yields, seedling vigor, maturity, and stand persistence of meadow fescue varieties sown September 10, 2021, at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 4, 2021	Maturity[2]		Percent Stand					Yield (tons/acre)				
		2022	2023	2021	2022		2023		2022	2023			2-year Total
		May 16	May 16	Oct 4	Mar 22	Oct 19	Mar 20	Oct 17	Total	May 16	Jun 16	Total	
Commercial Varieties-Availablr for Farm Use													
BARFFHDR	4.9	56.0	55.5	100	100	100	100	94	5.41	0.83	0.99	1.83	7.23*
Raskila	4.3	55.5	55.5	96	98	98	99	97	5.47	0.88	0.85	1.73	7.20*
Pradel	4.8	56.0	55.5	100	100	100	99	95	5.38	0.71	1.02	1.73	7.12*
Experimental Varieties													
KYFP1301	4.6	56.0	56.0	100	100	100	100	99	5.06	0.72	0.97	1.69	6.75*
Mean	4.6	55.9	55.6	99	99	99	99	96	5.33	0.79	0.96	1.74	7.07
CV,%	12.0	0.9	1.5	4	1	1	1	5	7.74	14.41	11.22	10.00	6.47
LSD,0.05	0.9	0.8	1.3	6	2	2	1	8	0.66	0.18	0.17	0.28	0.73

[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 15. Dry matter yields, seedling vigor, maturity, and stand persistence of meadow fescue varieties sown September 9, 2022, at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct. 25, 2022	Maturity[2] 2023 May 16	Percent Stand			Yield (tons/acre)			
			2022	2023		2023			
			Oct 25	Mar 20	Oct 17	May 16	Jun 28	Aug 8	Total
Commercial Varieties-Available for Farm Use									
Pradel	4.0	58.0	99	99	99	2.74	0.73	0.73	4.20*
Raskila	4.1	56.0	99	99	99	2.57	0.68	0.81	4.06*
Hyperbola	4.1	57.0	100	100	100	2.32	0.67	0.74	3.73*
Experimental Varieties									
KYFP1301	4.9	57.5	100	100	100	2.13	0.60	0.70	3.43*
Mean	4.3	57.1	99	99	99	2.44	0.67	0.75	3.85
CV,%	7.3	2.0	1	1	1	24.25	18.34	14.59	16.07
LSD,0.05	0.5	1.9	1	1	1	0.95	0.20	0.17	0.99

[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 16. Proprietors of tall fescue varieties in current trials.

Variety	Endophyte Status	Proprietor/KY distributor
Commercial Varieties-Available for Farm Use		
Armory	free	Barenbrug USA
BarOptima PLUS E34	novel	Barenbrug USA
Cajun II	free	Smith Seed Services
Cowgirl	free	Pure-Seed Testing
Dominate	free	Allied Seed
Estancia Arkshield	novel	Mountain View Seeds
Fillmore(FTF70)	free	DLF-Pickseed
Greendale	free	DLF-Pickseed
Greendale Protek	novel	DLF-Pickseed
KY31+	toxic	Ky Agric. Exp. Station/Public
Jesup MaxQ	novel	Pennington Seed
Jesup MaxQII	novel	Pennington Seed
Lacefield MaxQ II	novel	Pennington Seed
Martin 2 Protek	novel	DLF-Pickseed
Palatine	free	Mountain View Seeds
Ranchero	free	Smith Seed Services
SS-0705TFSL	free	Southern States
STF43	free	Barenbrug USA
Texoma MaxQII	novel	DLF-Pickseed
Tower Protek	novel	DLF-Pickseed
Triumphant	free	DLF-Pickseed
Triumphant Protek	novel	DLF-Pickseed
Experimental Varieties[1]		
BARBTR7NEA21	novel	Barenbrug USA
BARBTR7NEA23	novel	Barenbrug USA
BARFAF135	free	Barenbrug USA
BARFAF137	free	Barenbrug USA
BARFA6BTR179	novel	Barenbrug USA
BAR9301BTR1	novel	Barenbrug USA
B-18.1788	free	Blue Moon Farms
B-18,1789	free	Blue Moon Farms
B-18.1790	free	Blue Moon Farms
FTF96	free	DLF-Pickseed
FTF100 Protek	novel	DLF-Pickseed
FTF117	free	DLF-Pickseed
FTF120	free	DLF-Pickseed
GTC16076/T10941	free	Univ. of Georgia
GTC16077/T10942	free	Univ. of Georgia
GTC16078/T10943	free	Univ. of Georgia
GTC16079/T10944	free	Univ. of Georgia
GTC16081/T11044	novel	Univ. of Georgia
GTC16082/T10947	free	Univ. of Georgia
GTC19068	novel	Univ. of Georgia
GALA16029	free	Univ. of Georgia
KY31-	free	KY Agric. Exp. Station
KYFA9611	free	KY Agric. Exp. Station
PST-5FDS	free	Pure-Seed Testing
PST-5FEDS	free	Pure-Seed Testing
PST-5FMP	free	Pure-Seed Testing
RAD-ERFH82	free	Radix Research
RAD-TF119	free	Radix Research
RAD-2030E	free	Radix Research
SETFN97	free	Smith Seed Services
SETFPC-5BK	free	Smith Seed Services

[1] Experimental varieties are not available commercially, but provide an indication of the progress being made by forage breeding companies.

Table 17. Proprietors of bromegrass varieties in current trials.

Variety	Type	Proprietor/KY Distributor
Commercial Varieties-Available for Farm Use		
AAC Torque	hybrid	Brett Young Seeds
Admiral	meadow	Cisco Seeds
Arid	smooth	Mountain View Seeds
Arsenal	meadow	Barenbrug USA
Artillery	meadow	Barenbrug USA
CDC Torsion	meadow	Brett Young Seeds
Champaign	meadow	Mountain View Seeds
MacBeth	meadow	Cisco Seeds
Peak	smooth	Allied Seed
Stratus	meadow	Allied Seed
Experimental Varieties[1]		
MB1302	meadow	Allied Seed
MB1303	meadow	Allied Seed

[1] Experimental varieties are not available commercially, but provide an indication of the progress being made by forage breeding companies.

Table 18. Proprietors of meadow fescue varieties in current trials.

Variety	Proprietor/KY Distributor
Commercial Varieties-Available for Farm Use	
BARFP HDR	Barenbrug USA
Hyperbola	DLF Pickseed
Pradel	Barenbrug USA
Raskila	Columbia Seeds
Experimental Varieties[1]	
KYFF1301	Ky Agric. Exp. Station

[1] Experimental varieties are not available commercially, but provide an indication of the progress being made by forage breeding companies.

Table 19. Summary of Kentucky tall fescue yield trials 2005-2023 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Endophyte Status[1]	Proprietor	Lexington														Princeton								Quicksand					Mean[4] (#trials)
			05[2,3]	07	09	11	12	13	14	15	16	17	18	19	20	21	06	08	10	12	15	17	19	21	05	13	16	18	21	
			3-yr[5]	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	2-yr	3-yr	3-yr	3-yr	3-yr	2-yr	3-yr	3-yr	2-yr	4-yr	3-yr	3-yr	3-yr	2-yr	
Atlas Select	free	ProSeeds Marketing																95												–
Aprilia	free	ProSeeds Marketing																93												–
Armory	free	Barenbrug USA												98	99								98	99						99(4)
Baguala	free	Allied Seed								92											96									94(2)
BarElite	free	Barenbrug USA		96		100													92											96(3)
BARFASTF-43	free	Barenbrug USA												99									85							92(2)
Bariane	free	Barenbrug USA	99																						95					97(2)
Barolex	free	Barenbrug USA	90																											–
BarOptima PLUS E34	novel	Barenbrug USA	122	99		107	108	102	99	113	99	90	95	102	101	97			99	100	96	105	102	96		93	118	85	83	101(23)
Bronson	free	Ampac Seed	88	97	105	102	99	99			100			110					101	91	103				102					100(12)
Brutus	free	Saddle Butte Ag. Inc.							90																					–
Bull	free	Improved Forages	102				100						100							99						95				99(5)
Cajun II	free	Smith Seed Services				97		105	99	99	98	107	109	99	104	96			101		104	91	111			90	96	104	119	102(18)
Cowgirl	free	Rose-AgriSeeds					94											102	100	98										99(4)
DLFPS-FTF 100 Protek	novel	DLF Pickseed												98									80							89(2)
Dominate	free	Allied Seed								90						101					99			103						98(4)
Drover	free	Barenbrug USA							105	120																				113(2)
DuraMax GOLD	novel	DLF Pickseed				102											106													104(2)
Enhance	free	Allied Seed				93																								–
Estancia ArkShield	novel	Mountain View Seeds					106				96		105	99	100	100				102			102	100			103		90	100(11)
Fillmore(FTF70)	free	DLF Pickseed													103															–
Flourish	free	Allied Seed					92													101										97(2)
FSG 402TF	free	Farm Science Genetics								92											103									98(2)
Goliath	free	Ampac Seed			100			104											99											101(3)
Greendale	free	DLF Pickseed												105		101							113	101						105(4)
Greendale Protek	novel	DLF Pickseed												106	97								116							107(3)
HyMark	free	Fraser Seeds				91				104								102			103									100(4)
Jesup EF	free	Pennington Seed				98	105												103	100										102(4)
Jesup MaxQ	novel	Pennington Seed	98	101	110	103	100	93	106	102	111	104	101		111			95	100	98	98	103			102	100	116	105		103(21)
Jesup MaxQII	novel	Pennington Seed												103		92													102	99(3)
Kentucky 32	free	Oregro Seeds				93	94		101				83	101				98	94	101										96(8)
Kokanee	free	Smith Seed Services												81																–
Kora Protek	novel	DLF Pickseed									101																86			94(2)
KY31+	toxic	KY Agric Exp Sta.	108	102	102	93	95	103	100	99	103	101	107	71	93	103	104	93	112	101	92	105	105	94	110	110	110	107	112	101(27)
Lacefield MaxQ II	novel	Pennington Seed		109				97	104	93	92	94	106	112	100	100	101	106			105	100		95		113	102	95	107	102(19)
Martin2 Protek	novel	DLF Pickseed				104					96			105	97								99				106			101(6)
Nanryo	free	Jap. Grassland ForageSeed/		96																										–
Noria	free	ProSeeds Marketing		98																										–
Palatine	free	Mountain View Seeds													101														88	95(2)
Payload	free	Brett Young									89																111			100(2)
RAD-ERF50	free	Radix Research, Inc.																113												–
Ranchero	free	Smith Seed Services										92		101	107	95						96	107						103	100(7)
Savory	free	DLF Pickseed															91													–
Select	free	Southern States	99	99	98	90	100	97	103	97	102						102	105	99	100	99				91	99	86			98(17)
SS-0705TFSL	free	Southern States							99	99	106	111	94	110	103	107					103	101		104			101	104	100	103(14)
STF43	free	Barenbrug USA													91															–
Stockman	free	Seed Research of OR															97													–
Teton II	free	Mountain View Seeds				107	105		96		103									99							91			100(6)
Texoma MaxQ II	novel	Pennington Seed	95											111	107	107													94	105(4)

(continued on the next page)

Table 19. Summary of Kentucky tall fescue yield trials 2005-2023 (continued).

Variety	Endophyte Status[1]	Proprietor	Lexington														Princeton								Quicksand					Mean[4] (#trials)
			05[2,3]	07	09	11	12	13	14	15	16	17	18	19	20	21	06	08	10	12	15	17	19	21	05	13	16	18	21	
			3-yr[5]	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	3-yr	2-yr	3-yr	3-yr	3-yr	3-yr	2-yr	3-yr	3-yr	2-yr	4-yr	3-yr	3-yr	3-yr	2-yr	
TF0203G	free	Seed Research of OR		87																										–
Tower	free	DLF Pickseed									101			105									96				91			98(4)
Tower Protek	novel	DLF Pickseed				98					104			102	90								92				81			94(5)
Triumphant	free	DLF Pickseed												95		101							95	108						100(4)
Triumphant Protek	novel	DLF Pickseed												96	96								97							97(3)
Tuscany II	free	Seed Research of OR					97										98			106										–
Velvet	free	Oregro Seeds												91																–
5CAN	free	Brett Young			86																									–

[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 the fall of 2016 was harvested three years, so the final report would be "2019 Tall Fescue Report" archived in the UK Forage website (https://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 20. Summary of Kentucky bromegrass yield trials at Lexington 2006-2023 (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	2017	2018	2019	2020	2021	Mean[3] (#trials)
			4-yr[4]	3-yr	3-yr	3-yr	3-yr	3-yr	4-yr	3-yr	3-yr	3-yr	3-yr	2-yr	
AC Knowles	hybrid	Agriculture Canada	85		82	102	89								89(4)
Admiral	meadow	Cisco Seeds							107	106	100	100	102	101	103(6)
Arid	smooth	Mountain View Seeds							94	93					94(2)
Arsenal	meadow	Barenbrug USA									106	106	104	112	107(4)
Artillery	smooth	Barenbrug USA									100	99	89	94	96(4)
Bigfoot	hybrid	Grassland Oregon	108	116	105										110(3)
Canterbury	mountain	Barenbrug USA		79											–
Carlton	smooth	Pickseed USA				82	95				85				87(3)
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	103	123	100	95	105	105	111(11)
Olga	smooth	Barenbrug USA		116	101										109(2()
Peak	smooth	Allied Seed		97		100		93	95	88	103		99	88	97(8)
Persister	prairie	DLF Pickseed		72											–
RAD-BI29	smooth	Columbia Seeds	96	86											91(2)
Stratus	meadow	Allied Seed												100	–

[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 the fall of 2016 was harvested three years, so the final report would be "2019 Tall Fescue and Brome Report" archived in the UK Forage website (https://forages.ca.uky.edu).
[3] Mean only presented when respective variety was included in two or more trials.
[4] Number of years of data.

Notes

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