

2024 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 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. 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 digestibility 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 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.

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 twelve studies are reported. Tall fescue varieties were sown at Lexington (2021, 2022, and 2023), Princeton (2021 and 2023) and Quicksand (2021). Bromegrass varieties were sown in Lexington in 2021, 2022, and 2023. Meadow fescue varieties were sown in Lexington in 2021, 2022, and 2023. The soils at Lexington (Maury), Princeton (Crider) and Quicksand (Nolin) are well-drained silt loams and are well suited for tall fescue, bromegrass, and meadow fescue 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 16. Yields are given by cutting date for 2024 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 2022, 2023, and 2024.

	2022				2023				2024 ²			
	Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	29	-2	4.93	+2.07	44	+13	6.28	+3.42	32	+1	5.50	+2.60
FEB	38	+3	7.69	+4.48	47	+12	3.73	+0.52	44	+9	3.90	+0.70
MAR	49	+5	4.27	-0.13	48	+4	4.45	+0.05	49	+5	3.50	-0.90
APR	55	0	3.71	-0.17	58	+3	2.36	-1.52	58	+3	3.90	0.00
MAY	69	+5	3.84	-0.63	65	+1	2.53	-1.94	67	+3	4.60	+0.10
JUN	76	+4	2.10	-1.56	72	0	6.75	+3.09	74	+2	2.40	-1.30
JUL	80	+4	6.46	+1.46	78	+2	5.32	+0.32	77	+1	2.50	-2.50
AUG	77	+2	4.27	+0.34	76	+1	2.40	-1.53	75	0	3.30	-0.60
SEP	70	+2	1.50	-1.70	71	+3	0.99	-2.21	70	+2	6.20	+3.00
OCT	57	0	0.96	-1.61	61	+4	2.30	-0.27	58	+1	0.30	-2.30
NOV	49	+4	2.1	-1.29	49	+4	1.70	-1.69				
DEC	40	+4	3.46	-0.52	44	+8	2.41	-1.57				
Total			45.29	+0.74			41.22	-3.33			36.10	-1.10

¹ DEP is departure from the long-term average.

² 2024 data is for ten months through October.

Table 2. Temperature and rainfall at Princeton, Kentucky, in 2022, 2023, and 2024.

	2022				2023				2024 ²			
	Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	32	-2	5.04	+1.24	43	+9	5.11	+1.31	33	-1	6.42	2.62
FEB	39	+1	7.44	+3.01	46	+8	3.27	-1.16	47	9	1.68	-2.75
MAR	51	+4	4.85	-0.09	48	+1	6.89	+1.95	52	5	1.4	-3.54
APR	56	-2	6.41	+1.61	57	-2	2.14	-2.66	61	2	3.44	-1.36
MAY	68	+1	2.54	-2.42	67	0	4.47	-0.49	70	3	8.92	3.96
JUN	75	0	3.46	-1.39	72	-3	1.59	-2.26	75	0	4.36	0.51
JUL	80	+2	4.75	+0.46	77	-1	11.23	+6.54	77	-1	3.56	-0.73
AUG	76	-1	5.85	+1.84	75	-1	8.87	+4.86	76	-1	0.40	-3.61
SEP	69	-2	0.32	-3.01	71	0	2.77	-0.56	72	1	6.57	3.24
OCT	57	-2	1.19	-1.86	59	0	3.82	+0.77	62	3	0.43	-2.62
NOV	47	0	1.45	-3.18	49	+2	1.26	-3.37				
DEC	38	-1	3.95	-1.09	43	+4	1.73	-3.31				
Total			46.25	-4.88			53.15	+2.02			37.18	-4.28

¹ DEP is departure from the long-term average.

² 2024 data is for the ten months through October.

Table 3. Temperature and rainfall at Quicksand, Kentucky, in 2022, 2023, and 2024.

	2022				2023				2024 ²			
	Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	32	+1	7.18	+3.89	42	+11	3.80	+0.51	35	+4	4.07	+0.78
FEB	40	+7	5.5	+1.90	46	+13	5.10	+1.50	45	+12	5.39	+1.79
MAR	49	+8	2.04	-2.30	47	+6	4.10	-0.24	52	+11	2.26	-2.08
APR	55	+2	3.44	-0.66	56	+3	3.00	-1.10	60	+7	3.10	-1.00
MAY	67	+5	7.67	+3.19	62	0	4.30	-0.18	67	+5	4.37	-0.11
JUN	72	+2	2.81	-1.01	68	-2	3.70	-0.12	73	+3	4.05	+0.23
JUL	77	+3	15.02	+10.17	74	0	3.90	-1.02	76	+2	3.20	-2.05
AUG	74	+1	2.16	-1.85	73	0	4.70	+0.69	74	+1	4.54	+0.53
SEP	67	+1	3.29	-0.23	67	+1	2.00	-1.52	68	+2	4.27	+0.75
OCT	56	+2	0.85	-2.06	57	+3	1.00	-1.91	58	+4	0.19	-2.72
NOV	50	+8	2.4	-1.48	49	+7	1.66	-2.22				
DEC	40	+7	2.96	-1.18	44	+11	2.95	-1.19				
Total			55.72	+8.38			40.21	-7.13			35.44	-3.88

¹ DEP is departure from the long-term average.

² 2024 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. Further subdivision by means of leaf development index (see text).
12	2 leaves unfolded	
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 17, 18, and 19 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 brome grass varieties.

How to Interpret the Summary Tables

Summaries of yield data from 2007 to 2024 for tall fescue varieties, 2006 to 2024 for brome grass varieties, and 2019-2024 for meadow fescue varieties are presented in tables 20, 21, and 22, 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 20, 21, and 22 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 20, 21 and 22 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.

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, maturity, 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)							3-year Total
			2022	2023	2024	2021	2022		2023		2024		2022	2023	2024						
			May 5	May 3	Apr 30	Oct 4	Mar 22	Oct 19	Mar 20	Oct 17	Mar 20	Oct 18	Total	Total	Apr 30	Jun ⁴	Aug 22	Oct 21	Total		
Commercial Varieties-Available for Farm Use																					
Texoma MaxQII	novel	3.6	54.5	53.0	54.0	99	99	99	100	100	100	100	4.49	3.13	1.03	–	0.97	0.22	2.22	9.84*	
SS0705TFSL	free	4.3	53.0	52.0	53.5	99	99	99	100	100	100	99	4.60	3.00	0.86	–	1.05	0.21	2.12	9.72*	
Triumphant	free	4.1	57.5	56.0	56.0	100	99	99	99	99	99	99	4.35	2.82	0.90	–	1.03	0.29	2.22	9.39*	
KY31+	toxic	4.0	52.5	50.5	52.0	99	99	99	99	99	99	100	4.47	2.87	0.86	–	0.94	0.18	1.99	9.33*	
Dominate	free	4.0	55.5	54.5	55.0	100	98	98	98	98	99	98	4.43	2.80	1.01	–	0.81	0.22	2.04	9.27*	
Lacefield MaxQII	novel	4.1	53.5	52.0	53.0	99	99	99	99	99	100	99	4.26	2.83	0.84	–	0.97	0.23	2.03	9.13*	
Cajun II	free	3.9	55.0	53.5	54.0	99	99	99	99	99	99	100	4.23	2.63	1.00	–	0.92	0.27	2.19	9.05*	
Estancia Arkshield	novel	3.9	53.0	50.8	53.5	100	99	99	99	99	99	99	4.28	2.83	0.81	–	0.87	0.23	1.92	9.03*	
Greendale	free	4.3	50.5	45.0	50.0	100	100	100	100	100	100	100	4.53	2.68	0.69	–	0.88	0.22	1.80	9.01*	
BarOptima PLUS E34	novel	4.5	51.0	46.3	50.5	100	100	100	100	100	100	100	4.39	2.54	0.80	–	0.89	0.21	1.90	8.83*	
Rancho	free	4.1	55.0	53.5	53.5	100	100	100	100	100	100	100	4.27	2.53	0.90	–	0.85	0.20	1.95	8.75*	
Jesup MaxQII	novel	4.0	55.0	51.5	54.0	100	100	100	100	100	100	100	4.04	2.54	0.85	–	0.90	0.22	1.98	8.55	
Experimental Varieties																					
SETFPC-5BK	free	4.0	54.5	53.5	53.5	100	100	100	100	100	100	100	4.30	3.00	1.02	–	0.95	0.27	2.23	9.53*	
SETFN97	free	3.8	52.5	52.0	53.5	99	99	99	99	99	99	99	4.29	2.94	0.91	–	0.82	0.23	1.97	9.20*	
RAD-2030E	free	3.9	54.0	53.0	54.0	100	98	98	99	99	99	99	4.23	2.77	0.87	–	0.84	0.24	1.95	8.95*	
KY31-	free	4.6	51.5	50.5	51.5	100	100	100	100	100	100	100	4.13	2.83	0.89	–	0.92	0.17	1.98	8.94*	
KYFA9611	free	2.9	50.5	46.7	50.7	99	99	99	99	99	82	87	4.39	2.64	0.66	–	0.92	0.20	1.77	8.73*	
FTF96	free	3.6	51.5	46.3	50.5	98	98	98	98	98	98	98	3.85	2.54	0.89	–	0.88	0.20	1.97	8.36	
Mean		4.0	53.4	51.2	53.0	99	99	99	99	99	98	99	4.31	2.78	0.88		0.91	0.22	2.02	9.09	
CV,%		11.4	1.9	3.3	2.1	1	1	1	1	1	8	6	9.98	12.52	14.35		20.92	29.78	12.78	9.39	
LSD,0.05		0.6	1.4	2.4	1.6	2	2	2	1	1	12	8	0.61	0.50	0.18		0.27	0.09	0.37	1.22	

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.

⁴ There was no late June harvest because of minimal regrowth after the first harvest.

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

Table 6. Dry matter yields, seedling vigor, maturity, and stand persistence of tall fescue varieties sown September 9, 2022, at Lexington, Kentucky.

Variety	Endophyte Status ¹	Seedling Vigor ² Oct 25, 2022	Maturity ³		Percent Stand				Yield (tons/acre)					2-year Total	
			2023	2024	2022	2023		2024		2023	2024				
			May 3	Apr 30	Oct 25	Mar 20	Oct 17	Mar 20	Oct 18	Total	Apr 30	Jun 24	Oct 22		Total
Commercial Varieties-Available for Farm Use															
Triumphant	free	3.6	57.0	56.0	100	100	100	100	100	6.59	1.89	0.79	0.27	2.96	9.55*
Estancia Arkshield	novel	2.5	54.5	54.5	96	97	97	97	97	6.51	1.86	0.81	0.21	2.88	9.39*
Cowgirl	free	3.3	53.5	51.5	100	99	99	99	99	6.28	1.69	0.80	0.19	2.68	8.96*
SS0705TFSL	free	3.5	54.5	53.0	100	98	98	99	99	6.16	1.54	0.69	0.22	2.44	8.61*
Greendale	free	3.8	50.0	50.0	100	100	100	100	100	6.18	1.31	0.77	0.21	2.30	8.47*
Lacefield MaxQII	novel	3.8	53.5	53.0	100	99	99	100	100	5.88	1.68	0.62	0.24	2.54	8.41*
Cajun II	free	3.6	56.0	55.0	100	100	100	100	100	5.74	1.59	0.75	0.18	2.52	8.26*
Jesup MaxQII	novel	2.5	56.0	54.0	97	96	97	98	98	5.40	1.66	0.81	0.22	2.70	8.10*
KY31+	toxic	3.9	55.0	54.5	100	99	99	99	100	5.41	1.61	0.75	0.17	2.53	7.94*
Ranchero	free	2.9	55.0	55.0	99	98	98	98	98	5.07	1.61	0.71	0.15	2.47	7.54*
BarOptima PLUS E34	novel	2.4	47.5	50.0	98	96	97	97	97	4.89	1.60	0.58	0.17	2.34	7.23
Texoma MaxQII	novel	2.3	54.5	54.5	95	86	94	96	96	4.29	1.63	0.70	0.11	2.44	6.72
Experimental Varieties															
GTC16081/T11044	novel	3.0	56.0	54.5	96	97	97	97	97	6.57	1.93	0.76	0.28	2.96	9.54*
PST-5FDS	free	3.0	54.0	52.5	99	99	99	99	99	6.31	1.62	0.69	0.18	2.49	8.79*
RAD-TF119	free	2.1	54.5	54.0	97	96	96	97	97	5.74	1.81	0.72	0.17	2.70	8.44*
GTC16077/T10942	free	3.1	56.0	54.5	98	96	97	97	97	5.57	1.79	0.70	0.25	2.75	8.31*
PST-5FMP	free	1.5	45.0	51.0	93	93	94	94	94	5.45	1.68	0.88	0.21	2.78	8.23*
GTC16076/T10941	free	2.6	54.5	54.5	97	97	97	97	97	5.32	1.72	0.78	0.28	2.78	8.11*
KY31-	free	3.8	52.5	52.5	99	98	98	99	99	5.59	1.59	0.72	0.21	2.52	8.11*
GTC16082/T10947	free	3.4	55.0	54.5	98	99	99	99	99	5.55	1.64	0.67	0.21	2.53	8.08*
KYFA9732/AR584	novel	3.5	49.0	52.0	99	97	98	98	98	5.67	1.45	0.64	0.24	2.33	7.99*
GTC16078/T10943	free	2.6	55.5	53.5	97	97	97	97	97	5.25	1.52	0.75	0.24	2.52	7.77*
FTF96	free	2.5	49.8	50.5	96	97	96	97	97	5.21	1.47	0.75	0.21	2.43	7.64*
GTC16079/T10944	free	2.8	55.5	55.0	99	98	98	98	98	4.89	1.69	0.76	0.19	2.64	7.53*
PST-5FEDS	free	2.1	56.0	54.5	93	91	91	92	92	4.81	1.60	0.68	0.13	2.41	7.21
GTC19068	free	2.1	56.0	54.5	95	95	95	96	96	4.20	1.48	0.72	0.12	2.32	6.52
Mean		2.9	53.7	53.4	98	97	97	97	97	5.56	1.64	0.73	0.20	2.57	8.13
CV,%		23.3	3.4	2.0	2	4	3	3	3	24.60	15.51	20.56	39.13	13.35	20.20
LSD,0.05		1.0	2.6	1.5	3	6	4	3	3	1.93	0.36	0.21	0.11	0.48	2.31

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, maturity, and stand persistence of tall fescue varieties sown September 6, 2023, at Lexington, Kentucky.

Variety	Endophyte Status ¹	Seedling Vigor ² Oct 24, 2023	Maturity ³ 2024 Apr 30	Percent Stand			Yield (tons/acre)					
				2023		2024		2024				
				Oct 24	Mar 14	Oct 18	Apr 30	Jun 25	Aug 23	Oct 22	Total	
Commercial Varieties-Available for Farm Use												
SS0705TFSL	free	5.0	55.5	100	100	100	2.44	1.52	0.71	0.60	5.26*	
Cajun II	free	5.0	56.0	100	100	100	2.71	1.35	0.58	0.57	5.21*	
Greendale	free	4.9	51.5	100	100	100	2.32	1.57	0.64	0.64	5.18*	
Fawn	free	5.0	57.5	100	100	100	2.48	1.51	0.57	0.58	5.13*	
Iliade	free	5.0	50.0	100	100	100	1.97	1.72	0.82	0.51	5.02*	
BarOptima PLUS E34	novel	5.0	51.0	100	100	100	2.27	1.50	0.56	0.67	5.00*	
Jesup MaxQII	novel	4.5	56.0	100	100	100	2.56	1.43	0.53	0.48	5.00*	
Ranchero	free	5.0	56.0	100	100	100	2.47	1.42	0.63	0.48	5.00*	
KY31+	toxic	5.0	56.0	100	100	100	2.62	1.32	0.58	0.48	5.00*	
Texoma MaxQII	novel	4.6	54.0	100	100	100	2.52	1.36	0.53	0.54	4.94*	
Palatine	free	4.9	54.5	100	100	100	2.27	1.55	0.53	0.57	4.92*	
Estancia Arkshield	novel	4.9	55.5	100	100	100	2.49	1.30	0.59	0.51	4.88*	
Lacefield MaxQII	novel	5.0	55.0	100	100	100	2.39	1.41	0.56	0.48	4.84*	
Experimental Varieties												
SETFN97	free	4.8	55.0	100	100	100	2.56	1.39	0.66	0.59	5.21*	
KYFA9611	free	5.0	52.0	100	100	100	2.29	1.52	0.69	0.58	5.08*	
SETF-SGT	free	4.9	55.0	100	100	100	2.36	1.42	0.65	0.60	5.04*	
KY31-	free	5.0	53.5	100	100	100	2.33	1.48	0.54	0.55	4.90*	
FTF-96	free	4.1	52.0	98	99	99	2.08	1.55	0.63	0.57	4.83*	
KYFA1014	free	4.8	53.5	100	100	100	1.96	1.61	0.63	0.54	4.74*	
SETFPC5BK	free	5.0	56.0	100	100	100	2.41	1.31	0.57	0.46	4.74*	
PVF-FTF-2030	free	5.0	56.5	100	100	100	2.27	1.32	0.52	0.51	4.62	
KYFA0304	free	4.4	53.0	99	99	99	1.95	1.34	0.67	0.36	4.32	
Mean		4.8	54.3	100	100	100	2.35	1.45	0.61	0.54	4.95	
CV,%		3.3	2.1	1	1	1	10.13	11.71	15.75	23.52	7.50	
LSD,0.05		0.2	1.6	1	1	1	0.34	0.24	0.14	0.18	0.52	

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)						3-year Total
			2022	2023	2024	2021	2022		2023	2024		2022	2023	2024				
			May 10	May 10	May 30	Oct 26	Apr 14	Nov 9	Nov 6	Apr 16	Oct 24	Total	Total	May 30	Aug 16	Oct 24	Total	
Commercial Varieties-Available for Farm Use																		
Dominate	free	4.8	56.5	57.5	73.8	100	100	99	99	99	97	5.31	4.08	2.18	1.59	0.87	4.64	14.02*
Triumphant	free	5.0	57.5	58.0	77.5	100	100	99	98	98	96	5.83	4.04	2.03	1.26	0.85	4.14	14.02*
Greendale	free	4.6	56.0	55.0	76.3	100	100	99	100	99	98	5.42	3.89	2.15	1.42	0.75	4.33	13.64*
BarOptima PLUS E34	novel	4.5	55.5	54.5	73.8	100	100	99	100	100	98	5.24	3.50	2.37	1.28	0.74	4.39	13.13*
KY31+	toxic	4.8	56.5	57.0	75.0	100	100	100	100	99	98	4.83	3.87	2.40	1.34	0.68	4.42	13.13*
SS0705TFSL	free	4.8	56.5	56.5	73.8	100	100	100	98	98	98	5.18	3.75	2.14	1.31	0.70	4.15	13.08*
Estancia Arkshield	novel	4.3	56.5	57.5	75.0	100	100	100	100	100	99	4.80	3.79	2.03	1.39	0.90	4.32	12.91*
Lacefield MaxQII	novel	4.9	57.0	58.0	72.5	100	100	100	100	100	97	4.63	4.04	2.10	1.45	0.66	4.21	12.89
Armory	free	4.4	55.5	56.5	73.5	100	100	100	98	98	98	4.85	3.85	1.93	1.31	0.70	3.94	12.64
Experimental Varieties																		
FTF96	free	4.1	56.5	55.0	76.3	100	100	100	99	99	99	5.29	4.23	2.01	1.30	0.83	4.14	13.66*
KYFA9611	free	4.4	53.0	53.5	75.0	100	100	100	99	99	98	4.92	3.92	2.10	1.56	0.81	4.47	13.31*
KY31-	free	4.8	56.5	57.0	75.0	100	100	100	100	100	98	5.02	3.79	2.17	1.31	0.80	4.28	13.08*
Mean		4.6	56.1	56.3	74.8	100	100	100	99	99	98	5.11	3.90	2.13	1.38	0.77	4.29	13.29
CV,%		8.4	2.7	3.1	4.5	0	0	1	2	2	2	8.80	10.43	10.27	18.20	19.10	11.49	5.90
LSD,0.05		0.6	2.2	2.5	4.8	0	0	1	2	3	3	0.65	0.58	0.33	0.36	0.21	0.71	1.13

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 9. Dry matter yields, maturity and stand persistence of tall fescue varieties sown September 13, 2023, at Princeton, Kentucky.

Variety	Endophyte Status ¹	Maturity ² 2024 May 31	Percent Stand		Yield (tons/acre)			
			2023	2024	2024			
			Nov 3	Oct 24	May 31	Aug 16	Oct 24	Total
Commercial Varieties-Available for Farm Use								
SS0705TFS	free	80.0	100	100	2.37	1.77	0.73	4.86*
Texoma MaxQII	novel	80.0	100	100	2.43	1.56	0.73	4.72*
Iliade	free	75.3	100	99	2.21	1.64	0.85	4.71*
Cajun II	free	80.0	100	99	2.36	1.56	0.72	4.64*
KY31+	toxic	80.0	100	99	2.43	1.47	0.75	4.64*
Estancia Arkshield	novel	80.0	100	100	2.44	1.42	0.74	4.60*
Lacefield MaxQII	novel	78.8	100	100	2.53	1.37	0.69	4.59*
Jesup MaxQII	novel	80.0	100	100	2.34	1.50	0.69	4.53*
Ranchero	free	80.0	100	99	2.38	1.49	0.63	4.50
BarOptima PLUS E34	novel	78.8	100	99	2.27	1.40	0.67	4.34
Palatine	free	78.8	100	99	2.29	1.41	0.60	4.30
Fawn	free	85.3	100	99	1.98	1.27	0.58	3.83
Experimental Varieties								
KY31-	free	80.0	100	99	2.49	1.51	0.62	4.62*
FTF-96	free	78.8	96	97	2.36	1.45	0.79	4.60*
PVF-FTF-2	free	78.8	98	99	2.23	1.44	0.69	4.36
KYFA1014	free	78.8	100	98	2.11	1.37	0.64	4.12
KYFA0304	free	80.0	100	100	1.42	1.41	0.70	3.53
KYFA9611	free	77.5	100	99	1.27	1.32	0.60	3.19
Mean		79.5	99	99	2.22	1.47	0.69	4.37
CV,%		2.7	1	1	11.53	17.99	15.55	10.25
LSD,0.05		3.1	1	1	0.36	0.37	0.15	0.64

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 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 10. 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)						Total	
			2021	2022		2023		2024	2022	2023	2024					
			Oct 12	Apr 11	Nov 2 ³	Mar 9	Oct 25	Mar 20	Total	Total	Apr 26	Jun 26	Aug 5	Total		
Commercial Varieties-Available for Farm Use																
KY31+	toxic	4.9	100	100	100	100	100	100	100	5.06	3.31	1.10	0.90	1.03	3.03	11.40*
Cajun II	free	4.9	100	100	100	100	100	100	100	5.21	3.67	0.96	0.50	0.61	2.07	10.95*
Lacefield MaxQII	novel	4.6	100	100	100	100	100	100	100	4.77	3.26	0.81	0.51	0.94	2.27	10.29*
Ranchero	free	5.0	100	100	100	100	100	100	100	4.63	3.10	1.04	0.69	0.75	2.48	10.21*
Jesup MaxQII	novel	4.8	100	100	100	100	100	100	100	4.66	2.98	1.15	0.77	0.64	2.55	10.19*
SS0705TFSL	free	5.0	100	100	100	100	100	100	100	4.87	2.59	0.81	0.56	0.80	2.17	9.63
Texoma MaxQII	novel	4.8	100	100	100	100	100	100	100	4.38	2.67	0.85	0.70	0.72	2.26	9.31
Palatine	free	5.0	100	100	100	100	100	100	100	4.18	2.39	0.90	0.61	0.52	2.03	8.60
Estancia Arkshield	novel	4.9	100	100	100	100	100	100	100	4.12	2.62	0.67	0.52	0.53	1.72	8.45
BarOptima PLUS E34	novel	5.0	100	100	100	100	100	100	100	4.23	2.00	0.58	0.59	0.47	1.64	7.87
Experimental Varieties																
RAD-2030E	free	4.9	100	100	100	100	100	100	100	4.73	3.10	0.94	0.49	0.54	1.97	9.80
KY31-	free	5.0	100	100	100	100	100	100	100	4.28	2.65	0.99	0.64	0.72	2.35	9.28
Mean		4.9	100	100	100	100	100	100	100	4.59	2.87	0.90	0.62	0.69	2.21	9.67
CV,%		4.1	0	0	0	0	0	0	0	12.91	14.24	27.33	30.56	35.72	22.19	10.62
LSD,0.05		0.3	0	0	0	0	0	0	0	0.86	0.60	0.36	0.28	0.36	0.72	1.50

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

Variety	Type	Seedling Vigor ¹ Oct 4, 2021	Maturity ²			Percent Stand						Yield (tons/acre)						3-year Total		
			2022	2023	2024	2021	2022		2023		2024		2022	2023	2024					
			May 5	May 5	May 1	Oct 4	Mar 22	Oct 19	Mar 20	Oct 17	Mar 20	Oct 18	Total	Total	May 1	Jun 17	Aug 22		Oct 21	Total
Commercial Varieties-Available for Farm Use																				
Arsenal	meadow	4.9	58.0	56.0	56.5	99	99	99	99	98	97	95	4.53	2.62	0.66	0.70	0.43	0.20	1.98	9.13*
Macbeth	meadow	4.6	57.0	56.0	54.0	100	99	99	99	98	97	98	4.43	2.26	0.52	0.60	0.43	0.21	1.76	8.45*
Admiral	meadow	4.6	56.0	57.0	54.5	100	99	99	99	99	97	97	4.19	2.29	0.65	0.61	0.35	0.20	1.82	8.29*
Stratus	meadow	4.5	56.5	56.0	53.0	96	96	96	97	97	96	94	4.21	2.19	0.55	0.61	0.40	0.27	1.83	8.23*
Artillery	smooth	4.9	52.0	50.0	46.3	100	98	99	99	99	99	98	3.62	2.37	0.53	0.59	0.24	0.09	1.45	7.44
Peak	smooth	4.5	53.0	50.5	46.8	97	94	96	97	97	97	97	3.33	2.27	0.41	0.62	0.40	0.16	1.59	7.19
Experimental Varieties																				
MB1302	meadow	4.8	57.5	56.5	56.0	98	99	99	99	99	98	98	4.36	2.16	0.66	0.56	0.39	0.14	1.74	8.27*
MB1303	meadow	4.6	58.0	56.0	56.0	100	100	100	99	99	99	99	3.76	2.29	0.55	0.62	0.36	0.18	1.70	7.75
Mean		7.4	56.0	54.8	52.9	99	98	98	98	98	97	97	4.05	2.31	0.57	0.61	0.37	0.18	1.73	8.09
CV,%		7.0	2.0	1.5	4.3	1	1	1	1	1	2	2	9.90	12.77	23.15	15.32	24.67	48.17	15.90	9.43
LSD,0.05		0.5	1.7	1.2	3.3	2	2	2	2	2	2	3	0.59	0.43	0.19	0.14	0.14	0.13	0.41	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 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)					2-year Total	
			2023	2024	2022	2023		2024		2023	2024				
			May 5	May 1	Oct 25	Mar 20	Oct 17	Mar 20	Oct 18	Total	May 1	Jun 17	Oct 22		Total
Commercial Varieties-Available for Farm Use															
Arsenal	meadow	4.1	57.5	56.5	95	94	96	96	94	6.70	1.05	0.78	0.12	1.95	8.65*
CDC Torsion	meadow	3.1	56.5	56.5	95	89	90	91	87	6.26	0.90	0.79	0.26	1.95	8.35*
Stratus	meadow	3.6	57.0	56.5	90	90	91	91	92	6.72	0.78	0.67	0.09	1.54	8.26*
Arid	smooth	4.4	50.3	46.8	96	94	88	90	85	6.14	0.70	0.85	0.06	1.62	7.76*
Admiral	meadow	4.1	57.5	58.0	98	96	96	96	93	6.20	0.71	0.66	0.07	1.44	7.63*
Artillery	smooth	5.0	53.0	49.3	98	97	95	95	93	5.85	0.82	0.84	0.09	1.75	7.61*
Champaign	meadow	2.0	56.0	58.0	63	53	60	65	68	5.62	0.92	0.81	0.06	1.80	7.42
Macbeth	meadow	4.3	57.0	57.5	95	94	94	91	89	5.90	0.64	0.63	0.08	1.35	7.25
Peak	smooth	3.6	50.3	51.5	96	81	81	81	80	5.31	0.60	0.92	0.06	1.58	6.97
AAC Torque	hybrid	2.9	55.5	54.5	87	74	71	71	71	4.80	0.61	0.78	0.04	1.43	6.35
Mean		3.7	55.1	54.5	91	86	86	87	85	5.98	0.77	0.77	0.09		
CV,%		20.7	3.4	3.4	5	9	8	8	9	10.88	19.70	17.80	117.00	1.64	7.66
LSD,0.05		1.1	2.7	2.7	7	12	10	10	11	1.01	0.22	0.19	3.00	12.97	9.58

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.

* 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 6, 2023, at Lexington, Kentucky.

Variety	Type	Seedling Vigor ¹ Oct 24, 2023	Maturity ² 2024 Apr 22	Percent Stand			Yield (tons/acre)					Total
				2023	2024		2024					
				Oct 24	Mar 14	Oct 18	Apr 22	May 29	Jun 28	Aug 22	Oct 23	
Commercial Varieties-Available for Farm Use												
Admiral	meadow	4.5	55.5	100	100	100	1.79	0.81	0.29	0.71	0.43	4.03*
Arsenal	meadow	4.9	56.0	100	100	100	1.49	0.91	0.41	0.77	0.39	3.97*
CDC Torsion	meadow	3.9	52.8	100	100	100	1.35	1.03	0.38	0.66	0.43	3.85*
Stratus	meadow	4.4	54.5	100	100	100	1.21	0.87	0.27	0.58	0.35	3.28*
Macbeth	meadow	4.1	55.0	100	100	100	1.42	0.67	0.26	0.58	0.30	3.24
Champaign	meadow	4.1	54.0	100	100	100	1.26	0.78	0.25	0.57	0.37	3.22
Artillery	smooth	4.8	47.3	100	100	100	1.12	0.79	0.29	0.60	0.25	3.06
AAC Torque	hybrid	3.9	52.8	100	99	98	1.50	0.62	0.20	0.49	0.14	2.95
Peak	smooth	4.0	47.8	100	100	100	0.98	0.64	0.29	0.67	0.21	2.80
Arid	smooth	4.4	45.0	99	99	100	0.96	0.60	0.22	0.48	0.20	2.45
Experimental Varieties												
PVF-C2	meadow	3.1	52.8	99	99	99	1.18	0.73	0.27	0.63	0.37	3.18
PVF-A2	smooth	3.9	45.0	100	100	100	0.94	0.64	0.24	0.49	0.14	2.46
Mean		4.2	51.5	100	100	100	1.27	0.76	0.28	0.60	0.30	3.29
CV,%		11.5	6.8	1	1	1	28.91	27.65	23.44	18.70	37.58	17.20
LSD,0.05		0.7	5.0	1	1	1	0.53	0.30	0.09	0.16	0.16	0.79

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)						3-year Total	
		2022	2023	2024	2021	2022		2023		2024		2022	2023	2024				
		May 16	May 16	May 20	Oct 4	Mar 22	Oct 19	Mar 20	Oct 17	Mar 20	Oct 18	Total	Total	May 20	Jun-Aug ³	Oct 21		Total
Commercial Varieties-Available for Farm Use																		
HDR	4.9	56.0	55.5	57.0	100	100	100	100	94	93	89	5.41	1.83	0.60	–	0.26	0.87	8.10*
Raskila	4.3	55.5	55.5	56.5	96	98	98	99	97	94	64	5.47	1.73	0.72	–	0.13	0.85	8.05*
Pradel	4.8	56.0	55.5	56.0	100	100	100	99	95	94	66	5.38	1.73	0.65	–	0.16	0.80	7.92*
Experimental Varieties																		
KYFP1301	4.6	56.0	56.0	57.5	100	100	100	100	99	99	95	5.06	1.69	0.54	–	0.20	0.74	7.49*
Mean	4.6	55.9	55.6	56.8	99	99	99	99	96	95	78	5.33	1.74	0.63		0.19	0.82	6.46
CV,%	12.0	0.9	1.5	1.3	4	1	1	1	5	5	24	7.74	10.00	19.85		30.77	18.62	0.82
LSD,0.05	0.9	0.8	1.3	1.2	6	2	2	1	8	8	30	0.66	0.28	0.20		0.09	0.24	4.46

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 2 for complete scale.

³ There was no mid-summer harvest because of minimal regrowth after the first harvest.

* 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		Percent Stand						Yield (tons/acre)						2-year Total
		2023	2024	2022	2023		2024		2023	2024						
		May 16	May 20	Oct 25	Mar 20	Oct 17	Mar 20	Oct 18	Total	May 20	Jun-Aug ³	Oct 22	Total			
Commercial Varieties-Available for Farm Use																
Pradel	4.0	58.0	53.0	99	99	99	99	38	4.20	0.62	–	0.06	0.67	4.87*		
Raskila	4.1	56.0	56.0	99	99	99	99	65	4.06	0.64	–	0.06	0.70	4.76*		
Hyperbola	4.1	57.0	51.5	100	100	100	97	35	3.73	0.48	–	0.08	0.55	4.28*		
Experimental Varieties																
KYFP1301	4.9	57.5	56.0	100	100	100	100	70	3.43	0.43	–	0.06	0.49	3.92*		
Mean	4.3	57.1	54.1	99	99	99	99	52	3.85	0.54		0.06	0.60	4.46		
CV,%	7.3	2.0	4.1	1	1	1	2	43	16.07	21.62		55.80	21.46	13.32		
LSD,0.05	0.5	1.9	3.5	1	1	1	4	35	0.99	0.19		0.06	0.21	0.95		

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 2 for complete scale.

³ There was no mid-summer harvest because of minimal regrowth after the first harvest.

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

Table 16. Dry matter yields, seedling vigor, maturity, and stand persistence of meadow fescue varieties sown September 6, 2023, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 14, 2023	Maturity ² 2024 May 9	Percent Stand			Yield (tons/acre)				
			2023	2024		2024				
			Oct 24	Mar 14	Oct 18	May 9	Jun 27	Aug 22	Oct 23	Total
Commercial Varieties-Available for Farm Use										
Raskila	4.5	53.5	100	100	100	2.13	0.74	0.25	0.26	3.37*
HDR	4.9	55.5	100	100	100	2.11	0.75	0.28	0.21	3.34*
Pradel	4.6	56.0	100	100	99	1.95	0.74	0.30	0.25	3.24*
Hyperbola	4.8	54.0	100	100	100	2.02	0.64	0.23	0.21	3.10*
Mean	4.7	54.8	100	100	100	2.05	0.72	0.27	0.23	3.26
CV,%	6.4	1.8	0	0	1	13.75	14.66	22.07	35.30	11.38
LSD,0.05	0.5	1.6	0	0	2	0.45	0.17	0.09	0.13	0.59

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 2 for complete scale.

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

Table 17. 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
Fawn	free	Smith Seed Services
Fillmore(FTF70)	free	DLF-Pickseed
Greendale	free	DLF-Pickseed
Iliade	free	Columbia Seeds
Jesup MaxQII	novel	Pennington Seed
KY31+	toxic	Ky Agric. Exp. Station/Public
Lacefield MaxQ II	novel	Pennington Seed
Martin 2 Protek	novel	DLF-Pickseed
Palatine	free	Mountain View Seeds
Rancho	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
Experimental Varieties¹		
FTF96	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
KY31-	free	KY Agric. Exp. Station
KYFA0304	free	KY Agric. Exp. Station
KYFA1014	free	KY Agric. Exp. Station
KYFA9611	free	KY Agric. Exp. Station
KYFA9732/AR584	novel	KY Agric. Exp. Station
PST-5FDS	free	Pure-Seed Testing
PST-5FEDS	free	Pure-Seed Testing
PST-5FMP	free	Pure-Seed Testing
PVF-FTF-2030	free	Pine View Farms
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 18. 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 Varieties¹		
PVF A2	smooth	Pine View Farms
PVF-C2	meadow	Pine View Farms
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 19. Proprietors of meadow fescue varieties in current trials.

Variety	Proprietor/KY Distributor
Commercial Varieties-Available for Farm Use	
HDR	Barenbrug USA
Hyperbola	DLF Pickseed
Pradel	Barenbrug USA
Raskila	Columbia Seeds
Experimental Varieties¹	
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 21. Summary of Kentucky bromegrass yield trials at Lexington 2006-2024 (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	2022	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		
AAC Torque	hybrid	Brett Young Seeds													83	–
AC Knowles	hybrid	Agriculture Canada	85		82	102	89									89(4)
Admiral	meadow	Cisco Seeds							107	106	100	100	102	102	100	102(7)
Arid	smooth	Mountain View Seeds							94	93					101	96(3)
Arsenal	meadow	Barenbrug USA									106	106	104	112	113	108(5)
Artillery	smooth	Barenbrug USA									100	99	89	92	99	96(5)
Bigfoot	hybrid	Grassland Oregon	108	116	105											110(3)
Canterbury	mountain	Barenbrug USA		79												–
Carlton	smooth	Pickseed USA				82	95				85					87(3)
CDC Torsion	meadow	Brett Young Seeds													109	–
Champaign	meadow	Mountain View Seeds													97	–
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	104	95	109(12)
Olga	smooth	Barenbrug USA		116	101											109(2)
Peak	smooth	Allied Seed		97		100		93	95	88	103		99	89	91	95(9)
Persister	prairie	DLF Pickseed		72												–
RAD-BI29	smooth	Columbia Seeds	96	86												91(2)
Stratus	meadow	Allied Seed												101	108	105(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 the fall of 2021 was harvested three years, so the final report would be “2024 Tall Fescue, Bromegrass, and meadow Fescue 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.

Table 22. Summary of meadow fescue yield trials at Lexington 2019-2024 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietor/KY Distributor	2019 ^{1,2}	2020	2021	2022	Mean ³ (#trials)
		3-yr ⁴	3-yr	3-yr	2-yr	
HDR	Barenbrug USA	95	105	101		100(3)
Hyperbola	DLF Pickseed				92	–
Pradel	Barenbrug USA	105	88	99	105	99(4)
Raskila	Columbia Seeds		103	100	103	102(3)

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 2021 was harvested three years, so the final report would be “2024 Tall Fescue, Bromegrass, and Meadow Fescue 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

2024 Tall Fescue, Bromegrass and Meadow Fescue Report



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