



# 2022 Annual and Perennial Ryegrass and Festulolium Report

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## Introduction

Annual ryegrass (*Lolium multiflorum*) and perennial ryegrass (*Lolium perenne*) are high quality, productive, cool-season grasses used in Kentucky. Both have exceptionally high seedling vigor and are highly palatable to livestock. In Kentucky, winter survival can be an issue for many annual ryegrass varieties, so before planting, review winter survival results in this publication.

Annual ryegrasses are increasing in use across Kentucky as more winter-hardy varieties are released and promoted. Annual ryegrass is productive for three to five months and is used primarily for late fall and early to late spring pasture. Winter growth occurs only during mild winters in Kentucky. This crop has garnered increased interest for high-quality baleage. There are two main types of annual ryegrasses—Italian and Westerwolds (the most commonly used annual ryegrass in Kentucky). The Westerwolds type is a true annual, in that stands seeded in the spring produce seedheads that summer and little regrowth occurs after seedheads are produced. Westerwolds ryegrass varieties are commonly used in the lower South (Florida to Texas) because they can be seeded in the fall and will survive the winter. Many varieties also survive Kentucky winters. Italian ryegrass is native to Southern Europe and is not a true annual. Italian ryegrasses provide high yields of quality forage and show quick regrowth. If planted in the spring, little or no seedheads will grow that summer (vernalization is required). Spring planting of Italian ryegrass is common in northern states (e.g., Wisconsin, Minnesota, etc.) for summer grazing, but most varieties do not dependably survive Kentucky summers. Italian ryegrasses are almost always planted late summer to early fall in Kentucky and typically provide forage production into early summer, often one to two months later than Westerwolds types. As with Westerwolds types, make sure to plant only proven winter-hardy varieties. Both diploid (two sets of chromosomes) and tetraploid (four sets of chromosomes) varieties of annual ryegrass exist.

Perennial ryegrass can be used as a short-lived hay or pasture plant and has growth characteristics similar to tall fescue. It is more persistent than Italian ryegrass but less persistent than other cool-season grass species (e.g., tall fescue and orchardgrass). Perennial ryegrass usually survives two to three years in Kentucky. It tillers more profusely but is lower growing than Italian ryegrass and will not form a seedhead in the seeding year. Both diploid and tetraploid varieties of perennial ryegrass exist. Tetraploids have larger

**Table 1. Temperature and rainfall at Lexington, Kentucky in 2020, 2021, and 2022.**

	2020				2021				2022 <sup>2</sup>			
	Temp		Rainfall		Temp		Rainfall		Temp		Rainfall	
	°F	DEP <sup>1</sup>	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	40	+9	3.72	+0.86	34	+3	4.51	+1.65	29	-2	4.93	+2.07
FEB	38	+3	5.14	+1.93	31	-4	4.60	+1.39	38	+3	7.69	+4.48
MAR	51	+7	3.79	-0.61	50	+6	5.12	+0.72	49	+5	4.27	-0.13
APR	52	-3	4.92	+1.04	54	-1	2.72	-1.16	55	0	3.71	-0.17
MAY	62	-2	5.69	+1.22	62	-2	4.34	-0.13	69	+5	3.84	-0.63
JUN	72	0	2.56	-1.10	73	+1	6.26	+2.60	76	+4	2.10	-1.56
JUL	79	+3	3.23	-1.77	75	-1	5.90	+0.90	80	+4	6.46	+1.46
AUG	75	0	3.41	-0.52	76	+1	6.16	+2.23	77	+2	4.27	+0.34
SEP	68	0	4.43	+0.83	69	+1	3.03	-0.17	70	+2	1.50	-1.70
OCT	57	0	4.98	+2.41	62	+5	4.64	+2.10	57	0	0.96	-1.61
NOV	49	+4	2.18	-1.21	43	-2	2.13	-1.26				
DEC	36	0	2.27	-1.71	47	+11	4.41	+0.43				
Total			45.92	+1.37			53.85	+9.30			39.73	+2.55

<sup>1</sup>DEP is departure from the long-term average.

<sup>2</sup>2022 data is for ten months through October.

tillers and seedheads and wider leaves. Tetraploid types tend to be taller and less dense than diploid types, even in early stages of regrowth. Diploid types produce more tillers, have better stand persistence, and are more tolerant to heavy grazing.

Intermediate or hybrid ryegrass (*Lolium hybridum*) is the result of a cross between Italian ryegrass and perennial ryegrass. It is not as winter hardy as perennial ryegrass but it is higher yielding. It is also more persistent and winter hardy than Italian ryegrass. Its uses are similar to those of perennial ryegrass but it typically only survives two years or less in Kentucky.

Both forage and turf types of annual and perennial ryegrasses are available. Turf types are low growing and have poor yield. Turf types are also infected with a fungal endophyte that lives inside the plant, protecting it from insect attack but producing a toxin that reduces performance of grazing animals. All turf types are infected. Plant only forage-type varieties for grazing, hay, or silage.

Festuloliums are hybrids between various fescues and ryegrasses with higher quality than tall fescue and improved stand survival over perennial ryegrass. Their use in Kentucky is still limited since they do not survive as long as tall fescue, but some of the newer varieties are more adapted to Kentucky environmental conditions, especially those with more tall fescue in their background.

This report provides current yield data on annual and perennial ryegrass varieties in trials in Kentucky as well as guidelines for selecting varieties. Tables 15, 16, and 17 show summaries of all annual and perennial ryegrass and festulolium varieties tested in Kentucky for the last 17 years. The UK Forage Extension website (<https://forages.ca.uky.edu>) contains electronic versions of all forage variety testing reports from Kentucky and surrounding states, and a large number of other forage publications.

**Table 2. Descriptive scheme for the stages of development in perennial forage grasses.**

Code	Description	Remarks
<b>Leaf development</b>		
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	
<b>Sheath elongation</b>		
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	
<b>Tillering (alternative to sheath elongation)</b>		
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	
<b>Stem elongation</b>		
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	
<b>Booting</b>		
45	Boot swollen	
<b>Inflorescence emergence</b>		
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	
<b>Anthesis</b>		
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.
<b>Seed ripening</b>		
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.

## Important Selection Considerations

**Local adaptation and seasonal yield.** The variety should be adapted to Kentucky as indicated by good winter survival and good performance across years and locations in replicated yield trials, such as those presented in this publication. Choose high-yielding varieties, but choose varieties that are productive during the desired season of use.

**Seed quality.** Buy premium-quality seed that is high in germination, high in purity, and free from weed seed. Buy certified seed or proprietary seed of an improved variety. An improved variety is one that has performed well in independent trials. Other information on the label will include the test date (which must be within the previous nine months), the level of germination, and percentage of other crop and weed seed. Order seed well in advance of planting time to assure that it will be available when needed.

**Important:** When seeding perennial ryegrasses for horse or cattle pastures (of any kind), insist on an endophyte-free variety. Most forage types of perennial ryegrass are endophyte free, and most new turf types are infected. This endophyte is similar to the endophyte of tall fescue and produces alkaloids that are toxic to cattle and horses.

## Description of the Tests

Data from nine studies are reported. Annual ryegrass tests were established in the fall of 2018, 2019, and 2021 at Lexington. Perennial ryegrass tests (2019, 2020, and 2021) and festulolium tests (2019, 2020, and 2021) were established at Lexington. The soil at Lexington is a well-drained silt loam (Maury) and is well suited for ryegrass production.

Seedings were made at the rate of 25 pounds per acre 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. For the perennial tests, nitrogen was top-dressed at 60 pounds per acre of actual nitrogen in March, May, and August. For the annual tests, nitrogen was top-dressed at 60 pounds per acre in March and 60 pounds after the first spring harvest. The tests were harvested using a sickle-type forage plot harvester. The first cutting was harvested at each location when all ryegrass varieties had reached at least the boot stage. Fresh weight samples were taken at each harvest to calculate dry matter production. Management practices for these tests regarding establishment, fertility (P, K, and lime are 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 are presented in Table 1.

Ratings for maturity (see Table 2 for maturity scale) and dry matter yields (tons/A) are reported in tables 3 through 11. Yields are given by cutting date for 2022 and as total annual production. Stated yields are adjusted for percent weeds; therefore, the tonnage given is for crop only. Varieties are listed by total yield in descending order. Experimental varieties, listed separately at the bottom of the tables, are not available commercially.

In most years, annual ryegrasses can be expected to die or become unproductive after mid-June in their first summer. Unlike

**Table 3. Dry matter yields, seedling vigor, winter injury, plant height, maturity and stand persistence of annual ryegrass varieties sown September 4, 2018, at Lexington, Kentucky (see tables 12 and 15 for designation of Italian or Westerwolds type and diploid or tetraploid type varieties).**

Variety	Seedling Vigor <sup>1</sup> Sep 28, 2018	Winter Injury <sup>2</sup> Feb 6, 2019	Plant Height (in) Apr 22, 2019	Maturity <sup>3</sup>			Percent Stand			Yield (tons/acre)				
				2019			2018	2019		2019				
				Apr 22	May 14	Jun 5	Sep 28	Mar 22	Jul 16	Apr 22	May 14	Jun 5	Jul 2	Total
<b>Commercial Varieties-Available for Farm Use</b>														
Marshall	4.9	1.8	20.5	32.3	45.0	61.5	100	100	4	2.16	0.56	0.65	0.50	3.86*
Koga	4.3	1.8	17.0	32.0	46.3	57.5	100	100	96	1.80	0.66	0.67	0.59	3.72*
Winterhawk	4.8	2.0	20.0	32.5	45.0	62.0	100	100	4	2.00	0.43	0.71	0.56	3.70*
Jackson	4.4	3.5	20.5	32.5	46.3	61.5	100	99	4	2.01	0.56	0.67	0.43	3.67*
TAMTBO	4.6	3.3	17.5	32.3	51.5	62.0	100	90	3	1.62	0.73	0.70	0.48	3.53*
Nelson	4.6	2.3	17.5	31.8	49.8	61.5	100	96	2	1.75	0.58	0.65	0.53	3.51*
TetraPrime	3.8	1.3	16.5	31.3	45.0	54.0	100	100	100	1.64	0.78	0.52	0.51	3.46*
Maximus	4.4	2.0	15.5	32.0	56.0	62.0	100	43	12	1.30	0.71	0.66	0.57	3.24
Double Diamond	4.5	3.0	17.0	32.5	51.5	62.0	100	94	10	1.57	0.53	0.57	0.57	3.23
Jumbo	4.5	2.8	17.0	32.0	51.5	61.5	100	94	1	1.65	0.62	0.63	0.30	3.20
Master	4.1	3.5	15.5	32.3	55.0	61.5	100	69	1	1.44	0.64	0.66	0.43	3.18
Trinova	4.3	3.3	15.0	31.8	56.0	62.0	100	75	2	1.30	0.69	0.55	0.48	3.02
Baquano	4.0	1.5	15.5	32.0	54.5	62.0	100	79	3	1.37	0.59	0.66	0.36	2.99
Feast II	4.4	4.5	12.0	31.0	45.0	54.5	100	94	93	0.69	0.68	0.52	0.63	2.52
Gulf	4.8	2.8	13.5	31.8	56.0	61.5	100	40	1	0.69	0.64	0.51	0.32	2.16
<b>Experimental Varieties</b>														
BARLM17425	3.1	1.8	18.5	32.3	46.3	61.5	97	98	69	1.84	0.71	0.67	0.60	3.84*
KYLM1703	2.9	2.0	18.0	32.3	49.3	62.0	95	97	3	1.84	0.72	0.61	0.49	3.66*
K014-WEMA	4.1	1.3	19.5	32.3	45.0	61.5	100	99	9	1.95	0.49	0.57	0.61	3.62*
ME4	4.8	2.8	21.0	32.5	45.0	61.5	100	98	4	2.00	0.53	0.62	0.44	3.60*
BARLM17477	2.0	3.5	19.5	32.3	49.8	62.0	91	92	7	2.04	0.53	0.56	0.45	3.58*
M2CVS	4.0	1.3	21.5	32.5	46.3	61.5	100	100	3	2.16	0.45	0.55	0.37	3.54*
K014-WM	4.3	1.5	18.5	32.5	46.3	61.5	100	100	7	1.90	0.49	0.56	0.48	3.42*
ME94	4.5	1.3	21.0	32.5	45.0	61.5	100	100	0	1.88	0.50	0.64	0.35	3.37*
BARLM17538	3.1	1.3	17.0	32.0	47.5	61.5	99	99	48	1.71	0.54	0.55	0.54	3.34
WMWL	4.5	4.3	20.0	32.8	45.0	62.0	100	100	1	1.98	0.43	0.50	0.38	3.29
BARLM17514	3.3	3.5	18.0	32.3	51.0	61.5	99	97	11	1.51	0.65	0.65	0.44	3.24
PPG-LWT105	4.1	2.5	17.5	32.0	52.0	62.0	100	98	8	1.64	0.57	0.49	0.52	3.22
K014-WLS	4.3	1.0	19.5	32.8	48.5	62.0	100	98	4	1.70	0.65	0.47	0.39	3.21
BARLM17534	3.0	2.5	16.0	32.0	50.5	61.5	100	95	2	1.54	0.63	0.57	0.46	3.21
K014-WEAR	4.1	2.5	18.0	32.0	50.8	62.0	100	91	4	1.64	0.56	0.60	0.41	3.21
KYLM1601	2.8	1.8	17.0	32.3	48.0	62.0	99	98	3	1.65	0.50	0.55	0.31	3.00
KYLM1701	3.0	2.8	18.5	32.5	48.5	62.0	96	94	0	1.60	0.61	0.46	0.32	2.99
BARHAO	4.8	2.0	20.0	32.8	53.0	62.0	100	98	55	1.63	0.39	0.52	0.31	2.84
Mean	4.0	2.4	17.7	32.2	49.3	61.2	99	89	17	1.64	0.58	0.58	0.45	3.25
CV,%	40.4	75.5	10.1	1.6	4.8	1.8	1	7	45	14.10	25.05	20.99	28.33	10.90
LSD,0.05	0.6	2.5	2.5	0.7	3.7	6.5	1	9	10	0.32	0.20	0.17	0.18	0.50

<sup>1</sup>Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

<sup>2</sup>Winter injury score based on a scale of 1 to 9 with 9 being the greatest amount of injury.

<sup>3</sup>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.

annual ryegrasses, perennials should be productive under Kentucky conditions for an average of two to three growing seasons.

Statistical analyses were performed on all data (including experimentals) to determine if the apparent differences are truly due to varietal differences or just due to chance. Varieties not significantly different from the top variety in the total yield column are marked with one asterisk (\*). To determine if two varieties are truly different, compare the difference between them to the least significant difference (LSD) 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; increased variability within a study results in higher CVs and larger LSDs.

Tables 12, 13, and 14 show information about proprietors/distributors for all annual and perennial ryegrass and festulolium varieties included in tests discussed in this report. Varieties are listed in alphabetical order by species, with the experimental varieties at the bottom. 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 ryegrass varieties (Tables 3 through 11).

### How to Interpret the Summary Tables

Tables 15, 16, and 17 are summaries of yield data from 2001 to 2022 of commercial varieties that have been entered in the Kentucky trials. In Table 15, the data are listed as a percentage of

**Table 4. Dry matter yields, seedling vigor, injury rating, plant height, maturity, and stand persistence of annual ryegrass varieties sown August 30, 2019, at Lexington, Kentucky (see tables 12 and 15 for designation of Italian or Westerwolds type and diploid or tetraploid type varieties).**

Variety	Seedling Vigor <sup>1</sup> Oct 11, 2019	Early Freeze Injury <sup>2</sup> Dec 9, 2019	Plant Height (in)		Maturity <sup>3</sup>				Percent Stand		Yield (tons/acre)						Total
									2019	2020	2019			2020			
			Apr 1	Apr 28	Apr 1	Apr 28	May 21	Jun 8	Oct 11	Mar 17	Nov 6	Apr 1	Apr 28	May 21	Jun 8	Jun 25	
<b>Commercial Varieties-Available for Farm Use</b>																	
Meroa	4.8	4	12	14	31.5	31.8	46.3	57.5	100	100	1.16	0.64	1.04	0.84	0.62	0.27	4.56*
Nelson	5.0	43	12	15	31.0	32.0	53.5	62.0	100	92	1.35	0.56	0.80	0.84	0.50	0.32	4.37*
Koga	4.9	3	13	15	31.3	32.0	46.8	57.5	100	100	1.15	0.64	0.99	0.70	0.54	0.23	4.25*
Marshall	4.9	4	15	16	31.3	32.0	53.5	60.0	100	97	1.07	0.72	0.92	0.76	0.45	0.30	4.22*
Bruiser	4.5	30	16	14	31.5	31.8	52.5	61.5	100	98	0.91	0.73	0.87	0.77	0.55	0.22	4.05*
Hellen	4.9	34	12	15	31.0	31.8	47.3	57.0	100	93	1.32	0.49	0.77	0.75	0.40	0.28	4.01*
Jackson	4.5	7	16	14	31.5	31.5	53.0	61.0	100	100	1.04	0.83	0.76	0.73	0.39	0.24	3.99*
Frostproof	4.4	6	16	14	31.8	31.5	52.5	62.0	100	99	0.98	0.70	0.81	0.77	0.38	0.29	3.93
Attain	4.0	26	13	15	31.3	31.8	54.5	61.5	100	93	0.89	0.62	0.83	0.81	0.52	0.23	3.89
Winterhawk	4.6	2	17	14	31.8	31.3	53.5	61.5	100	100	0.94	0.85	0.73	0.72	0.41	0.19	3.84
Grazekeeper	3.0	0	15	14	31.3	31.5	46.8	56.5	100	100	0.61	0.73	0.84	0.80	0.53	0.25	3.76
TetraPrime	3.4	2	13	14	31.0	32.0	45.0	56.0	100	100	0.43	0.60	1.02	0.70	0.55	0.35	3.65
Feast II	4.5	59	10	13	31.0	31.3	49.0	59.0	100	72	0.90	0.36	0.83	0.82	0.45	0.29	3.64
Gulf	4.6	70	11	15	31.3	32.0	56.0	61.5	100	63	1.09	0.27	0.77	0.63	0.39	0.21	3.36
Rapido	4.6	68	11	15	31.0	32.0	56.0	61.5	100	80	1.17	0.32	0.65	0.64	0.34	0.15	3.26
<b>Experimental Varieties</b>																	
ME94	4.9	2	15	15	31.3	32.0	49.3	58.0	100	100	1.24	0.79	0.93	0.76	0.44	0.28	4.45*
ME4	4.9	7	15	15	31.5	32.0	53.0	59.0	100	100	1.11	0.86	0.85	0.79	0.40	0.34	4.34*
SELWT110	4.5	6	12	15	31.0	32.0	45.0	58.0	100	99	0.93	0.69	0.98	0.83	0.58	0.33	4.33*
PPG-LMT106-102	4.1	7	12	14	31.0	32.0	45.0	56.5	100	100	0.94	0.61	1.05	0.80	0.55	0.26	4.21*
PPG-LMT104M	4.4	1	13	14	31.0	31.5	45.0	58.0	100	100	0.99	0.73	0.94	0.83	0.43	0.26	4.19*
PPG-LMT105	4.1	7	12	14	31.0	32.0	45.0	57.5	100	98	0.93	0.66	0.87	0.73	0.53	0.24	3.96
WMWL	4.6	32	15	15	31.0	31.8	50.8	60.5	100	97	1.00	0.68	0.80	0.78	0.38	0.28	3.92
M2CVS	3.5	0	17	15	31.8	31.5	53.0	60.0	100	100	0.68	0.86	0.92	0.81	0.36	0.25	3.87
WMWL2	3.4	2	18	14	32.0	31.8	54.0	60.0	100	100	0.66	0.92	0.66	0.80	0.49	0.30	3.83
KYLM1701	2.0	0	15	13	31.0	31.0	52.5	58.5	98	98	0.34	0.91	0.79	0.82	0.60	0.26	3.72
SELWTB119	2.1	0	15	14	31.8	31.8	50.8	61.0	100	100	0.50	0.80	0.88	0.76	0.57	0.20	3.70
Mean	4.2	16	14	14	31.3	31.7	50.4	59.3	100	95	0.94	0.67	0.86	0.77	0.47	0.26	3.97
CV,%	16.5	79	8	6	1.2	1.2	4.5	2.4	1	9	28.03	14.52	20.24	16.67	21.84	28.84	10.25
LSD,0.05	0.7	18	2	1	0.5	0.6	3.2	2.0	1	12	0.37	0.14	0.24	0.18	0.15	0.11	0.57

<sup>1</sup>Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

<sup>2</sup>Percent injury rating taken after a cold spell after the Nov 6, 2019, harvest.

<sup>3</sup>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.

Marshall. In other words, the mean for all varieties is expressed as a percent of Marshall, with Marshall set as 100. Varieties with percentages over 100 yielded better than Marshall and those with percentages less than 100 yielded less than Marshall. In tables 16 and 17, the data are listed as a percentage of the mean of the commercial varieties entered in each specific trial. In other words, the mean for each trial is 100 percent—varieties with percentages over 100 yielded better than average, and varieties with percentages less than 100 yielded lower than average. Direct, statistical comparisons of varieties cannot be made using the summaries of tables 15, 16, and 17, but these comparisons do help to identify varieties for further consideration. Varieties that have performed better than average over many years and at several locations have stable performance; others may have performed well in wet years

or on particular soil types. These details may influence variety choice, and the information can be found in the yearly reports. See the footnotes in tables 15, 16, and 17 to determine the yearly report that should be referenced.

## Summary

Selecting a good variety of annual or perennial ryegrass or festulolium 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.

**Table 5. Dry matter yields, seedling vigor, maturity, and stand persistence of annual grass varieties sown September 10, 2021, at Lexington, Kentucky (see tables 12 and 15 for designation of Italian or Westerwolds type and diploid or tetraploid type varieties).**

Variety	Seedling Vigor <sup>1</sup> Oct 5, 2021	Maturity <sup>2</sup>			Percent Stand		Yield (tons/acre)				
		2022			2021	2022	2021	2022			Total
		Apr 30	May 9	Jun 6	Oct 5	Mar 22	Dec 3	Apr 30	May 9	Jun 6	
<b>Commercial Varieties-Available for Farm Use</b>											
Marshall	4.9	31.8	51.5	58.0	100	100	0.91	1.84	1.01	1.00	4.75*
Winterhawk	4.8	31.3	51.0	57.5	100	99	0.87	1.78	1.06	0.96	4.67*
Grazekeeper	4.3	31.8	45.0	56.5	97	98	0.74	1.66	1.10	1.13	4.63*
Meroa	4.6	31.8	46.3	57.5	100	100	0.81	1.71	1.08	0.98	4.58*
Centurion	5.0	31.8	49.3	58.0	100	100	0.93	1.91	0.91	0.80	4.55*
Koga	4.6	31.5	46.3	55.5	100	100	0.81	1.66	1.03	1.02	4.52*
Nelson	4.0	31.5	52.0	58.0	100	98	0.88	1.54	1.07	0.95	4.45*
Bendix	4.8	31.5	46.3	57.5	100	100	0.78	1.45	1.03	1.07	4.33*
Amp	3.8	31.8	54.5	58.0	97	98	0.69	1.64	1.03	0.97	4.32*
Dexter	4.4	31.5	47.5	56.0	100	100	0.65	1.46	1.06	1.06	4.24*
Mantis	4.3	32.0	53.0	58.0	99	96	0.88	1.43	0.98	0.87	4.16*
Jackson	3.8	31.3	51.5	58.0	100	100	0.64	1.55	1.02	0.93	4.14
Claro	4.6	31.8	48.0	57.5	100	99	0.87	1.33	0.94	0.95	4.08
GreenFarm 2	4.6	32.0	54.5	58.0	100	100	0.61	1.75	0.89	0.81	4.07
Bruiser	4.8	31.0	52.5	58.0	100	100	0.75	1.46	0.94	0.83	3.97
Dyna Plus	4.4	31.0	49.8	58.0	100	100	0.63	1.48	1.02	0.84	3.97
Hellen	4.4	31.5	48.8	57.5	98	99	0.74	1.29	0.94	0.95	3.92
Frostproof	4.5	31.0	53.0	58.5	100	99	0.80	1.32	0.89	0.80	3.80
Tetra Prime	3.5	31.5	46.3	54.5	98	98	0.49	1.32	1.14	0.84	3.79
Feast II	4.1	31.0	50.0	56.0	100	90 <sup>3</sup>	0.62	0.71	0.98	0.87	3.17
Gulf	5.0	31.0	54.5	58.0	100	75 <sup>3</sup>	0.80	0.63	0.91	0.79	3.13
<b>Experimental Varieties</b>											
PPG--LHT-111	4.0	31.8	46.3	56.5	98	100	0.72	1.88	1.18	1.07	4.86*
KYLM1702	4.3	32.0	49.3	58.0	98	99	0.77	1.80	1.16	1.09	4.82*
ME94	4.3	31.8	50.5	58.0	100	100	0.87	1.89	0.95	1.02	4.73*
ME4	4.6	31.8	51.5	57.5	100	100	0.83	1.77	1.07	0.89	4.56*
PPG-LMT 104M	4.5	31.3	47.5	55.0	100	100	0.81	1.70	1.16	0.87	4.53*
PPG--LHT-112	4.1	31.3	45.0	56.0	100	100	0.67	1.52	1.25	0.94	4.38*
M2CVS	3.3	32.0	52.0	58.0	100	100	0.59	1.78	1.01	0.97	4.34*
WMWL	4.8	31.5	52.5	58.0	100	100	0.78	1.65	0.96	0.92	4.30*
WMWL2	4.3	31.8	52.0	58.0	100	100	0.69	1.66	0.95	0.92	4.21*
PPG-LMT-105	4.1	31.3	45.0	55.0	100	100	0.77	1.36	1.15	0.83	4.11
PPG-LMT-106-102	4.0	31.3	46.3	55.0	100	100	0.69	1.24	1.17	0.78	3.88
Mean	4.3	31.5	49.7	51.2	100	98	0.75	1.54	1.03	0.93	4.25
CV,%	9.4	1.4	3.7	1.4	2	5	19.65	15.29	11.07	17.62	11.75
LSD,0.05	0.6	0.6	2.3	1.1	2	6	0.21	0.33	0.16	0.23	0.70

<sup>1</sup>Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

<sup>2</sup>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.

<sup>3</sup>Winter injury on Feast II and Gulf resulted in stand reduction.

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

The following is a list of University of Kentucky Cooperative Extension publications related to ryegrass management. They are available from your county Extension office and are listed in the Publications section of the UK Forage website (<https://forages.ca.uky.edu>).

- Lime and Fertilizer Recommendations (AGR-1)
- Grain and Forage Crop Guide for Kentucky (AGR-18)
- Establishing Forage Crops (AGR-64)
- Forage Identification and Use Guide (AGR-175)
- Annual Ryegrass (AGR-179)
- New Recommendations for Perennial Ryegrass Seedings for Kentucky Horse Farms (ID-142)

- Rotational Grazing (ID-143)
- Establishing and Managing Horse Pastures (ID-147)
- Festulolium Hybrid Grass (see the UK Forage website under "Publications" and "Grasses")

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**Table 6. Dry matter yields, seedling vigor, plant height, maturity, and stand persistence of perennial ryegrass varieties sown August 30, 2019, at Lexington, Kentucky (see Table 13 and Table 16 for designation of diploid or tetraploid varieties).**

Variety	Seedling Vigor <sup>1</sup> Oct 11, 2019	Plant Height (in) May 7, 2020	Maturity <sup>2</sup>				Percent Stand						Yield (tons/acre)				3-year Total				
			2020		2021		2020		2021		2022		2021		2022						
			May 7	Jun 17	May 20	Jun 22	May 20	Jun 22	Mar 17	Oct 27	Mar 24	Oct 22	Mar 22	Nov 9	2020 Total	2021 Total		May 21	Jun 29	Oct 17	Total
<b>Commercial Varieties-Available for Farm Use</b>																					
TetraMag	4.1	23	46.3	56.0	51.0	49.3	53.5	100	100	95	95	93	92	35	4.43	2.99	1.69	0.22	0.40	2.32	9.74*
Barvitra	4.5	26	49.8	58.0	56.0	52.0	57.5	100	100	76	78	76	80	14	4.58	2.25	1.89	0.11	0.37	2.38	9.21*
Boost	3.5	21	48.5	56.5	55.0	29.0	56.0	100	100	100	100	74	98	23	3.98	3.03	1.59	0.10	0.43	2.11	9.12*
Linn	4.6	30	54.0	58.0	60.5	29.0	57.5	100	100	98	98	54	69	11	4.01	2.49	1.93	0.04	0.38	2.35	8.85*
Power	4.4	17	40.5	29.0	53.5	43.5	55.0	100	100	100	100	100	99	24	3.23	2.91	1.72	0.16	0.43	2.31	8.45
TetraSweet	4.4	17	43.3	29.0	54.0	50.3	54.5	100	100	100	100	100	97	24	3.29	2.86	1.45	0.15	0.43	2.03	8.19
Calibra	3.5	16	43.5	29.0	51.0	41.5	53.5	100	100	100	100	99	98	41	3.23	2.77	1.46	0.15	0.37	1.98	7.97
PayDay	4.6	17	42.0	29.0	54.0	50.8	55.0	100	100	100	100	100	100	33	3.16	2.65	1.48	0.18	0.38	2.04	7.85
Remington PLUS NEAZ <sup>3</sup>	2.0	15	40.5	29.0	39.0	57.5	48.8	100	100	100	100	100	100	75	2.86	2.88	1.12	0.36	0.42	1.90	7.64
Remington	2.9	15	39.0	29.0	37.0	58.0	46.3	100	100	100	100	100	98	48	2.97	2.27	1.04	0.40	0.45	1.88	7.13
<b>Experimental Varieties</b>																					
PI2B2	2.1	24	50.8	57.0	54.5	36.3	55.5	100	100	100	100	84	64	10	3.80	2.61	1.65	0.18	0.45	2.28	8.69*
PPG-FPRT119	4.1	21	43.5	56.0	47.8	58.0	53.0	100	100	99	99	96	93	40	3.68	2.46	1.63	0.28	0.39	2.30	8.44
Mean	3.7	20	45.1	43.0	51.1	46.3	53.8	100	100	97	97	90	91	31	3.60	2.68	1.55	0.19	0.41	2.16	8.44
CV%	20.3	7	6.5	1.0	4.7	19.7	2.8	0	0	4	3	18	12	53	8.80	16.46	18.93	34.39	23.25	16.21	9.81
LSD <sub>0.05</sub>	1.1	2	4.2	0.6	3.5	13.1	2.2	0	0	6	5	23	16	24	0.46	0.63	0.42	0.10	0.14	0.50	1.19

<sup>1</sup>Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

<sup>2</sup>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.

<sup>3</sup>Remington PLUS NEAZ contains a non-toxic (novel) endophyte.

\*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 perennial ryegrass varieties sown August 28, 2020, at Lexington, Kentucky (see Table 13 and Table 16 for designation of diploid or tetraploid varieties).**

Variety	Seedling Vigor <sup>1</sup> Sep 24, 2020	Maturity <sup>2</sup>				Percent Stand						Yield (tons/acre)				2-year Total
		2021		2022		2021		2022		2021		2022				
		May 18	Jun 18	May 20	Sep 24	Mar 24	Oct 22	Mar 22	Oct 18	May 20	Jun 27	Oct 18	Total			
<b>Commercial Varieties-Available for Farm Use</b>																
TetraMag	4.4	45.0	43.5	52.5	100	100	100	98	97	4.19	3.49	0.30	0.46	1.80	5.98*	
Elena	4.4	46.5	29.0	52.5	100	100	100	100	97	3.49	0.96	0.29	0.30	1.55	5.04*	
Boost	4.4	51.5	29.0	54.0	100	100	100	99	99	3.11	1.21	0.19	0.44	1.84	4.95*	
Linn	4.6	56.0	57.0	58.0	100	100	81	80	78	3.01	1.36	0.07	0.27	1.70	4.71	
Remington	4.3	37.0	29.0	46.3	100	100	100	100	99	2.88	0.75	0.43	0.44	1.62	4.50	
PayDay	4.3	44.3	29.0	53.0	100	100	100	100	100	2.62	0.92	0.22	0.39	1.53	4.15	
Remington PLUS NEAZ <sup>3</sup>	3.7	37.0	43.0	45.0	100	100	100	100	99	2.65	0.61	0.40	0.27	1.27	3.92	
Power	4.3	39.0	29.0	51.5	100	100	100	100	100	2.53	0.63	0.29	0.31	1.23	3.76	
TetraSweet	4.8	40.3	29.0	49.8	100	100	100	100	98	2.32	0.83	0.27	0.30	1.41	3.73	
<b>Experimental Varieties</b>																
BARLPF237	3.8	37.0	34.3	45.0	100	100	100	100	100	2.97	0.55	0.42	0.50	1.46	4.43	
Mean	4.3	43.4	35.2	50.8	100	100	98	98	96	2.98	0.89	0.29	0.37	1.54	4.52	
CV%	9.4	8.6	20.3	3.3	0	0	3	3	4	17.38	26.91	19.23	29.59	19.15	17.25	
LSD <sub>0.05</sub>	0.6	5.4	10.4	2.5	0	0	4	4	5	0.75	0.34	0.08	0.16	0.43	1.13	

<sup>1</sup>Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

<sup>2</sup>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.

<sup>3</sup>Remington PLUS NEAZ contains a non-toxic (novel) endophyte.

\*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 perennial ryegrass varieties sown September 10, 2021, at Lexington, Kentucky (see Table 13 and Table 16 for designation of diploid or tetraploid varieties).

Variety	Seedling Vigor <sup>1</sup> Oct 4, 2021	Maturity <sup>2</sup> 2022		Percent Stand 2022		Yield (tons/acre) 2022					
		May 20		Oct 19		Total					
		Oct 4	Mar 22	Oct 19	May 20	Jun 28	Oct 19	Total			
<b>Commercial Varieties-Available for Farm Use</b>											
Remington	4.3	50.5	100	100	100	3.86	0.46	0.66			4.98*
TetraPrime II	4.3	56.0	99	97	97	3.46	0.89	0.38			4.72*
TetraGain SLT	4.4	55.5	100	100	100	3.82	0.44	0.42			4.67*
Remington PLUS NEA <sup>3</sup>	4.6	51.0	100	100	100	3.79	0.30	0.48			4.57*
TetraMag	4.3	55.0	99	99	99	3.77	0.41	0.30			4.49*
TetraSweet	4.3	54.5	100	100	100	3.60	0.40	0.37			4.37*
Dexter 1	4.5	56.0	99	100	99	3.34	0.39	0.47			4.20*
PayDay	4.8	54.5	100	100	99	3.42	0.37	0.30			4.09
Power	4.1	54.5	100	100	100	3.18	0.38	0.32			3.88
Linn	4.1	58.0	100	100	99	2.87	0.46	0.26			3.59
<b>Experimental Varieties</b>											
PPG-FRPT122	4.4	51.5	100	100	100	3.58	0.45	0.24			4.27*
GPRT14021 AR1 <sup>3</sup>	4.3	53.0	100	100	100	2.93	0.37	0.43			3.73
Mean	4.3	54.2	100	100	99	3.47	0.44	0.39			4.30
CV%	9.3	2.0	1	1	1	13.92	34.13	41.45			14.14
LSD <sub>0.05</sub>	0.6	1.5	2	1	1	0.69	0.22	0.23			0.87

<sup>1</sup>Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

<sup>2</sup>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.

<sup>3</sup>Remington PLUS NEA2 and GPRT14021 AR1 contain a non-toxic (novel) endophyte.

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

Table 9. Dry matter yields, seedling vigor, plant height, maturity, and stand persistence of festulolium varieties sown August 30, 2019, at Lexington, Kentucky (see Table 14 and Table 17 for ryegrass and fescue genetic background of these varieties).

Variety	Seedling Vigor <sup>1</sup> Oct 11, 2019	Plant Height (in) Apr 29, 2020	Maturity <sup>2</sup>					Percent Stand					Yield (tons/acre)									
			2020		2021		2022		2020		2021		2022		2020		2021		2022			
			Apr 29	Jun 8	May 13	Jun 14	May 17	Oct 11	2019	2020	Oct 27	Mar 24	Oct 22	Mar 22	Nov 9	2022	Total	May 17	Jun 29	Oct 17	Total	
<b>Commercial Varieties-Available for Farm Use</b>																						
Perseus	5.0	19	40.5	58.0	46.3	62.0	54.5	100	100	94	93	91	91	38	546	3.19	1.38	0.53	0.47	2.37	11.02*	
Perun	4.0	19	43.5	59.0	48.8	62.0	56.0	100	100	97	97	95	94	68	471	3.28	1.36	0.45	0.47	2.28	10.27*	
Lofa	5.0	21	42.0	58.0	46.3	62.0	55.5	100	100	78	79	79	82	33	460	3.15	1.57	0.52	0.28	2.37	10.13*	
SpringGreen	4.8	26	45.0	61.0	47.5	62.0	55.0	100	100	98	97	97	95	40	460	2.95	1.66	0.39	0.25	2.30	9.85*	
Duo	5.0	26	43.5	62.0	47.5	62.0	55.0	100	100	70	65	66	69	28	443	2.88	1.56	0.36	0.30	2.23	9.54*	
Hykor	2.0	23	45.0	29.0	58.0	29.0	58.0	100	100	100	100	100	100	100	346	3.47	1.34	0.42	0.49	2.25	9.18	
Fojtan	2.3	14	40.3	29.0	57.0	29.0	58.0	100	98	98	98	98	98	98	283	3.33	1.45	0.40	0.41	2.26	8.42	
<b>Experimental Varieties</b>																						
ORRUS	4.1	16	38.8	58.0	46.3	62.0	53.5	100	100	98	97	93	93	35	423	3.03	1.29	0.50	0.30	2.09	9.36	
Mean	4.0	20	42.3	51.8	49.7	53.8	55.7	100	100	92	91	90	90	55	429	3.16	1.45	0.45	0.37	2.27	9.72	
CV%	13.2	13	10.0	1.5	4.7	0.0	3.2	0	1	8	7	7	6	19	11.95	16.74	16.59	13.50	36.61	11.11	10.91	
LSD <sub>0.05</sub>	0.8	4	6.2	1.2	3.4	0.0	2.6	0	1	11	9	9	8	16	0.75	0.73	0.35	0.09	0.20	0.37	1.56	

<sup>1</sup>Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

<sup>2</sup>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 10. Dry matter yields, seedling vigor, maturity, and stand persistence of festulolium varieties sown August 28, 2020, at Lexington, Kentucky (see Table 14 and Table 17 for ryegrass and fescue genetic background of these varieties).**

Variety	Seedling Vigor <sup>1</sup> Sep 24, 2020	Maturity <sup>2</sup>		Percent Stand					Yield (tons/acre)					2-year Total
		2021	2022	2020	2021		2022		2021 Total	2022				
		May 6	May 17	Sep 24	Mar 24	Oct 22	Mar 22	Oct 18		May 17	Jun 27	Oct 18	Total	
<b>Commercial Varieties-Available for Farm Use</b>														
Perseus	4.3	41.8	52.5	100	100	100	100	98	5.27	0.80	0.38	0.42	1.60	6.87*
Lofa	4.8	39.0	53.0	100	100	100	100	100	5.23	0.88	0.30	0.26	1.43	6.66*
Hykor	3.0	56.0	58.0	100	100	100	100	100	4.47	0.99	0.29	0.73	2.01	6.48*
Mahulena	2.4	57.5	58.0	100	100	100	100	100	4.26	1.18	0.25	0.56	1.99	6.25*
Perun	3.8	49.8	53.5	100	100	100	100	97	4.85	0.72	0.28	0.25	1.25	6.11
Duo	5.0	54.0	53.0	100	100	100	99	98	4.63	0.88	0.27	0.29	1.45	6.08
SpringGreen	3.9	48.8	53.5	100	100	100	100	97	4.64	0.69	0.28	0.37	1.34	5.99
<b>Experimental Varieties</b>														
FPF7B	2.8	56.0	58.0	100	100	100	100	100	4.23	0.95	0.28	0.64	1.88	6.10
FPF6	2.8	54.0	57.0	100	100	100	100	100	4.43	0.82	0.26	0.57	1.65	6.08
FPF8B	3.0	49.0	56.5	100	100	100	100	100	3.99	0.93	0.30	0.54	1.77	5.76
FPF9B	2.6	50.3	56.5	100	100	100	100	100	3.98	0.79	0.22	0.60	1.61	5.58
FPF5	3.0	55.0	57.0	100	100	100	100	100	3.84	0.88	0.23	0.58	1.69	5.53
Mean	3.4	50.9	55.5	100	100	100	99	99	4.48	0.88	0.28	0.48	1.64	6.12
CV,%\$	10.5	6.5	1.7	0	0	0	1	1	6.06	16.38	15.26	23.90	13.19	7.82
LSD,0.05	0.5	4.8	1.3	0	0	0	1	2	0.52	0.21	0.06	0.17	0.31	0.69

<sup>1</sup>Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

<sup>2</sup>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 11. Dry matter yields, seedling vigor, maturity, and stand persistence of festulolium varieties sown September 10, 2021, at Lexington, Kentucky (see Table 14 and Table 17 for ryegrass and fescue genetic background of these varieties).**

Variety	Seedling Vigor <sup>1</sup> Oct 4, 2021	Maturity <sup>2</sup> 2022 May 17	Percent Stand			Yield (tons/acre) 2022			
			2021 Oct 4	2022		May 17	Jun 27	Oct 20	Total
				Mar 22	Oct 19				
<b>Commercial Varieties-Available for Farm Use</b>									
Perseus	4.9	52.0	99	99	99	4.04	0.69	0.57	5.31*
Lofa	4.9	54.5	100	100	99	3.76	0.70	0.34	4.80*
Lenor	3.3	57.0	97	98	98	2.82	0.74	0.90	4.45
Sugarcrest	4.8	53.5	100	100	100	3.60	0.46	0.32	4.38
Mahulena	3.4	58.0	95	98	98	2.83	0.55	0.73	4.11
SpringGreen	4.5	56.5	100	100	99	3.19	0.49	0.40	4.08
Tatran	5.0	51.5	100	100	99	2.93	0.64	0.48	4.05
Duo	4.9	56.5	100	96	96	2.76	0.56	0.33	3.64
<b>Experimental Varieties</b>									
FPF7	3.1	58.0	98	98	98	3.04	0.61	0.86	4.51
FPF8	3.4	57.5	97	98	98	2.60	0.72	1.09	4.42
KYFL1013	4.5	55.0	100	100	98	3.34	0.29	0.37	4.00
ORRUS	4.5	53.5	100	100	100	2.89	0.58	0.43	3.90
Mean	4.3	55.3	99	99	98	3.15	0.59	0.57	4.30
CV,%	8.8	2.5	1	1	1	17.01	16.32	18.97	12.05
LSD,0.05	0.5	2.0	2	2	2	0.77	0.14	0.16	0.75

<sup>1</sup>Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

<sup>2</sup>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 12. Proprietors and type information of annual ryegrass varieties in current trials.**

Variety	Type	Proprietor/KY Distributor
<b>Commercial Varieties-Available for Farm Use</b>		
Amp	Westerwold tetraploid	Columbia Seeds
Bendix	Westerwold tetraploid	Smith Seed
Bruiser	Westerwold diploid	Smith Seed
Centurion	Westerwold diploid	Mountain View Seeds
Claro	Westerwold tetraploid	Smith Seed
Dexter	Westerwold tetraploid	Smith Seed
Dyna Plus	Westerwold diploid	Columbia Seeds
Feast II	Italian tetraploid	Ampac Seed
Frostproof	Westerwold diploid	Smith Seed
Grazekeeper	Westerwold tetraploid	Smith Seed
GreenFarm II	Westerwold diploid	Smith Seed
Gulf	Westerwold diploid	Public
Hellen	Westerwold tetraploid	Smith Seed
Jackson	Westerwold diploid	The Wax Company
Koga	Westerwold tetraploid	Smith Seed
Mantis	Westerwolds tetraploid	Smith Seed
Marshall	Westerwold diploid	The Wax Company
Meroa	Italian tetraploid	Smith Seed
Nelson	Westerwold tetraploid	The Wax Company
TetraPrime	Italian tetraploid	Mountain View Seeds
Winterhawk	Westerwold diploid	Oregro Seeds
<b>Experimental Varieties</b>		
KYLM1702	Westerwold tetraploid	KY Agri. Exp, Station
M2CVS	Westerwold diploid	The Wax Company
ME4	Westerwold diploid	The Wax Company
ME-94	Westerwold diploid	The Wax Company
PPG-LMT104M	Italian tetraploid	Mountain View Seeds
PPG-LMT105	Italian tetraploid	Mountain View Seeds
PPG-LMT106-102	Italian tetraploid	Mountain View Seeds
PPG-LHT-111	Italian tetraploid	Mountain View Seeds
PPG-LHT-112	Italian tetraploid	Mountain View Seeds
WMWL	N/A <sup>1</sup>	The Wax Company
WMWL2	N/A <sup>1</sup>	The Wax Company

<sup>1</sup>Type was not provided by the company.

**Table 13. Proprietors and type information of perennial ryegrass varieties in current trials.**

Variety	Type	Proprietor/KY Distributor
<b>Commercial Varieties-Available for Farm Use</b>		
Barvitra	tetraploid	Barenbrug USA
BG34	diploid	Barenbrug USA
Boost	tetraploid	Allied Seed
Calibra	tetraploid	DLF Pickseed
Dexter I	tetraploid	DLF Pickseed
Elena	tetraploid	Allied Seed
Linn (certified)	diploid	Public
Melpetra	tetraploid	Hood River Seed
PayDay	tetraploid	Mountain View Seeds
Power	tetraploid	Allied Seed
Remington	tetraploid	Barenbrug USA
Remington PLUS NEA2 <sup>1</sup>	tetraploid	Barenbrug USA
TetraGain SLT	tetraploid	Smith Seed
TetraMag	tetraploid	Mountain View Seeds
TetraSweet	tetraploid	Mountain View Seeds
<b>Experimental Varieties</b>		
BARLPF237	tetraploid	Barenbrug USA
GPRT14021 AR1 <sup>1</sup>	tetraploid	Mountain View Seeds
PI2B2	diploid	Oregro Seeds
PPG-FPRT119	tetraploid	Mountain View Seeds
PPG-FRPT122	tetraploid	Mountain View Seeds

<sup>1</sup>Remington PLUS NEA2 and GPRT14021 AR1 contain a non-toxic (novel) endophyte.

**Table 14. Proprietors and genetic background of festulolium varieties in current trials.**

Variety	Type <sup>1</sup>	Proprietor/KY Distributor
<b>Commercial Varieties-Available for Farm Use</b>		
Duo	MF x PR	Ampac Seed
Fojtan	(TF x IR) x TF	DLF Pickseed
Hykor	(TF x IR) x TF	DLF Pickseed
Lenor	ryegrass type	Columbia Seeds
Lofa	(TF x Int) x Int	DLF Pickseed
Mahulena	(TF x IR) x TF	DLF Pickseed
Perseus	MF x IR	DLF Pickseed
Perun	MF x IR	DLF Pickseed
Spring Green	MF x PR	Turf Seed
Sugarcrest	MF x PR	Mountain View Seeds
Tatran	fescue type	Columbia Seeds
<b>Experimental Varieties</b>		
FPF5	(TF x IR) xTF	DLF Pickseed
FPF6	(TF x IR) xTF	DLF Pickseed
FPF7B	(TF x IR) xTF	DLF Pickseed
FPF8B	(TF x IR) xTF	DLF Pickseed
FPF9B	(TF x IR) xTF	DLF Pickseed
KYFL1013	MF x IR	KY Agric. Exp. Station
ORRUS	N/A <sup>2</sup>	Oregro Seeds

<sup>1</sup>MF=meadow fescue, TF=tall fescue, IR=Italian ryegrass, PR=perennial ryegrass, Int=intermediate ryegrass, AR=annual ryegrass.

<sup>2</sup>Type was not provided by the company.

**Table 15. Summary of Kentucky annual ryegrass yield trials 2003-2022 (yield shown as a percentage of the yield value of Marshall).**

Variety	Type	Proprietor	Lexington <sup>1</sup>																Mean <sup>4</sup> (#trials)						
			03-3	04	05	06	07	08	09	10	10	11	12	12	13	14	15	16		17	18	19	21		
Abundant	tetraploid	Ampac Seed				12																			
Acrobat	N/A <sup>5</sup>	Proseeds Marketing					144																		
AE110	Westerwold tetraploid	Pickseed USA, Inc.								89	100													95(2)	
Amp	Westerwold tetraploid	Columbia Seeds											75										91	83(2)	
Assist	Westerwold diploid	SaddleButte											88												
Attain	Westerwold tetraploid	Smith Seed Services							111				52	69							92			91(3)	
Baquano	Westerwold tetraploid	Smith Seed Services																			77				
Barmultra II	Italian tetraploid	Barenbrug USA							133				103			125	108								117(4)
Bendix	Westerwold tetraploid	Smith Seed Services																				91			
Big Bang	Westerwold tetraploid	Brett Young												67											
Big Boss	Westerwold tetraploid	Smith Seed Services							98				86	38	73										86(3)
Big Daddy	Westerwold tetraploid	FFR/Sou. St.							86	98	82														89(3)
Bill	Westerwold diploid	Smith Seed Services													62										
Brangus	Italian tetraploid	KB SeedSolutions							94																
Bruiser	Westerwold diploid	Ampac Seed					65	105	100	100	104	86	100	105	86	95	86	113		96	84				94(11)
Centurion	Westerwold diploid	Mountain View Seeds										97		132				100	117						108(5)
Claro	Westerwold tetraploid	Smith Seed Services																							
Dexter	Westerwold tetraploid	Smith Seed Services																							
DH-3	Italian tetraploid	Allied Seed					91	27					89												69(3)
Diamond T	Italian tetraploid	Oregro Seeds					8																		
Dixie Gold	Westerwold tetraploid	Caudill Seed																							
DoubleDiamond	Westerwold tetraploid	Oregro Seeds																			84				
Dyna-Gain	Westerwold diploid	Columbia Seeds																							
DynaPlus	Westerwold diploid	Columbia Seeds																							
Ed	Westerwold diploid	Smith Seed Services							96							100									98(2)
Fantastic	Westerwold diploid	Ampac Seed					48	84																	86(3)
Feast II	Italian tetraploid	Ampac Seed						35	113	109		81	93	71	47	56	88	80	87	65	86	67			79(13)
Flying A	Westerwold diploid	Oregro Seeds					39	59																	
Fox	Italian diploid	DLF Pickseed							109																
Fria	Westerwold diploid	Allied Seed							95			87	89	104	81	85	98								89(6)
Frostproof	Westerwold diploid	Smith Seed Services																96							90(3)
GR-AS10	Italian	Ampac Seed							113																
Grazekeeper	Westerwold tetraploid	Smith Seed Services																							
Graze-N-Gro	Westerwold diploid	Seed Research of OR																							
Green Farm	Westerwold diploid	Smith Seed Services													85										
Green Farm 2	Westerwold diploid	Smith Seed Services																							
Gulf	Westerwold diploid	Public										76	72		27	69	60	87	87	56	80	66			70(13)
Hellen	Westerwold tetraploid	Smith Seed Services																							89(2)

Table 15. (continued)

Variety	Type	Proprietor	Lexington <sup>1</sup>																	Mean <sup>4</sup> (#trials)			
			03 <sup>2,3</sup>	04	05	06	07	08	09	10	10	11	12	12	13	14	15	16	17		18	19	21
Hercules	Westerwold tetraploid	Barenbrug USA										91	68										
HS-1	Italian diploid	KB SeedSolutions							72														
Jackson	Westerwold diploid	The Wax Co.	66	100	62	103	59	101	99	106	106	91	77	69	100	99	97	105	95	95	87	93(17)	
Jumbo	Westerwold tetraploid	Barenbrug USA	112														88	83				94(3)	
KB Royal	Italian diploid	KB SeedSolutions							83														
Koga	Westerwold tetraploid	Smith Seed Services															94	96	101	95	97(4)		
Kospeed	Westerwold diploid	Smith Seed Services													80	92						86(2)	
Kowinearly	Westerwold diploid	Smith Seed Services													95	96						96(2)	
LHT-102	Intermediate	Ampac Seed									100												
Mantis	Westerwold tetraploid	Smith Seed Services																			88		
Marshall	Westerwold diploid	The Wax Co.	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100(18)	
Master	Westerwold tetraploid	Smith Seed Services																82					
Maximo	Intermediate tetraploid	Pickseed USA, Inc.									101												
Maximus	Westerwold tetraploid	Barenbrug USA															63	84				74(2)	
Melquatro	Italian tetraploid	Hood River Seed														135	72					104(2)	
Meroa	Westerwold diploid	Smith Seed Services													93	102				108	96	100(4)	
MX 108	Westerwold tetraploid	Pickseed USA, Inc.									95	114										105(2)	
Nelson	Westerwold tetraploid	The Wax Co.								86			93	65	77	105	97	73	91	104	94	91(9)	
Oryx	Italian diploid	Hood River Seed														100							
Primecut	Westerwold brand	Oregro Seeds									94												
Rapido	Westerwold diploid	Smith Seed Services																		77			
Striker	Westerwold tetraploid	Seed Research of OR					90																
TAMTBO	Westerwold tetraploid	Tex. Ag Exp Sta.						47	101		108	95			79			91				87(6)	
Tam 90	Italian diploid	Tex. Ag Exp Sta.						49							78							64(2)	
TetraPrime	Italian tetraploid	Mountain View Seeds										101			96	104	91	99	90	86	80	93(8)	
TetraPro	Italian tetraploid	Tex. Ag Exp Sta.						40															
TillageRootMax	Westerwold diploid	Cover Crop Solutions									82	90										86(2)	
T-Rex	Westerwold tetraploid	SaddleButte			11																		
Trinova	Westerwold tetraploid	Smith Seed Services																78					
Ugne	Italian tetraploid	Hood River Seed															102						
Verdure	Westerwold tetraploid	Smith Seed Services							86					42	58							72(2)	
Winterhawk	Westerwold diploid	Oregro Seeds							104		117	92			119			113	96	91	98	104(8)	

<sup>1</sup>In annual ryegrass, low-yielding varieties usually result from winterkill. Note: Due to severe winterkill, yield results from the 2006 and 2013 plantings were not included in the overall mean.

<sup>2</sup>Year trial was established.

<sup>3</sup>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 2015 was harvested 1 year, so the final report would be "2016 Annual and Perennial Ryegrass and Festulolium Report" archived in the UK Forage website (<https://forages.ca.uky.edu>).

<sup>4</sup>Mean only presented when respective variety was included in two or more trials.

<sup>5</sup>Type was not provided by the company.

**Table 16. Summary of Kentucky perennial ryegrass yield trials 2000-2022 (yield shown as a percentage of the mean of the commercial varieties in the trial).**

Variety	Type	Proprietor	Lexington																				Princeton			Mean <sup>3,4</sup> #trials
			01:2	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	00	02			
			2yr <sup>5</sup>	2yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	2yr	3yr	3yr	3yr	3yr	2yr	2yr	3yr	3yr		
Aires	diploid	Ampac Seed	95																				93	94(2)		
Albion	tetraploid	Grasslands Oregon												105	103									104(2)		
Amazon	tetraploid	AgriBioTech		99																		107	103(2)			
Anaconda	tetraploid	Caudill Seed																			95		-			
Aubisque	tetraploid	Seed Research of OR	144																					-		
Bandit	tetraploid	Grassland West																			106			-		
Barvitra	diploid	Barenbrug USA												104					109					107(2)		
Bastion C-2	tetraploid	Seed Research of OR		91																				-		
Bestfor	tetraploid	Improved Forages																			113	107	110(2)			
Best for Plus	hybrid tetraploid	Improved Forages	116	108	118																			114(3)		
BG-34	diploid	Barenbrug USA			83	85				86	87	84	85	81			83							84(8)		
Boost	tetraploid	Allied Seed					130	125	120	143	110	103	102						108	109				117(9)		
Boxer	tetraploid	AgriBioTech																			106			-		
Calibra	tetraploid	DLF Pickseed						96	109	81	99	103	96	87	100	98	98	89	95			112	97(13)			
CAS MP64	diploid	Cascade International	97																					-		
Citadel	tetraploid	Ag Canada																			94	113	104(2)			
Crave	tetraploid	Ampac Seed									95													-		
Elena DS	tetraploid	Allied Seed									110				110					111				110(2)		
Eurostar	tetraploid	Seed Research of OR					112																	-		
Everlast	diploid	Caudill Seed										104												-		
Feeder	diploid	Seed Research of OR					76																	-		
Grand Daddy	tetraploid	Smith Seed	118			101	109	76	92	84	86		107									111	98(9)			
Green Gold	tetraploid	Grasslands Oregon				96																		-		
Herbal	NA <sup>6</sup>	ProSeeds Marketing						77																-		
Impressario	tetraploid	DLF Pickseed						107				92												100(2)		
Kentaur	tetraploid	DLF Pickseed								106		117												112(2)		
Lactal	tetraploid	Brett Young							102															-		
Lasso	diploid	DLF Pickseed	98																					-		
LHT-102	tetraploid	Ampac Seed										114												-		
Linn (certified)	diploid	Public	98	98	102	98	85	84	101	92	93	80	95	83	89	83	74	98	105	104	87	88	92(20)			
Manhattan	diploid	-																					85	-		

**Table 16. (Continued)**

Variety	Type	Proprietor	Lexington																								Princeton			Mean <sup>3,4</sup> (#trials)
			01:2	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	00	02							
			2yr <sup>5</sup>	2yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	3yr	2yr	3yr	3yr	3yr	2yr	2yr	2yr	3yr						
Matrix	diploid	Cropmark seeds		77																						-				
Maverick Gold	hybrid tetraploid	Ampac Seed	97																						71	84(2)				
Melpetra	tetraploid	Hood River Seed											83													-				
Orantas	diploid	DLF Pickseed							82																	-				
Ortet	tetraploid	Oregro Seeds						114																		-				
PayDay	tetraploid	Mountain View Seeds									101	103	99	87	108	95	93	92								97(8)				
Polly II	tetraploid	FS Growmark																			110					-				
Polly Plus	hybrid tetraploid	Allied Seed		64																						-				
Power	tetraploid	Ampac Seed						110	103	102	100	109	104	95	101	107		83								101(11)				
Polim	tetraploid	DLF Pickseed									106															-				
Quartermaster	tetraploid	Radix Research																								-				
Quartet	tetraploid	Ampac Seed	97					46																113		78(4)				
RAD-CPS212	hybrid tetraploid	Radix Research						134																		-				
RAD-M1125	hybrid tetraploid	Mountain View Seeds						120																		-				
Remington	tetraploid	Barenbrug USA											95	117	109	108	105	85	99							103(7)				
Remington PLUS NEA27	tetraploid	Barenbrug USA											119	99				105	91	87						100(5)				
Sierra	diploid	Lewis Seed Co.						89																		-				
TetraGain	tetraploid	Pure Seed																								-				
TetraMag	tetraploid	Mountain View Seeds										111														-				
TetraSweet	tetraploid	Mountain View Seeds										110			136	127	124	121	116	132						124(7)				
Tonga	tetraploid	Kings AgriSeeds													104	105	87	97	82							95(5)				
Verseka	tetraploid	Allied Seed																								100(3)				
Victorian	diploid	Caudill Seed																								-				
Yatsyn	diploid	Barenbrug USA												104	83											94(2)				
																					89					-				

<sup>1</sup>Year trial was established.  
<sup>2</sup>Use this summary table as a guide in making variety decisions, but refer to specific yearly reports to determine statistical differences in forage yield between varieties. To find actual yields, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in 2012 was harvested 3 years, so the final report would be "2015 Annual and Perennial Ryegrass and Festulolium Report" archived in the UK Forage website (https://forages.ca.uky.edu).  
<sup>3</sup>Mean only presented when respective variety was included in two or more trials.  
<sup>4</sup>In perennial ryegrass, low yielding varieties usually result from winterkill or summer mortality.  
<sup>5</sup>Number of years of data.  
<sup>6</sup>Type was not provided by the company.  
<sup>7</sup>Remington PLUS NEA2 contains a non-toxic (novel) endophyte.

**Table 17. Summary of Kentucky festulolium yield trials 2001-2022 (yield shown as a percentage of the mean of the commercial varieties in the trial).<sup>1</sup>**

Variety	Type <sup>2</sup>	Proprietor	Lexington														Mean <sup>5</sup> (#trials)					
			2001 <sup>3,4</sup> 2yr <sup>6</sup>	2005 3yr	2008 3yr	2009 3yr	2010 3yr	2011 3yr	2012 2yr	2013 3yr	2014 2yr	2015 3yr	2016 3yr	2017 3yr	2019 3yr	2020 2yr						
Agula	MF x IR	Allied Seed					94														–	
Barfest	MF x PR	Barenbrug USA					105	101	107	119	91	92	92									101(7)
Bonus	MF x IR	Allied Seed					93	46	32	34												51(4)
Duo	MF x PR	Ampac Seed		89	98	99	95	106	103	96	96	83	83	80	98	96						94(13)
Felina	(TF x IR) x TF	DLF Pickseed	104				132	118	134	114	96											116(6)
Fojtan	(TF x IR) x TF	DLF Pickseed					112	101	124	92	72	94	100	108	86							99(9)
Gain	MF x IR	Allied Seed					103	77	52	75												77(4)
Hostyn	MF x IR	DLF Pickseed							107	110	106		108									108(4)
Hykor	(TF x IR) x TF	DLF Pickseed					133	141	153	131	119	121	112		94	102						123(9)
InaMerlin	MF x IR	Hood River Seed											88	77								83(2)
Kenfest	MF x AR	KY Agr. Exp Station												97								–
Lofa	(TF x Int) x Int	DLF Pickseed					105	107	110	128	112	91	109	108	104	105						108(10)
Mahulena	(TF x IR) x TF	DLF Pickseed							131	109	107		111	114								112(6)
Meadow Green	N/A <sup>7</sup>	Pure Seed							37	34												36(2)
Perseus	MF x IR	DLF Pickseed					132	114	126	123	110	109	105	112	113	108						115(10)
Perun	MF x IR	DLF Pickseed					127	114	107	131	110	102	99	110	105	96						110(10)
Rebab	(TF x IR) x TF	DLF Pickseed								94	77											86(2)
Spring Green	MF x PR	Turf-Seed	96	111	114	101	113	112	114	110	103	107	92	94	101	94						104(14)
Sweet Tart	MF x IR	ProSeeds Marketing			88		82	63	62													74(4)

<sup>1</sup>The festuloliums were in fescue trials from 2001-2005 and in perennial ryegrass trials from 2008-2009.<sup>2</sup>MF=meadow fescue, TF=tall fescue, IR=Italian ryegrass, PR=perennial ryegrass, Int=intermediate ryegrass.<sup>3</sup>Year trial was established.<sup>4</sup>Use this summary table as a guide in making variety decisions, but refer to specific yearly reports to determine statistical differences in forage yield between varieties. To find actual yields, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in 2012 was harvested 3 years, so the final report would be “2015 Annual and Perennial Ryegrass and Festulolium Report” archived in the UK Forage website (<https://forages.ca.uky.edu>).<sup>5</sup>Mean only presented when respective variety was included in two or more trials.<sup>6</sup>Number of years of data.<sup>7</sup>Type was not provided by the company.