

2024 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 current 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 Westwolds types, make sure to only plant 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 (two sets of chromosomes) and tetraploid (four sets of chromosomes) varieties of perennial ryegrass exist. Tetraploids have larger tillers

Table 1. Temperature and rainfall at Lexington, Kentucky, in 2022, 2023, and 2024.

	2022				2023				2024 ²			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		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
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	2.10	-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.

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 20 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
Leaf development		
11	First leaf unfolded	Applicable to regrowth of established (plants) and to primary growth of seedlings.
12	2 leaves unfolded	Further subdivision by means of leaf development index (see text).
13	3 leaves unfolded	
.	
19	9 or more leaves unfolded	
Sheath elongation		
20	No elongated sheath	Denotes first phase of new spring growth after overwintering. This character is used instead of tillering which is difficult to record in established stands.
21	1 elongated sheath	
22	2 elongated sheaths	
23	3 elongated sheaths	
.	
29	9 or more elongated sheaths	
Tillering (alternative to sheath elongation)		
21	Main shoot only	Applicable to primary growth of seedlings or to single tiller transplants.
22	Main shoot and 1 tiller	
23	Main shoot and 2 tillers	
24	Main shoot and 3 tillers	
.	
29	Main shoot and 9 or more tillers	
Stem elongation		
31	First node palpable	More precisely an accumulation of nodes. Fertile and sterile tillers distinguishable.
32	Second node palpable	
33	Third node palpable	
34	Fourth node palpable	
35	Fifth node palpable	
37	Flag leaf just visible	
39	Flag leaf ligule/collar just visible	
Booting		
45	Boot swollen	
Inflorescence emergence		
50	Upper 1 to 2 cm of inflorescence visible	
52	1/4 of inflorescence emerged	
54	1/2 of inflorescence emerged	
56	3/4 of inflorescence emerged	
58	Base of inflorescence just visible	
Anthesis		
60	Preanthesis	Inflorescence-bearing internode is visible. No anthers are visible.
62	Beginning of anthesis	First anthers appear.
64	Maximum anthesis	Maximum pollen shedding.
66	End of anthesis	No more pollen shedding.
Seed ripening		
75	Endosperm milky	Inflorescence green.
85	Endosperm soft doughy	No seeds loosening when inflorescence is hit on palm.
87	Endosperm hard doughy	Inflorescence losing chlorophyll; a few seeds loosening when inflorescence hit on palm
91	Endosperm hard	Inflorescence-bearing internode losing chlorophyll; seeds loosening in quantity when inflorescence hit on palm.
93	Endosperm hard and dry	Final stage of seed development; most seeds shed.

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

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 2021, 2022, and 2023 at Lexington. Perennial ryegrass tests (2021, 2022, and 2023) and festulolium tests (2021, 2022, and 2023) 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 2024 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 annual ryegrasses, perennials should be productive under Kentucky conditions for an average of two to three growing seasons.

Table 3. Dry matter yields, seedling vigor, maturity, and stand persistence of annual grass varieties sown September 10, 2021, at Lexington, Kentucky (see Table 12 and Table 15 for designation of Italian or Westerwolds type and diploid or tetraploid type varieties).

Variety	Seedling Vigor ¹ Oct 5, 2021	Maturity ²			Percent Stand		Yield (tons/acre)				Total
		2022			2021	2022	2022				
		Apr 30	May 9	Jun 6	Oct 5	Mar 22	Dec 3	Apr 30	May 9	Jun 6	
Commercial Varieties-Available for Farm Use											
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 ³	0.62	0.71	0.98	0.87	3.17
Gulf	5.0	31.0	54.5	58.0	100	75 ³	0.80	0.63	0.91	0.79	3.13
Experimental Varieties											
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

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 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.

Statistical analyses were performed on all data (including experimental) 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. 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 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 2024 of commercial varieties that have been entered in the Kentucky trials. In Table 15, the data are listed as a percentage of 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

Table 4. Dry matter yields, seedling vigor, maturity, plant height, and stand persistence of annual ryegrass varieties sown September 9, 2022, at Lexington, Kentucky (see Table 12 and Table 15 for designation of Italian or Westerwolds type and diploid or tetraploid type varieties).

Variety	Seedling Vigor ¹ Oct 25, 2022	Maturity ² 2023				Plant Height (in) 2023			Percent Stand		Yield (tons/acre) 2023				
		Apr 19	May 19	Jun 14	Jul 7	Apr 19	May 19	Jun 14	2022	2023	Apr 19	May 19	Jun 14	Jul 7	Total
									Oct 25	Mar 20					
Commercial Varieties-Available for Farm Use															
Nelson	4.0	32.0	51.0	56.8	62.0	20	21	20	100	100	2.73	1.51	0.54	0.17	4.94*
Mantis	4.4	31.8	51.5	56.8	62.0	19	21	18	100	100	2.47	1.43	0.54	0.17	4.61*
Claro	4.4	32.0	51.0	56.3	61.0	19	22	20	100	100	2.16	1.42	0.56	0.27	4.41*
Winterhawk	4.4	32.5	51.0	56.5	61.5	19	18	18	100	100	2.56	1.17	0.44	0.14	4.31
Marshall	3.8	32.0	53.5	56.0	61.0	20	22	18	100	100	2.51	1.27	0.41	0.11	4.30
TetraPrime II	4.3	31.8	52.0	56.0	59.0	17	20	20	100	100	2.09	1.31	0.59	0.22	4.21
Centurion	4.3	32.3	52.0	57.0	62.0	20	20	18	100	100	2.55	0.96	0.42	0.14	4.06
GreenFarm II	4.5	32.0	56.0	57.5	62.0	18	20	18	100	100	2.44	1.08	0.37	0.15	4.04
Hellen	4.6	31.5	52.0	56.0	59.5	17	21	20	100	100	1.98	1.28	0.53	0.23	4.02
Jackson	4.1	32.0	51.5	57.3	61.5	20	20	17	100	100	2.39	1.07	0.36	0.11	3.93
Bruiser	4.6	31.8	53.0	56.8	61.5	19	18	17	100	100	2.34	1.07	0.38	0.13	3.91
Bendix	4.4	31.8	50.5	57.0	61.0	17	20	20	100	100	1.89	1.26	0.51	0.20	3.86
Frostproof	4.8	31.8	53.5	57.5	61.5	20	18	19	100	100	2.36	0.93	0.39	0.16	3.85
Feast II	4.6	31.3	52.5	56.0	58.5	13	20	15	100	100	1.75	1.19	0.45	0.29	3.68
Gulf	4.5	32.0	54.0	57.8	60.5	18	20	18	100	100	1.99	0.99	0.35	0.09	3.41
Experimental Varieties															
WMWL	4.6	33.0	51.0	57.3	61.5	23	21	19	100	100	2.93	1.27	0.49	0.16	4.85*
KYLM1702	4.0	31.8	52.0	56.0	62.0	19	23	21	100	100	2.29	1.57	0.58	0.16	4.60*
ME94	4.1	31.8	50.5	57.0	62.0	20	20	17	100	100	2.75	1.29	0.42	0.13	4.59*
KYLM1701	3.6	32.3	53.5	56.8	62.0	20	24	21	100	100	2.15	1.40	0.52	0.13	4.20
ME4	4.1	32.8	50.5	56.8	62.0	23	20	17	100	100	2.42	1.20	0.42	0.12	4.16
WMWL2	4.6	32.3	51.0	56.3	61.5	22	21	18	100	100	2.52	1.12	0.40	0.12	4.15
KYLM1603	3.9	32.0	54.0	57.5	61.0	17	23	19	100	100	2.30	1.25	0.41	0.12	4.08
Mean	4.3	32.0	52.2	56.8	61.2	19	20	18	100	100	2.34	1.23	0.46	0.16	4.19
CV,%	9.1	1.5	3.2	1.4	1.4	11	8	6	0	0	22.80	11.88	13.59	21.57	10.04
LSD,0.05	0.6	0.7	2.4	1.1	1.2	3	2	2	0	0	0.42	0.21	0.06	0.05	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.

less than 100 yielded lower than average. Direct, statistical comparisons of varieties cannot be made using the tables 15, 16, and 17 summaries, but these comparisons do help to identify varieties for further consideration. Varieties that have performed better than average over many years and at several locations have 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.

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, Forage, and Cover 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)

Table 5. Dry matter yields, seedling vigor, cold injury, maturity, plant height, and stand persistence of annual ryegrass varieties sown September 7, 2023, at Lexington, Kentucky (see Table 12 and Table 15 for designation of Italian or Westerwolds type and diploid or tetraploid type varieties).

Variety	Seedling Vigor ¹ Oct 19, 2023	% Leaf Injury from Cold ² Jan 30, 2024	Maturity ³ 2024		Plant Height (in) Apr 22	Percent Stand		Yield (tons/acre)				Total
			Apr 22	May 23		2023	2024	2023 Dec 7	2024			
						Oct 19	Mar 14		Apr 22	May 23	Jun 17	
Commercial Varieties-Available for Farm Use												
Koga	3.8	8	46.0	56.0	23	100	100	0.42	3.17	1.13	0.65	5.38*
Nelson	4.4	10	38.0	57.5	28	100	100	0.72	3.14	0.96	0.53	5.35*
Alisca	4.0	14	34.5	56.5	23	100	100	0.57	2.78	1.10	0.69	5.14*
McKinley	4.5	18	37.5	56.5	26	100	100	0.69	2.91	0.98	0.56	5.13*
Dexter	3.5	6	36.0	55.5	24	100	100	0.46	2.94	1.12	0.59	5.11*
Kodiak	4.4	18	47.5	55.5	26	100	100	0.75	2.93	0.95	0.45	5.08*
Marshall	4.1	7	39.3	58.0	29	100	100	0.67	2.86	1.02	0.49	5.04*
Halsey	4.0	11	34.3	57.5	23	100	100	0.59	2.85	1.07	0.53	5.04*
Centurion	4.0	11	37.5	57.0	28	100	100	0.76	2.81	0.91	0.48	4.96*
Winterhawk	3.9	16	40.8	56.5	28	100	100	0.65	2.94	0.90	0.43	4.92*
Jackson	2.4	5	39.3	57.0	29	100	100	0.36	3.26	0.82	0.42	4.85
Frostproof	4.9	30	40.8	56.0	28	100	100	0.86	2.77	0.74	0.38	4.74
Melquatro	4.1	18	34.3	59.5	22	100	100	0.63	2.59	0.95	0.49	4.67
Feast II	3.9	33	32.5	57.0	20	100	100	0.52	2.62	0.93	0.53	4.61
Ed	4.4	23	45.8	58.5	23	100	100	0.66	2.41	0.98	0.46	4.51
Gulf	4.4	43	47.8	59.0	27	100	100	0.64	2.44	0.81	0.41	4.29
Oryx	4.3	16	34.3	58.5	23	100	100	0.49	2.33	1.01	0.44	4.28
Diplomat	4.8	50	35.8	59.5	21	100	100	0.74	2.10	0.88	0.49	4.21
Experimental Varieties												
SELWTWL1	3.9	16	42.0	58.0	26	100	100	0.60	3.09	1.05	0.63	5.37*
WMWL2	4.8	18	42.0	57.0	32	100	100	0.87	3.00	0.95	0.44	5.26*
KYLM1702	2.9	0	39.3	59.0	27	100	100	0.49	3.10	1.10	0.56	5.25*
SELWT19-9	3.4	5	33.5	55.5	24	100	100	0.42	3.00	1.20	0.63	5.25*
WMWL	3.9	9	43.5	56.5	30	100	100	0.57	3.09	0.87	0.49	5.02*
ME94	3.3	4	40.5	56.0	30	100	100	0.52	3.13	0.92	0.43	5.00*
ME4	4.4	6	36.5	56.0	30	100	100	0.82	2.72	0.96	0.45	4.96*
SELWD19-12	4.1	11	38.0	57.5	28	100	100	0.68	2.78	0.90	0.46	4.82
SELWDTSEM1	3.5	29	54.0	60.0	29	100	100	0.49	2.77	0.88	0.46	4.60
KYLM1603	3.3	8	42.0	58.0	26	100	100	0.36	2.85	0.90	0.48	4.58
SELWD19-7	3.8	28	48.5	60.0	27	100	100	0.54	2.56	1.00	0.47	4.58
KYLM1701	2.3	0	43.5	58.5	29	100	100	0.24	2.86	1.00	0.40	4.50
Mean	3.9	16	40.2	57.5	26	100	100	0.59	2.83	0.97	0.50	4.88
CV,%	15.6	48	12.4	2.1	8	0	0	24.57	9.58	14.70	14.50	7.61
LSD,0.05	0.9	10	7.0	1.7	3	0	0	0.20	0.38	0.20	0.10	0.52

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

² Injury symptoms disappeared after 2-3 weeks.

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 2 for complete scale.

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

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Table 6. 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 ¹ Oct 4, 2021	Maturity ²			Plant Height (in) May 22, 2024	Percent Stand								Yield (tons/acre)						3-year Total
		2022	2023	2024		2021	2022		2023		2024		2022	2023	2024					
		May 20	May 25	May 22		Oct 4	Mar 22	Oct 19	Mar 20	Oct 17	Mar 20	Oct 18	Total	Total	May 22	Jun-Aug ⁴	Oct 24	Total		
Commercial Varieties-Available for Farm Use																				
Remington	4.3	50.5	49.8	51.5	15	100	100	100	100	99	99	99	4.98	2.01	1.07	–	0.18	1.25	8.25*	
Tetragain SLT	4.4	55.5	56.5	56.0	24	100	100	100	95	94	92	73	4.67	1.93	1.18	–	0.13	1.31	7.91*	
Remington NEA2 ³	4.6	51.0	48.8	50.0	14	100	100	100	100	98	98	98	4.57	1.60	0.79	–	0.12	0.91	7.08*	
TetraMag	4.3	55.0	55.5	55.5	22	99	99	99	34	49	55	49	4.49	1.39	0.96	–	0.09	1.05	6.92*	
TetraSweet	4.3	54.5	56.0	56.0	19	100	100	100	93	84	90	83	4.37	1.38	1.01	–	0.12	1.13	6.88*	
Dexter 1	4.5	56.0	57.0	57.0	24	99	100	99	95	90	92	87	4.20	1.51	0.97	–	0.11	1.08	6.80*	
Linn (certified)	4.1	58.0	59.5	58.0	29	100	100	99	69	60	74	55	3.59	1.64	1.21	–	0.09	1.29	6.52*	
PayDay	4.8	54.5	56.5	56.0	23	100	100	99	94	92	94	87	4.09	1.30	1.02	–	0.08	1.10	6.49*	
Power	4.1	54.5	56.0	55.5	21	100	100	100	94	93	93	88	3.88	1.50	0.86	–	0.11	0.97	6.35	
Experimental Varieties																				
PPG-FRPT122	4.4	51.5	52.0	48.8	14	100	100	100	89	87	86	86	4.27	1.40	0.64	–	0.09	0.73	6.40	
GPRT14021 AR1 ³	4.3	53.0	51.5	51.0	12	100	100	100	97	95	94	89	3.73	1.32	0.71	–	0.08	0.79	5.84	
Mean	4.4	54.0	54.5	54.1	20	100	100	99	87	85	88	81	4.26	1.54	0.95		0.11	1.06	6.86	
CV,%	8.5	2.1	3.2	2.4	13	1	0	1	12	9	9	15	14.86	28.12	34.28		41.98	33.18	18.27	
LSD,0.05	0.5	1.6	2.5	1.8	4	1	1	1	15	11	12	17	0.91	0.63	0.47		0.07	0.51	1.81	

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 Remington PLUS NEA2 and GPRT14021 AR1 contain a non-toxic (novel) endophyte.

⁴ 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 7. Dry matter yields, seedling vigor, maturity, plant height, and stand persistence of perennial ryegrass varieties sown September 9, 2022, at Lexington, Kentucky (see Table 13 and Table 16 for designation of diploid or tetraploid varieties).

Variety	Seedling Vigor ¹ Oct 25, 2022	Maturity ²			Plant Height (in) May 20, 2024	Percent Stand						Yield (tons/acre)					2-year Total
		2023		2024		2022	2023		2024		2023	2024					
		May 17	Jun 28	May 20		Oct 25	Mar 20	Oct 17	Mar 20	Oct 18	Total	May 20	Jun-Aug ⁴	Oct 22	Total		
Commercial Varieties-Available for Farm Use																	
TetraMag	4.8	55.0	53.0	54.0	17	100	100	100	100	87		5.06	1.19	–	0.10	1.29	6.35*
Tetragain SLT	4.3	55.5	52.3	56.0	23	100	100	100	99	91		5.01	1.24	–	0.04	1.28	6.29*
Boost	4.1	57.0	53.0	56.5	24	100	100	100	100	68		4.86	1.24	–	0.04	1.28	6.14
PayDay	4.4	55.0	29.0	55.0	17	100	100	100	100	92		4.79	0.93	–	0.09	1.02	5.81
Dexter I	4.3	56.0	29.0	57.0	21	100	100	100	100	70		4.14	1.15	–	0.04	1.19	5.33
Power	4.5	55.5	28.3	56.0	20	100	100	100	100	97		3.95	1.11	–	0.04	1.16	5.10
TetraSweet	4.8	56.5	29.0	56.0	17	100	100	100	100	96		4.10	0.94	–	0.05	0.99	5.09
Linn (certified)	4.8	58.0	58.0	60.0	29	100	100	100	100	69		3.73	1.03	–	0.03	1.06	4.79
Remington	3.5	47.5	54.5	45.0	11	99	100	100	100	100		3.94	0.67	–	0.09	0.76	4.69
Experimental Varieties																	
PPG-LHT111	4.9	56.5	57.5	56.0	27	100	100	100	96	73		5.59	1.27	–	0.05	1.32	6.90*
PST-2BUL19	4.0	57.5	53.5	56.0	18	100	100	100	96	24		4.14	0.83	–	0.02	0.85	4.99
GPRT14021 AR1 ³	3.8	50.0	52.5	49.3	13	100	100	100	100	99		3.91	0.90	–	0.06	0.95	4.86
Mean	4.3	55.0	45.8	54.7	20	100	100	100	99	80		4.43	1.04		0.05	1.10	5.53
CV,%	8.3	2.3	5.0	2.0	8	1	0	1	1	19		7.79	14.95		79.00	14.25	8.32
LSD,0.05	0.5	1.8	3.3	1.6	2	1	0	1	2	22		0.50	0.22		97.00	0.22	0.66

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 GPRT14021 AR1 contains a non-toxic (novel) endophyte.

⁴ 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 8. Dry matter yields, seedling vigor, maturity, and stand persistence of perennial ryegrass varieties sown September 6, 2023, at Lexington, Kentucky (see Table 13 and 16 for designation of diploid or tetraploid varieties).

Variety	Seedling Vigor ¹ Oct 25, 2022	Maturity ² 2024 May 16	Plant Height (in) May 16, 2024	Percent Stand			Yield (tons/acre) 2024			
				2023		2024	2024		Oct 23	Total
				Oct 24	Mar 14	Oct 18	May 16	Jun-Aug ⁴		
Commercial Varieties-Available for Farm Use										
TetraMag	4.88	55.50	28	100	100	100	2.96	–	0.20	3.16*
TetraGain SLT	4.50	56.00	30	100	100	99	2.76	–	0.02	2.79*
Linn (certified)	5.00	59.50	34	100	100	98	2.25	–	0.03	2.28
Dexter I	4.50	55.50	25	100	100	99	2.22	–	0.05	2.27
PayDay	4.63	56.00	24	100	100	100	2.11	–	0.07	2.18
Power	4.75	55.50	24	100	100	99	2.08	–	0.09	2.16
Remington NEA2 ³	3.88	46.25	17	100	100	100	1.88	–	0.14	2.02
TetraSweet	4.63	55.50	24	100	100	99	1.97	–	0.05	2.02
Remington	4.63	50.50	18	100	100	100	1.89	–	0.10	1.99
Delika	5.00	45.00	14	100	100	91	1.29	–	0.06	1.35
Mean	4.60	53.50	24	100	100	98	2.14		0.08	2.22
CV,%	6.40	2.30	8	0	0	1	12.15		78.65	12.08
LSD,0.05	0.40	1.80	3	0	0	2	0.38		0.09	0.39

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 Remington PLUS NEA2 contains a non-toxic (novel) endophyte.

⁴ 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 9. Dry matter yields, seedling vigor, maturity, plant height, 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 ¹ Oct 4, 2021	Maturity ²				Plant Height (in) May 22, 2024	Percent Stand						Yield (tons/acre)						3-year Total	
		2022		2023			2024	2021	2022		2023		2024		2022	2023	2024			
		May 17	May 15	Jun 20	May 22		May 22, 2024	Oct 4	Mar 22	Oct 19	Mar 20	Oct 17	Mar 20	Oct 18	Total	Total	May 22	Jun-Aug ³		Oct 21
Commercial Varieties-Available for Farm Use																				
Perseus	4.9	52.0	45.0	58.0	56.0	23	99	99	99	97	94	79	73	5.31	1.86	0.11	–	0.15	0.26	7.43*
Lofa	4.9	54.5	46.3	58.0	56.0	27	100	100	99	98	93	89	50	4.80	2.03	0.10	–	0.05	0.16	6.99*
Mahulena	3.4	58.0	58.0	29.0	60.0	39	95	98	98	98	98	98	97	4.11	2.28	0.14	–	0.29	0.43	6.82*
Lenor	3.3	57.0	55.5	29.0	60.0	39	97	98	98	99	99	99	98	4.45	1.84	0.14	–	0.30	0.44	6.74*
Sugarcrest	4.8	53.5	47.3	57.5	56.0	22	100	100	100	99	92	89	62	4.38	1.59	0.10	–	0.08	0.18	6.15
Tatran	5.0	51.5	46.3	58.0	56.0	23	100	100	99	98	96	93	72	4.05	1.91	0.12	–	0.06	0.18	6.14
SpringGreen	4.5	56.5	46.3	57.5	56.0	24	100	100	99	99	94	92	81	4.08	1.66	0.11	–	0.12	0.23	5.97
Duo	4.9	56.5	51.5	58.0	56.5	26	100	96	96	96	89	85	56	3.64	1.75	0.11	–	0.07	0.19	5.58
Experimental Varieties																				
FPF7	3.1	58.0	58.0	29.0	60.0	39	98	98	98	99	99	76	98	4.51	2.43	0.14	–	0.29	0.43	7.37*
FPF8	3.4	57.5	56.5	29.0	59.5	38	97	98	98	98	98	99	99	4.42	2.24	0.14	–	0.34	0.48	7.14*
ORRUS	4.5	53.5	46.3	58.0	56.0	22	100	100	100	99	94	87	69	3.90	1.97	0.11	–	0.15	0.26	6.12
KYFL1013	4.5	55.0	53.5	57.5	58.0	36	100	100	98	98	74	81	45	4.00	1.62	0.12	–	0.08	0.20	5.83
Mean	4.3	55.3	50.9	48.2	57.5	30	99	99	98	98	93	89	75	4.30	1.93	0.12		0.16	0.29	6.12
CV,%	8.8	2.5	4.5	1.1	1.0	10	1	1	1	1	11	16	24	12.05	6.72	9.09		35.28	20.95	8.41
LSD,0.05	0.5	2.0	3.3	0.7	0.9	7	2	2	2	2	14	21	26	0.75	0.19	0.02		0.08	0.09	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 2 for complete scale.

³ There was no mid-summer harvest because of minimal regrowth after the first harvest and low yields may be due to the age of the stand.

* 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, plant height, and stand persistence of festulolium varieties sown September 9, 2022, at Lexington, Kentucky (see Table 14 and Table 17 for ryegrass and fescue genetic background of these varieties).

Variety	Seedling Vigor ¹ Oct 25, 2022	Maturity ²			Plant Height (in) May 13, 2024	Percent Stand					Yield (tons/acre)					2-year Total
		2023		2024		2023		2024			2023	2024				
		May 5	Jun 8	May 13		Oct 25	Mar 20	Oct 17	Mar 20	Oct 18	Total	May 16	Jun 24	Oct 22	Total	
Commercial Varieties-Available for Farm Use																
Perseus	4.5	45.0	56.5	47.5	14	100	100	100	100	33	5.74	1.01	0.47	0.03	1.51	7.25*
Lofa	4.9	45.0	48.8	53.5	19	100	100	100	100	53	5.34	1.36	0.40	0.05	1.81	7.15*
Mahulena	2.3	56.5	42.5	58.0	40	100	100	100	100	99	4.78	1.49	0.43	0.18	2.10	6.88*
Tatran	4.5	45.0	42.0	49.3	15	100	100	100	100	65	5.20	1.22	0.41	0.04	1.67	6.87*
SpringGreen	4.4	48.5	49.8	53.5	18	100	100	100	100	64	5.00	1.02	0.41	0.05	1.48	6.47*
Sugarcrest	4.0	46.3	48.8	49.3	14	100	100	100	100	76	4.92	0.89	0.48	0.06	1.43	6.35
Duo	4.8	53.0	49.0	50.8	14	100	100	80	40	24	4.89	0.66	0.47	0.01	1.14	6.03
Lenor	2.6	46.3	55.0	56.5	32	100	100	100	100	100	4.12	1.10	0.58	0.20	1.88	5.99
Experimental Varieties																
FPF7	2.9	56.5	29.0	58.0	33	100	100	100	100	100	4.50	0.97	0.43	0.13	1.52	6.02
FPF8	3.0	52.5	36.3	55.0	26	100	100	100	100	100	4.05	0.90	0.50	0.07	1.47	5.53
Mean	3.8	49.5	45.8	53.1	22	100	100	98	94	71	4.86	1.06	0.46	0.08	1.60	6.46
CV,%	10.7	3.9	27.5	4.2	9	0	0	3	12	31	7.98	23.89	20.79	76.51	15.90	8.64
LSD,0.05	0.6	2.8	18.2	3.3	3	0	0	4	16	32	0.56	0.37	0.14	0.09	0.37	0.81

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 11. Dry matter yields, seedling vigor, maturity, and stand persistence of festulolium varieties sown September 6, 2023, at Lexington, Kentucky (see Table 14 and Table 17 for ryegrass and fescue genetic background of these varieties).

Variety	Seedling Vigor ¹ Oct 24, 2023	Maturity ² 2024 May 8	Percent Stand			Yield (tons/acre)			
			2023	2024		2024			
			Oct 24	Mar 14	Oct 18	May 13	Jun 17	Oct 23	Total
Commercial Varieties-Available for Farm Use									
Perseus	4.5	56.0	100	100	99	2.97	0.49	0.19	3.65*
SpringGreen	4.3	57.5	100	100	100	2.70	0.49	0.09	3.28*
Sugarcrest	4.3	59.0	100	100	100	2.76	0.43	0.09	3.28*
Duo	4.6	60.0	100	100	90	2.58	0.61	0.04	3.23*
Mean	4.4	58.1	100	100	97	2.75	0.50	0.1	3.36
CV,%	6.1	2.6	0	0	3	10.45	18.76	53.62	10.78
LSD,0.05	0.4	2.3	0	0	5	0.46	0.15	0.09	0.58

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 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
Commercial Varieties-Available for Farm Use		
Alisca	Westerwold tetraploid	Allied Seed
Centurion	Westerwold diploid	Mountain View Seeds
Dexter	Westerwold tetraploid	Smith Seed
Diplomat	Westerwold diploid	Allied Seed
Ed	Westerwold diploid	Smith Seed
Feast II	Italian tetraploid	Ampac Seed
Frostproof	Westerwold diploid	Smith Seed
Gulf	Westerwold diploid	Public
Halsey	Intermediate tetraploid	Smith Seed
Jackson	Westerwold diploid	The Wax Company
Kodiak	Westerwold diploid	DLF Pickseed
Koga	Westerwold tetraploid	Smith Seed
Marshall	Westerwold diploid	The Wax Company
McKinley	Westerwold diploid	DLF Pickseed
Melquatro	Italian tetraploid	Columbia Seeds
Nelson	Westerwold tetraploid	The Wax Company
Oryx	Italian diploid	Columbia Seeds
Winterhawk	Westerwold diploid	Oregro Seeds
Experimental Varieties		
KYLM1603	N/A ¹	KY Agri. Exp, Station
KYLM1701	Westerwold tetraploid	KY Agri. Exp, Station
KYLM1702	Westerwold tetraploid	KY Agri. Exp, Station
ME4	Westerwold diploid	The Wax Company
ME-94	Westerwold diploid	The Wax Company
SELWD19-7	Westerwold diploid	Smith Seed
SELWD19-12	Westerwold diploid	Smith Seed
SELWDTSEM1	Westerwold tetraploid	Smith Seed
SELWTWL1	Westerwold tetraploid	Smith Seed
SELWT19-9	Westerwold tetraploid	Smith Seed
WMWL	N/A ¹	The Wax Company
WMWL2	N/A ¹	The Wax Company

¹ 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
Commercial Varieties-Available for Farm Use		
Boost	tetraploid	Allied Seed
Delika	diploid	Columbia Seeds
Dexter I	tetraploid	DLF Pickseed
Elena	tetraploid	Allied Seed
Linn (certified)	diploid	Public
PayDay	tetraploid	Mountain View Seeds
Power	tetraploid	Allied Seed
Remington	tetraploid	Barenbrug USA
Remington PLUS NEA2 ¹	tetraploid	Barenbrug USA
TetraGain SLT	tetraploid	Smith Seed
TetraMag	tetraploid	Mountain View Seeds
TetraSweet	tetraploid	Mountain View Seeds
Experimental Varieties		
GPRT14021 AR1 ¹	tetraploid	Mountain View Seeds
PPG-FRPT122	tetraploid	Mountain View Seeds
PPG-LHT111	tetraploid	Mountain View Seeds
PST-2BUL19	N/A ²	Pure Seed Testing

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

² Type was not provided by the company.

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

Variety	Type ¹	Proprietor/KY Distributor
Commercial Varieties-Available for Farm Use		
Duo	MF x PR	Ampac Seed
Lenor	IR x TF	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
Tatrn	IR x TF	Columbia Seeds
Experimental Varieties		
FPF7B	(TF x IR) x TF	DLF Pickseed
FPF8B	(TF x IR) x TF	DLF Pickseed
KYFL1013	MF x IR	KY Agric. Exp. Station
ORRUS	N/A ²	Oregro Seeds

¹ MF=meadow fescue, TF=tall fescue, IR=Italian ryegrass, PR=perennial ryegrass, Int=intermediate ryegrass

² Type was not provided by the company.

Table 15. Summary of Kentucky annual ryegrass yield trials at Lexington from 2004-2024 (yield shown as a percentage of the yield value of Marshall)¹.

Variety	Type	Proprietor	04 ^{2,3}	05	06	07	08	09	10	10	11	12	12	13	14	15	16	17	18	19	21	22	23	Mean ⁴ (#trials)
Acrobat	_5	Proseeds Marketing					144																	-
AE110	Westerwold tetraploid	Pickseed USA, Inc.									89	100												95(2)
Alisca	Westerwold tetraploid	Allied Seed																				101		-
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)
Baqueano	Westerwold tetraploid	Smith Seed Services																	77					-
Barmultra II	Italian tetraploid	Barenbrug USA							133				103	95		125	108							117(4)
Bendix	Westerwold tetraploid	Smith Seed Services																			91	90		91(2)
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		104	86		100	105	95	86	113		96	84	91		94(12)
Centurion	Westerwold diploid	Mountain View Seeds											97			132		100	117		96	94	98	105(7)
Claro	Westerwold tetraploid	Smith Seed Services																			86	103		95(2)
Dexter	Westerwold tetraploid	Smith Seed Services																			89		101	95(2)
DH-3	Italian tetraploid	Allied Seed				91	27				89													69(3)
Diplomat	Westerwold diploid	Allied Seed																					83	-
Dixie Gold	Westerwold tetraploid	Caudill Seed												19										-
DoubleDiamond	Westerwold tetraploid	Oregro Seeds																	84					-
Dyna-Gain	Westerwold diploid	Columbia Seeds												71										-
DynaPlus	Westerwold diploid	Columbia Seeds																			84			-
Ed	Westerwold diploid	Smith Seed Services							96					101	100								89	97(4)
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	86	91	80(16)
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				93	80	90	93	90(5)
GR-AS10	Italian	Ampac Seed							113															-
Green Farm	Westerwold diploid	Smith Seed Services													85									-
Green Farm 2	Westerwold diploid	Smith Seed Services																			86	94		90(2)
Gulf	Westerwold diploid	Public				67	26	87	78		76	72		27	69	60	87	87	56	80	66	79	84	72(15)
Halsey	Intermediate tetraploid	Smith Seed Services																					99	-
Hellen	Westerwold tetraploid	Smith Seed Services																		95	83	93		90(3)
Hercules	Westerwold tetraploid	Barenbrug USA											91	68										80(2)

Table 15. (continued).

Variety	Type	Proprietor	042,3	05	06	07	08	09	10	10	11	12	12	13	14	15	16	17	18	19	21	22	23	Mean4 (#trials)	
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	91	95	93(19)	
Jumbo	Westerwold tetraploid	Barenbrug USA																88	83					94(3)	
KB Royal	Italian diploid	KB SeedSolutions							83															–	
Kodiak	Westerwold diploid	DLF Pickseed																					100	–	
Koga	Westerwold tetraploid	Smith Seed Services																94	96	101	95		106	98(5)	
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	107		98(2)	
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	100	100(19)	
Master	Westerwold tetraploid	Smith Seed Services																	82					–	
Maximo	Intermediate tetraploid	Pickseed USA, Inc.									101													–	
Maximus	Westerwold tetraploid	Barenbrug USA																63	84					74(2)	
McKinley	Westerwold diploid	DLF Pickseed																					101	–	
Melquatro	Italian tetraploid	Columbia Seeds														135		72					92	100(3)	
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	115	105	95(11)	
Oryx	Italian diploid	Columbia Seeds														100							84	–	
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)	
TetraPrime II	Italian tetraploid	Mountain View Seeds																				98		–	
TetraPro	Italian tetraploid	Tex. Ag Exp Sta.					40																	–	
TillageRootMax	Westerwold diploid	Cover Crop Solutions									82	90												86(2)	
Trinova	Westerwold tetraploid	Smith Seed Services																	78					–	
Ugne	Italian tetraploid	Columbia Seeds														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	100	97	103(10)

¹ 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.

² Year trial was established.

³ Use this summary table as a guide in making variety decisions, but refer to specific yearly reports to determine statistical differences in forage yield between varieties. To find actual yields, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in the fall of 2015 was harvested one 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>).

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

⁵ Type was not provided by the company.

Table 16. Summary of Kentucky perennial ryegrass yield trials at Lexington from 2001-2024 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Type	Proprietor	01 ^{1,2}	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	Mean ^{3,4} (#trials)	
			2yr ⁵	2yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	3yr	3yr	3yr	3yr	2yr	2yr	3yr	3yr	3yr	3yr	3yr	3yr		3yr
Aires	diploid	Ampac Seed	95																					-	
Albion	tetraploid	Grasslands Oregon													105	103								104(2)	
Amazon	tetraploid	AgriBioTech			99																			-	
Aubisque	tetraploid	Seed Research of OR		144																				-	
Barvitra	diploid	Barenbrug USA														104				109				107(2)	
Bastion C-2	tetraploid	Seed Research of OR			91																			-	
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	112		111	116(10)	
Calibra	tetraploid	DLF Pickseed							96	109	81	99	103	96	87	100	98	98	89	95				96(12)	
Crave	tetraploid	Ampac Seed											95											-	
Dexter 1	tetraploid	DLF Pickseed																				97	93	95(2)	
Elena DS	tetraploid	Allied Seed											110				110				110			110(3)	
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									97(8)	
Green Gold	tetraploid	Grasslands Oregon					96																	-	
Herbal	- ⁷	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	102	93	85	92(20)	
Matrix	diploid	Cropmark seeds		77																				-	
Maverick Gold	hybrid tetraploid	Ampac Seed	97																					-	
Melpetra	tetraploid	Columbia Seeds															83							-	
Orantas	diploid	DLF Pickseed								82														-	
Ortet	tetraploid	Oregro Seeds							114															-	
PayDay	tetraploid	Mountain View Seeds											101	103	99		87	108	95	93	89	92	105	97(10)	
Polly Plus	hybrid tetraploid	Allied Seed		64																				-	
Power	tetraploid	Ampac Seed						110	103	102	100	109	104	95	101	107				100	86	90	93	100(13)	
Polim	tetraploid	DLF Pickseed									106													-	
Quartermaster	tetraploid	Radix Research				122																		-	
Quartet	tetraploid	Ampac Seed	97			56		46																66(3)	
RAD-CPS212	hybrid tetraploid	Radix Research				134																		-	
RAD-MI125	hybrid tetraploid	Mountain View Seeds					120																	-	
Remington	tetraploid	Barenbrug USA													95	117	109	108	105	85	102	117	83	102(9)	
Remington PLUS NEA2 ⁶	tetraploid	Barenbrug USA													119	99			105	91	89	101		101(6)	
Sierra	diploid	Lewis Seed Co.				89																		-	
TetraGain SLT	tetraploid	Pure Seed											111										113	114	114(2)
TetraMag	tetraploid	Mountain View Seeds											110		136		127	124	121	116	130	99	115	120(9)	
TetraSweet	tetraploid	Mountain View Seeds															104	105	87	97	80	98	87	94(7)	
Tonga	tetraploid	Kings AgriSeeds				96				103														100(2)	
Verseka	tetraploid	Allied Seed											75											-	
Victorian	diploid	Caudill Seed													104	83								94(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 2012 was harvested three 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>).

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

⁴ In perennial ryegrass, low yielding varieties usually result from winterkill or summer mortality.

⁵ Number of years of data.

⁶ Remington PLUS NEA2 contains a non-toxic (novel) endophyte.

⁷ Type was not provided by the company.

Table 17. Summary of Kentucky festulolium yield trials at Lexington from 2001-2024 (yield shown as a percentage of the mean of the commercial varieties in the trial).¹

Variety	Type ²	Proprietor	2001 ^{3,4}	2005	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2019	2020	2021	2022	Mean ⁵ (#trials)
			2yr ⁶	3yr	3yr	3yr	3yr	3yr	2yr	3yr	2yr	3yr	3yr	3yr	3yr	3yr	3yr	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	97	86	91	93(15)
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	109			124(9)
InaMerlin	MF x IR	Columbia Seeds											88	77					83(2)
Kenfest	MF x AR	KY Agr. Exp Station												97					-
Lenor	IR x TF	Columbia Seeds															104	90	97(2)
Lofa	(TF x Int) x Int	DLF Pickseed					105	107	110	128	112	91	109	108	104	100	108	108	108(12)
Mahulena	(TF x IR) x TF	DLF Pickseed							131	109	107		111	114		106	105	104	111(8)
Meadow Green	MF x PR	Pure Seed Testing							37	34									36(2)
Perseus	MF x IR	DLF Pickseed					132	114	126	123	110	109	105	112	113	105	115	109	114(12)
Perun	MF x IR	DLF Pickseed					127	114	107	131	110	102	99	110	105	87			109(10)
Rebab	(TF x IR) x TF	DLF Pickseed								94	77								86(2)
Spring Green	MF x PR	Pure Seed Testing	96	111	114	101	113	112	114	110	103	107	92	94	101	96	92	98	103(16)
Sugarcrest	MF x PR	Mountain View Seeds															95	96	96(2)
Sweet Tart	MF x IR	ProSeeds Marketing			88		82	63	62										74(4)
Tatran	IR x TF	Columbia Seeds															95	104	100(2)

¹ The festuloliums were in fescue trials from 2001-2005 and in perennial ryegrass trials from 2008-2009.

² MF=meadow fescue, TF=tall fescue, IR=Italian ryegrass, PR=perennial ryegrass, Int=intermediate ryegrass.

³ Year trial was established.

⁴ 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 2012 was harvested three 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>).

⁵ Mean only presented when respective variety was included in two or more trials.

⁶ Number of years of data.

Notes

Notes

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