

2023 Annual and Perennial Ryegrass and Festulolium Report

G.L. Olson, S.R. Smith, T.D. Phillips, C.D. Teutsch, and J.C. Henning, Plant and Soil Sciences

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 2-3 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 2021, 2022, and 2023.

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

¹DEP is departure from the long-term average.

²2023 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	
13	3 leaves unfolded	
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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 2019, 2021, and 2022 at Lexington. Perennial ryegrass tests (2020, 2021, and 2022) and festulolium tests (2020, 2021, and 2022) 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 2023 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, injury rating, plant height, maturity, and stand persistence of annual ryegrass varieties sown August 30, 2019, 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 11, 2019	Early Freeze Injury ² Dec 9, 2019	Plant Height (in)		Maturity ³				Percent Stand		Yield (tons/acre)						Total
			Apr 1	Apr 28	Apr 1	Apr 28	May 21	Jun 8	2019	2020	2020						
									Oct 11	Mar 17	Nov 6	Apr 1	Apr 28	May 21	Jun 8	Jun 25	
Commercial Varieties-Available for Farm Use																	
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
Experimental Varieties																	
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

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

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

³Maturity 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.

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 festulium 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 2023 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, 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
					2021	2022	2021	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

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

²Maturity 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.

³Winter 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.

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, 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				Plant Height (in)			Percent Stand		Yield (tons/acre)				
		2023				2023			2022	2023	2023				
		Apr 19	May 19	Jun 14	Jul 7	Apr 19	May 19	Jun 14	Oct 25	Mar 20	Apr 19	May 19	Jun 14	Jul 7	Total
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

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

²Maturity 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.

Authors

G.L. Olson is a research specialist, S.R. Smith and J.C. Henning are Extension professors and forage specialists, C.D. Teutsch is an Extension associate professor and forage specialist, and T.D. Phillips is an associate professor of tall fescue and grass breeding.

Table 6. 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 ¹ Sep 24, 2020	Maturity ²				Percent Stand							Yield (tons/acre)			
		2021		2022	2023	2020	2021		2022		2023		2021	2022	2023	3-year Total
		May 18	Jun 18	May 20	May 25	Sep 24	Mar 24	Oct 22	Mar 22	Oct 18	Mar 20	Oct 17	Total	Total	May 25	
Commercial Varieties-Available for Farm Use																
TetraMag	4.4	45.0	43.5	52.5	54.7	100	100	100	98	97	4	4	4.19	1.80	0.22	6.20*
Boost	4.4	51.5	29.0	54.0	55.3	100	100	100	100	99	28	38	3.11	1.84	0.41	5.35*
Elena	4.4	46.5	29.0	52.5	54.0	100	100	100	100	97	18	27	3.49	1.55	0.20	5.25*
Remington	4.3	37.0	29.0	46.3	46.3	100	100	100	100	99	75	79	2.88	1.62	0.35	4.85
Linn (certified)	4.6	56.0	57.0	58.0	59.5	100	100	81	80	78	9	2	3.01	1.70	0.14	4.85
Remington PLUS NEA2 ³	3.7	37.0	43.0	45.0	46.3	100	100	100	100	99	66	75	2.65	1.27	0.34	4.26
PayDay	4.3	44.3	29.0	53.0	54.0	100	100	100	100	100	20	26	2.62	1.53	0.10	4.25
Power	4.3	39.0	29.0	51.5	54.7	100	100	100	100	100	23	27	2.53	1.23	0.33	4.09
TetraSweet	4.8	40.3	29.0	49.8	50.7	100	100	100	100	98	5	8	2.32	1.41	0.08	3.81
Experimental Varieties																
BARLPF237	3.8	37.0	34.3	45.0	45.0	100	100	100	100	100	67	66	2.97	1.46	0.28	4.71
Mean	4.3	43.4	35.2	50.8	51.7	100	100	98	98	96	31	35	2.98	1.54	0.29	4.76
CV,%	9.4	8.6	20.3	3.3	3.8	0	0	3	3	4	91	76	17.38	19.15	25.35	18.32
LSD,0.05	0.6	5.4	10.4	2.5	3.1	0	0	4	4	5	41	39	0.75	0.43	0.30	1.27

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

²Maturity 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.

³Remington PLUS NEA2 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 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			Percent Stand					Yield (tons/acre)				2-year Total
		2022	2023	2021	2022		2023		2022	2023		Total		
		May 20	May 25	Oct 4	Mar 22	Oct 19	Mar 20	Oct 17	Total	May 25	Sug 16			
Commercial Varieties-Available for Farm Use														
Remington	4.3	50.5	49.8	100	100	100	100	99	4.98	1.27	0.74	2.01	6.99*	
Tetragain SLT	4.4	55.5	56.5	100	100	100	95	94	4.67	1.35	0.58	1.93	6.60*	
Remington PLUS NEA2 ³	4.6	51.0	48.8	100	100	100	100	98	4.57	1.02	0.58	1.60	6.17*	
TetraMag	4.3	55.0	55.5	99	99	99	34	49	4.49	0.90	0.49	1.39	5.87*	
TetraSweet	4.3	54.5	56.0	100	100	100	93	84	4.37	0.84	0.54	1.38	5.74*	
Dexter 1	4.5	56.0	57.0	99	100	99	95	90	4.20	1.02	0.49	1.51	5.72*	
PayDay	4.8	54.5	56.5	100	100	99	94	92	4.09	0.83	0.47	1.30	5.39	
Power	4.1	54.5	56.0	100	100	100	94	93	3.88	1.02	0.48	1.50	5.38	
Linn (certified)	4.1	58.0	59.5	100	100	99	69	60	3.59	1.24	0.40	1.64	5.23	
Experimental Varieties														
PPG-FRPT122	4.4	51.5	52.0	100	100	100	89	87	4.27	0.87	0.53	1.40	5.66*	
GPRT14021 AR13	4.3	53.0	51.5	100	100	100	97	95	3.73	0.87	0.45	1.32	5.05	
Mean	4.4	54.0	54.5	100	100	99	87	85	4.26	1.02	0.52	1.54	5.80	
CV,%	8.5	2.0	3.2	1	0	1	12	9	14.86	28.35	30.56	28.12	16.64	
LSD,0.05	0.5	1.6	2.5	2	1	1	15	11	0.91	0.42	0.23	0.63	1.39	

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

²Maturity 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.

³Remington 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 8. Dry matter yields, seedling vigor, maturity, and stand persistence of perennial ryegrass varieties sown September 9, 2022, at Lexington, Kentucky (see Table 13 and 16 for designation of diploid or tetraploid varieties).

Variety	Seedling Vigor ¹ Oct 25, 2022	Maturity ² 2023		Percent Stand			Yield (tons/acre) 2023			
				2022		2023		2023		
		May 17	Jun 28	Oct 25	Mar 20	Oct 17	May 17	Jun 28	Aug 8	Total
Commercial Varieties-Available for Farm Use										
TertraMag	4.8	55.0	53.0	100	100	100	4.31	0.47	0.28	5.06
Tetragain SLT	4.3	55.5	52.3	100	100	100	4.34	0.33	0.34	5.01
Boost	4.1	57.0	53.0	100	100	100	4.23	0.30	0.33	4.86
PayDay	4.4	55.0	29.0	100	100	100	4.10	0.30	0.38	4.79
Dexter I	4.3	56.0	29.0	100	100	100	3.57	0.29	0.27	4.14
TetraSweet	4.8	56.5	29.0	100	100	100	3.49	0.27	0.34	4.10
Power	4.5	55.5	28.3	100	100	100	3.27	0.32	0.36	3.95
Remington	3.5	47.5	54.5	99	100	100	3.18	0.39	0.37	3.94
Linn (certified)	4.8	58.0	58.0	100	100	100	3.26	0.26	0.21	3.73
Experimental Varieties										
PPG-LHT111	4.9	56.5	57.5	100	100	100	4.48	0.66	0.45	5.59*
PST-2BUL19	4.0	57.5	53.5	100	100	100	3.65	0.26	0.24	4.14
GPRT14021 AR13	3.8	50.0	52.5	100	100	100	3.25	0.32	0.35	3.91
Mean	4.3	55.0	45.8	100	100	100	3.76	0.35	0.33	4.43
CV,%	8.3	2.3	5.0	1	0	1	9.07	16.89	16.70	7.79
LSD,0.05	0.5	1.8	3.3	1	0	1	0.49	0.08	0.08	0.50

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

²Maturity rating scale: 37=flag leaf emergence, 45=boot swollen, 50=beginning of inflorescence emergence, 58=complete emergence of inflorescence, 62=beginning of pollen shed.

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

Table 9. Dry matter yields, seedling vigor, maturity, and stand persistence of 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 ¹ Sep 24, 2020	Maturity ²				Percent Stand						Yield (tons/acre)						3-year Total		
		2021		2022		2020		2021		2022		2021		2022		2023				
		May 6	May 17	May 12	Jun 20	Sep 24	Mar 24	Oct 22	Mar 22	Oct 18	Mar 20	Oct 17	Total	Total	May 12	Jun 22	Aug 16		Total	
Commercial Varieties-Available for Farm Use																				
Hykor	3.0	56.0	58.0	56.5	29.0	100	100	100	100	100	100	95	4.47	2.01	0.57	0.19	0.68	1.45	7.93*	
Mahulena	2.4	57.5	58.0	57.5	29.0	100	100	100	100	100	100	100	4.26	1.99	0.66	0.16	0.63	1.45	7.70*	
Perseus	4.3	41.8	52.5	45.0	58.0	100	100	100	100	98	16	25	5.27	1.60	0.18	0.33	0.26	0.77	7.64*	
Lofa	4.8	39.0	53.0	45.0	58.0	100	100	100	100	100	12	14	5.23	1.43	0.15	0.31	0.16	0.62	7.27*	
Duo	5.0	54.0	53.0	46.3	58.0	100	100	100	99	98	41	53	4.63	1.45	0.27	0.42	0.26	0.95	7.03*	
SpringGreen	3.9	48.8	53.5	45.0	58.0	100	100	100	100	97	54	61	4.64	1.34	0.28	0.44	0.27	0.99	6.98	
Perun	3.8	49.8	53.5	45.0	58.7	100	100	100	100	97	1	1	4.85	1.25	0.03	0.12	0.10	0.25	6.36	
Experimental Varieties																				
FPF7B	2.8	56.0	58.0	56.5	29.0	100	100	100	100	100	100	100	4.23	1.88	0.64	0.16	0.61	1.42	7.52*	
FPF6	2.8	54.0	57.0	55.8	29.0	100	100	100	100	100	100	100	4.43	1.65	0.53	0.18	0.59	1.30	7.37*	
FPF8B	3.0	49.0	56.5	56.5	29.0	100	100	100	100	100	100	100	3.99	1.77	0.48	0.20	0.59	1.27	7.03*	
FPF9B	2.6	50.3	56.5	55.0	29.0	100	100	100	100	100	100	100	3.98	1.61	0.50	0.21	0.65	1.36	6.95	
FPF5	3.0	55.0	57.0	56.0	29.0	100	100	100	100	100	100	100	3.84	1.69	0.57	0.14	0.57	1.28	6.82	
Mean	3.4	50.9	55.5	51.9	40.8	100	100	100	100	99	69	71	4.48	1.64	0.41	0.24	0.45	1.09	7.22	
CV,%	10.5	6.5	1.7	2.0	0.7	0	0	0	0	1	23	27	8.06	13.19	32.84	42.22	22.81	25.57	9.02	
LSD,0.05	0.5	4.8	1.3	1.5	0.4	0	0	0	0	2	23	27	0.52	0.31	0.19	0.15	0.15	0.40	0.94	

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

²Maturity 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 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			Percent Stand					Yield (tons/acre)					2-year Total
		2022		2023	2021	2022		2023		2022	2023				
		May 17	May 15	Jun 20	Oct 4	Mar 22	Oct 19	Mar 20	Oct 17	Total	May 15	Jun 22	Aug 16	Total	
Commercial Varieties-Available for Farm Use															
Perseus	4.9	52.0	45.0	58.0	99	99	99	97	94	5.31	0.78	0.54	0.55	1.86	7.18*
Lofa	4.9	54.5	46.3	58.0	100	100	99	98	93	4.80	1.09	0.48	0.46	2.03	6.84*
Mahulena	3.4	58.0	58.0	29.0	95	98	98	98	98	4.11	1.21	0.27	0.81	2.28	6.40*
Lenor	3.3	57.0	55.5	29.0	97	98	98	99	99	4.45	0.78	0.26	0.80	1.84	6.30
Sugarcrest	4.8	53.5	47.3	57.5	100	100	100	99	92	4.38	0.76	0.37	0.45	1.59	5.97
Tatron	5.0	51.5	46.3	58.0	100	100	99	98	96	4.05	0.93	0.49	0.49	1.91	5.96
SpringGreen	4.5	56.5	46.3	57.5	100	100	99	99	94	4.08	0.90	0.30	0.47	1.66	5.74
Duo	4.9	56.5	51.5	58.0	100	96	96	96	89	3.64	1.04	0.34	0.37	1.75	5.40
Experimental Varieties															
FPF7	3.1	58.0	58.0	29.0	98	98	98	99	99	4.51	1.27	0.26	0.90	2.43	6.94*
FPF8	3.4	57.5	56.5	29.0	97	98	98	98	98	4.42	1.00	0.28	0.95	2.24	6.67*
ORRUS	4.5	53.5	46.3	58.0	100	100	100	99	94	3.90	0.99	0.45	0.53	1.97	5.86
KYFL1013	4.5	55.0	53.5	57.5	100	100	98	98	74	4.00	0.97	0.25	0.39	1.62	5.63
Mean	4.3	55.3	50.9	48.2	99	99	98	98	93	4.30	0.98	0.36	0.60	1.93	6.24
CV,%	8.8	2.5	4.5	1.1	1	1	1	1	11	12.05	15.16	16.07	12.20	6.72	8.85
LSD,0.05	0.5	2.0	3.3	0.7	2	2	2	2	14	0.75	0.21	0.08	0.11	0.19	0.79

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

²Maturity 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 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 2023 May 5	Percent Stand			Yield (tons/acre)			
			2022	2023		2023			
			Oct 25	Mar 20	Oct 17	May 5	Jun 8	Aug 8	Total
Commercial Varieties-Available for Farm Use									
Perseus	4.5	45.0	100	100	100	4.21	0.91	0.62	5.74*
Lofa	4.9	45.0	100	100	100	4.19	0.76	0.39	5.34*
Tatron	4.5	45.0	100	100	100	3.82	0.83	0.55	5.20*
SpringGreen	4.4	48.5	100	100	100	3.76	0.83	0.41	5.00
Sugarcrest	4.0	46.3	100	100	100	3.78	0.78	0.37	4.92
Duo	4.8	53.0	100	100	80	3.82	0.85	0.23	4.89
Mahulena	2.3	56.5	100	100	100	3.15	0.65	0.98	4.78
Lenor	2.6	46.3	100	100	100	2.24	0.87	1.00	4.12
Experimental Varieties									
FPF7	2.9	56.5	100	100	100	2.73	0.73	1.04	4.50
FPF8	3.0	52.5	100	100	100	2.22	0.83	1.00	4.05
Mean	3.8	49.5	100	100	98	3.39	0.80	0.66	4.86
CV,%	10.7	3.9	0	0	3	8.76	12.44	14.31	7.98
LSD,0.05	0.6	2.8	0	0	4	0.43	0.15	0.14	0.56

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

²Maturity 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		
Bendix	Westerwold tetraploid	Smith Seed
Bruiser	Westerwold diploid	Smith Seed
Centurion	Westerwold diploid	Mountain View Seeds
Claro	Westerwold tetraploid	Smith Seed
Feast II	Italian tetraploid	Ampac Seed
Frostproof	Westerwold diploid	Smith Seed
GreenFarm II	Westerwold diploid	Smith Seed
Gulf	Westerwold diploid	Public
Hellen	Westerwold tetraploid	Smith Seed
Jackson	Westerwold diploid	The Wax Company
Mantis	Westerwolds tetraploid	Smith Seed
Marshall	Westerwold diploid	The Wax Company
Nelson	Westerwold tetraploid	The Wax Company
TetraPrime II	Italian tetraploid	Mountain View 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
WMWL	N/A ¹	The Wax Company
WMWL2	N/A ¹	The Wax Company

¹Type 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
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		
BARLPF237	tetraploid	Barenbrug USA
GAT14021 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

¹Remington PLUS NEA2 and GAT14021 AR1 contain a non-toxic (novel) endophyte.
²Type 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
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
Experimental Varieties		
FPF5	(TF x IR) x TF	DLF Pickseed
FPF6	(TF x IR) x TF	DLF Pickseed
FPF7B	(TF x IR) x TF	DLF Pickseed
FPF8B	(TF x IR) x TF	DLF Pickseed
FPF9B	(TF x IR) x TF	DLF Pickseed
KYFL1013	MF x IR	KY Agric. Exp. Station
ORRUS	N/A ²	Oregro Seeds

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

²Type was not provided by the company.

Table 15. Summary of Kentucky annual ryegrass yield trials 2003-2023 (yield shown as a percentage of the yield value of Marshall).

Variety	Type	Proprietor	Lexington ¹																				Mean ⁴ (#trials)		
			03 ^{2,3}	04	05	06	07	08	09	10	10	11	12	12	13	14	15	16	17	18	19	21		22	
Abundant	tetraploid	Ampac Seed				12																		-	
Acrobat	_5	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	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	106(6)
Claro	Westerwold tetraploid	Smith Seed Services																				86	103	95(2)	
Dexter	Westerwold tetraploid	Smith Seed Services																					89		-
DH-3	Italian tetraploid	Allied Seed					91	27				89												69(3)	
Diamond T	Italian tetraploid	Oregro Seeds				8																			-
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								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	86	80(14)	
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	90(4)
GR-AS10	Italian	Ampac Seed									113														-
Graze-N-Gro	Westerwold diploid	Seed Research of OR	114				67																		91(2)
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	71(14)	
Hellen	Westerwold tetraploid	Smith Seed Services																				95	83	93	90(3)
Hercules	Westerwold tetraploid	Barenbrug USA													91	68									-

Table 15. (continued)

Variety	Type	Proprietor	Lexington ¹																				Mean ⁴ (#trials)		
			03 ^{2,3}	04	05	06	07	08	09	10	10	11	12	12	13	14	15	16	17	18	19	21		22	
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	93(18)	
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	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	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)	
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	115	94(10)	
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)	
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)	
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	100	103(9)

¹In 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.

²Year trial was established.

³Use 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>).

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

⁵Type was not provided by the company.

Table 16. Summary of Kentucky perennial ryegrass yield trials 2001-2023 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Type	Proprietor	Lexington																				Mean ^{3,4} (#trials)
			01 ^{1,2}	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	
			2yr ⁵	2yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	2yr	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	117(9)
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	-
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	89	92(19)
Matrix	diploid	Cropmark seeds		77																			-
Maverick Gold	hybrid tetraploid	Ampac Seed	97																				-
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	89	91	96(9)
Polly Plus	hybrid tetraploid	Allied Seed		64																			-

Table 16. (Continued)

Variety	Type	Proprietor	Lexington																				Mean ^{3,4} (#trials)	
			01 ^{1,2}	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21		
			2yr ⁵	2yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	2yr	3yr	3yr	3yr	3yr	3yr	3yr		2yr
Power	tetraploid	Ampac Seed						110	103	102	100	109	104	95	101	107				100	86	91	101(12)	
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	118	105(8)	
Remington PLUS NEA2 ⁶	tetraploid	Barenbrug USA													119	99			105	91	89	105	101(6)	
Sierra	diploid	Lewis Seed Co.				89																		-
TetraGain SLT	tetraploid	Pure Seed												111									112	-
TetraMag	tetraploid	Mountain View Seeds														136		127	124	121	116	130	100	121(8)
TetraSweet	tetraploid	Mountain View Seeds															104	105	87	97	80	97	95(6)	
Tonga	tetraploid	Kings AgriSeeds				96				103														100(2)
Verseka	tetraploid	Allied Seed												75									-	
Victorian	diploid	Caudill Seed													104	83							94(2)	

¹Year trial was established.

²Use 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>).

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

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

⁵Number of years of data.

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

⁷Type was not provided by the company.

Table 17. Summary of Kentucky festulolium yield trials 2001-2023 (yield shown as a percentage of the mean of the commercial varieties in the trial).¹

Variety	Type ²	Proprietor	Lexington																
			2001 ^{3,4}	2005	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2019	2020	2021	Mean ⁵	
			2yr ⁶	3yr	3yr	3yr	3yr	3yr	2yr	3yr	2yr	3yr	3yr	3yr	3yr	3yr	3yr	2yr	(#trials)
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	87	94(14)	
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	Hood River Seed											88	77				83(2)	
Kenfest	MFx AR	KY Agr. Exp Station												97				-	
Lenor	ryegrass type	Columbia Seeds															101	-	
Lofa	(TF x Int) x Int	DLF Pickseed					105	107	110	128	112	91	109	108	104	100	110	108(11)	
Mahulena	(TF x IR) x TF	DLF Pickseed								131	109	107		111	114		106	103	112(7)
Meadow Green	— ⁷	Pure Seed								37	34							36(2)	
Perseus	MF x IR	DLF Pickseed					132	114	126	123	110	109	105	112	113	105	115	115(11)	
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	Turf-Seed	96	111	114	101	113	112	114	110	103	107	92	94	101	96	92	104(15)	
Sugarcrest	MFxPR	Mountain View Seeds															96	-	
Sweet Tart	MF x IR	ProSeeds Marketing			88		82	63	62									74(4)	
Tatron	fescue type	Columbia Seeds															96	-	

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

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

³Year trial was established.

⁴Use 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>).

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

⁶Number of years of data.

⁷Type was not provided by the company.

Notes

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