University of Kentucky
College of Agriculture, Food and Environment
Agricultural Experiment Station

2017 Annual and Perennial Ryegrass and Festulolium Report

G.L. Olson, S.R. Smith, T.D. Phillips, and C.D. Teutsch, 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. The severe winter of 2013-2014 and 2014-2015 showed those varieties that are not adapted to Kentucky (tables 3 and 4).

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. This crop has garnered increased interest for high-quality baleage. Two main types of annual ryegrasses are used. The most commonly used type in Kentucky is Italian ryegrass. The other is sometimes referred to as Westerwolds ryegrass. 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, no or few 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.

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. 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 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*, Hausska) 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 typically only survive 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.

This report provides current yield data on annual and perennial ryegrass varieties in trials in Kentucky as well as guidelines for selecting varieties. Tables 14,

Table 1. Temperature and rainfall at Lexington, Kentucky, in 2014, 2015, 2016, and 2017.

	2014				2015				2016				2017[2]			
	Temp		Rainfall		Temp		Rainfall		Temp		Rainfall		Temp		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	25	-6	2.28	-.58	32	+1	2.17	-0.69	32	+1	0.80	-2.06	40	+9	6.81	+3.95
FEB	30	-5	5.47	+2.26	26	-9	3.08	-0.13	38	+3	6.09	+2.88	47	+12	4.46	+1.25
MAR	39	-5	3.08	-1.32	45	+1	7.34	+2.94	52	+8	4.07	-0.33	48	+4	3.34	-1.06
APR	58	+3	5.27	-1.89	57	+2	13.19	+9.31	57	+2	3.97	+0.09	62	+7	4.17	+0.29
MAY	66	+2	5.72	+1.25	69	+5	3.02	-1.45	64	0	9.17	+4.70	66	+2	7.74	+3.27
JUN	75	+3	2.93	-0.73	75	+3	8.20	+4.54	76	+4	5.09	+1.43	73	+1	7.68	+4.02
JUL	74	-2	3.18	-1.82	77	+1	10.22	+5.22	79	+3	7.43	+2.43	76	0	4.49	-0.51
AUG	76	+1	6.53	+2.60	74	-1	3.49	-0.44	79	+4	4.37	+0.44	74	-1	6.66	+2.73
SEP	69	+1	3.63	+.43	72	+4	3.49	+0.29	74	+6	2.18	-1.02	69	+1	4.72	+1.52
OCT	57	0	5.55	+2.98	59	+2	2.78	+0.21	64	+7	0.37	-2.20	60	+3	6.06	+3.49
NOV	41	-4	2.79	-0.60	51	+6	3.72	+0.33	51	+6	1.94	-1.45				
DEC	40	+4	2.47	-1.51	49	+13	8.42	+4.44	37	+1	9.4	+5.42				
Total			49.4	+4.85			69.12	+24.57			54.88	+10.33			56.13	+18.95

[1] DEP is departure from the long-term average.
[2] 2017 data is for the ten months through October.

15, and 16 show summaries of all annual and perennial ryegrass and festulolium varieties tested in Kentucky for the last 17 years. The UK Forage Extension website at www.uky.edu/Ag/Forage contains electronic versions of all forage variety testing reports from Kentucky and surrounding states and a large number of other forage publications.

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. The endophyte level will be stated on a green tag on every bag of seed. 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.

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 seedlingsor 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	¼ of inflorescence emerged	
54	½ of inflorescence emerged	
56	¾ 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.

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

Description of the Tests

Data from eight studies are reported. Annual ryegrass tests were established in the fall of 2013, 2014, 2015, and 2016 at Lexington. Perennial ryegrass tests and festulolium tests were established in 2015 and 2016 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

Table 3. Dry matter yields, seedling vigor winter injury, plant height, maturity and plant persistence of annual ryegrass varieties sown September 5, 2013, at Lexington, Kentucky (see table 14 for designation of Italian or Westerwolds type commercial varieties).

Variety	Seedling Vigor[1] Oct 14, 2013	Percent Stand 2013 Oct 14	Percent Stand 2014 Apr 2	Winter Injury[2] Jan 27	Plant Height (in) May 1	Maturity[3] 2014 May 1	Maturity[3] 2014 May 22	Maturity[3] 2014 Jun10	Yield (tons/acre) 2014 May 2	Yield (tons/acre) 2014 May 23	Yield (tons/acre) 2014 Jun 10	Yield (tons/acre) 2014 Jun 27	Yield (tons/acre) 2014 Total
Commercial Varieties-Available for Farm Use													
Fria	4.3	96	97	1.5	19	37	50	60	2.01	0.89	0.49	0.09	3.47*
Ed	4.1	97	96	2.8	19	41	51	59	1.77	0.93	0.55	0.11	3.35*
Bruiser	4.8	97	96	2.5	19	42	53	58	1.80	0.88	0.55	0.12	3.34*
Marshall	3.8	93	95	1.3	22	36	48	59	1.94	0.82	0.47	0.10	3.33*
Barmultra II	3.4	89	70	3.5	15	33	52	56	1.20	1.05	0.72	0.18	3.15*
Assist	3.5	93	93	3.0	18	39	49	60	1.57	0.79	0.50	0.07	2.92*
Amp	3.4	89	46	3.5	17	43	54	59	1.09	0.75	0.54	0.11	2.49
Dyna-Gain	3.8	93	83	3.5	19	39	51	59	1.13	0.66	0.46	0.10	2.35
Jackson	4.0	95	78	5.3	16	49	54	61	1.10	0.68	0.43	0.10	2.31
Hercules	4.3	92	44	5.8	14	34	52	59	0.88	0.71	0.52	0.17	2.28
Nelson	3.3	90	51	4.8	15	34	53	60	0.91	0.64	0.51	0.10	2.16
Attain	3.6	92	31	4.5	14	33	53	61	0.71	0.58	0.36	0.09	1.74
Feast II	3.3	88	12	8.3	10	32	54	59	0.40	0.42	0.53	0.23	1.58
Verdure	4.0	92	23	7.5	12	32	53	60	0.51	0.46	0.38	0.06	1.41
Big Boss	3.3	90	13	7.3	12	34	56	60	0.43	0.39	0.38	0.07	1.27
Gulf	4.0	93	14	7.3	11	38	56	60	0.33	0.28	0.25	0.04	0.90
Dixie Gold	2.8	80	2	8.0	11	33	55	60	0.18	0.17	0.23	0.05	0.64
Experimental Varieties													
M2CVS	3.4	93	97	1.5	20	39	50	59	1.99	0.81	0.46	0.14	3.40*
ME4	3.3	88	89	1.3	23	37	48	58	1.98	0.83	0.52	0.04	3.37*
ME-94	3.9	92	95	2.0	20	42	50	58	1.75	0.86	0.49	0.10	3.19*
LMT-15M3	3.4	80	75	3.3	16	34	51	57	1.30	0.92	0.65	0.14	3.01*
B-13.0171	2.8	84	21	5.0	15	34	50	61	0.78	0.54	0.60	0.12	2.03
FL4XMep	2.8	80	20	4.8	14	46	55	62	0.64	0.55	0.38	0.10	1.67
FL4XMarmi	2.6	70	27	5.3	15	44	56	61	0.50	0.34	0.32	0.11	1.26
FL4XMaron	2.8	84	9	4.8	12	47	56	62	0.38	0.23	0.31	0.07	0.99
Mean	3.5	89	55	4.3	16	38	52	59	1.09	0.65	0.46	0.10	2.30
CV,%	15.9	11	26	25.8	10	13	5	3	23.00	24.17	24.22	49.33	20.15
LSD,0.05	0.8	14	21	1.6	2	7	4	3	0.35	0.24	0.16	0.07	0.65

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
[2] Winter injury score based on a scale of 1 to 9 with 9 being the greatest amount of injury.
[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.

(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 10. Yields are given by cutting date for 2017 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.

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 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 11, 12, and 13 summarize information about distributors and yield performance for all annual and perennial ryegrass and festulolium varieties currently 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. In tables 11, 12, and 13, an open block indicates that the variety was not in that particular test (labeled at the top of the column); an "x" in the block means that the variety was in the test but yielded significantly less than the top-yielding variety. A single asterisk (*) means that the variety was not significantly different from the top variety, based on the 0.05 LSD. It is best to choose a variety that has performed well over several years and locations. Remember to consider the

Table 4. Dry matter yields, seedling vigor, and stand persistence of annual ryegrass varieties sown September 5, 2014, at Lexington, Kentucky (see Table 14 for designation of Italian or Westerwolds type commercial varieties).

Variety	Seedling Vigor[1] Oct 9, 2014	Percent Stand 2014 Oct 9	Percent Stand 2015 Apr 3	Winter Injury[2] Jan 19,2015	Maturity[3] 2015 Apr 23	Maturity[3] 2015 May 19	Plant Height (in) Apr 23	Yield (tons/acre) 2014 Dec 15	Yield (tons/acre) 2015 Apr 24	Yield (tons/acre) 2015 May 19	Yield (tons/acre) 2015 Jun 15	Yield (tons/acre) 2015 Total
Commercial Varieties-Available for Farm Use												
Centurion	4.1	99	95	0.5	32.3	50.5	18	0.53	1.51	1.22	0.48	3.74*
Winterhawk	4.1	99	92	1.5	35.8	54.5	18	0.74	1.29	1.05	0.31	3.39*
Bruiser	4.4	99	80	2.5	32.5	55.5	17	0.74	0.98	0.90	0.36	2.98
Ed	3.3	94	70	2.0	31.5	55.5	13	0.45	0.88	1.13	0.39	2.85
Marshall	4.0	98	81	0.5	32.5	54.0	17	0.51	1.14	0.91	0.28	2.84
Jackson	3.8	98	88	1.0	32.5	55.5	16	0.57	1.18	0.81	0.29	2.84
TetraPrime	3.0	98	98	0.5	31.0	46.3	12	0.34	1.17	0.99	0.22	2.72
Kowinearly	3.1	97	91	1.8	41.3	59.0	17	0.30	1.14	0.95	0.31	2.70
Meroa	3.0	78	64	2.8	36.3	55.0	13	0.28	0.96	0.93	0.48	2.65
Green Farm	4.0	100	66	2.8	46.0	59.5	21	0.52	0.87	0.71	0.29	2.40
Fria	4.0	99	58	3.3	32.0	57.0	13	0.44	0.58	0.96	0.32	2.30
Kospeed	4.4	99	63	1.8	41.0	59.0	16	0.58	0.72	0.78	0.19	2.26
TAMTBO	2.9	78	43	1.8	31.5	57.5	13	0.30	0.63	1.04	0.26	2.23
Tam 90	3.8	100	26	5.0	30.0	58.0	10	0.64	0.34	0.92	0.32	2.22
Nelson	2.1	65	48	1.8	31.0	56.5	12	0.34	0.70	0.90	0.26	2.20
Big Boss	2.5	68	6	5.8	30.3	58.0	11	0.48	0.21	0.86	0.52	2.07
Attain	2.1	63	16	2.3	30.5	58.0	11	0.38	0.32	0.92	0.32	1.95
Gulf	4.0	100	26	6.3	30.8	59.0	10	0.53	0.31	0.76	0.34	1.95
Big Bang	3.4	86	25	4.3	30.0	55.5	9	0.28	0.30	0.92	0.41	1.91
Bill	3.6	88	11	5.0	30.3	59.0	9	0.43	0.26	0.76	0.29	1.75
Verdure	3.4	87	4	6.0	29.5	59.5	9	0.51	0.18	0.72	0.26	1.66
Feast II	3.0	88	13	7.3	35.0	54.0	9	0.35	0.24	0.73	0.26	1.58
Experimental Varieties												
ME94	3.9	92	88	0.5	36.8	54.0	18	0.60	1.33	1.09	0.54	3.57*
ME4	2.9	96	94	0.0	32.3	53.0	19	0.43	1.40	0.91	0.41	3.14*
M2CVS	3.9	99	92	0.5	31.5	54.0	14	0.50	1.31	0.95	0.35	3.12*
GO-ITT12	3.0	94	89	1.8	32.5	55.0	15	0.28	0.93	1.28	0.29	2.79
GO-FLN2	3.3	97	49	3.3	30.5	57.0	10	0.50	0.49	1.08	0.32	2.40
GO-IT213	2.3	78	11	5.3	30.8	59.5	13	0.27	0.23	0.74	0.36	1.60
Mean	3.4	90	57	2.8	33.0	56.0	14	0.46	0.77	0.93	0.34	2.49
CV,%	20.9	9	36	33.2	14.0	3.0	18	30.34	32.57	24.47	47.53	17.71
LSD,0.05	1.0	12	21	1.3	7.0	2.0	4	0.20	0.35	0.32	0.23	0.62

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
[2] Winter injury score based on a scale of 1 to 9 with 9 being the greatest amount of injury.
[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.

relative spring maturity and the distribution of yield across the growing season when evaluating productivity of ryegrass varieties (tables 3 through 10).

Tables 14, 15, and 16 are summaries of yield data from 1999 to 2017 of commercial varieties that have been entered in the Kentucky trials. The data are listed as a percentage of the mean of the commercial varieties entered in each specific trial. In other words, the mean for each trial is 100 percent—varieties with percentages over 100 yielded better than average, and varieties with percentages less than 100 yielded lower than average. Direct, statistical comparisons of varieties cannot be made using the summary tables 14, 15, and 16, 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 14, 15, and 16 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, www.uky.edu/Ag/Forage.

- Lime and Fertilizer Recommendations (AGR-1)
- Grain and Forage Crop Guide for Kentucky (AGR-18)
- Establishing Forage Crops (AGR-64)
- Forage Identification and Use Guide (AGR-175)
- Annual Ryegrass (AGR-179)
- New Recommendations for Perennial Ryegrass Seedings for Kentucky Horse Farms (ID-142)
- Rotational Grazing (ID-143)
- Establishing and Managing Horse Pastures (ID-147)

Table 5. Dry matter yields, seedling vigor, winter injury, plant height, maturity and stand persistence of annual ryegrass varieties sown September 3, 2015, at Lexington, Kentucky (see Table 14 for designation of Italian or Westerwolds type commercial varieties).

Variety	Seedling Vigor[1] Oct 15,2015	Percent Stand 2015 Oct 15	Percent Stand 2016 Mar 18	Percent Stand 2016 Jul 5	Percent Stand 2016 Aug 5	Winter Injury[2] Jan 29	Plant Height (in) Apr 18	Maturity[3] 2016 Apr 18	Maturity[3] 2016 May 13	Maturity[3] 2016 Jun 9	Yield (tons/acre) 2015 Nov 23	Yield (tons/acre) 2015 Dec 17	Yield (tons/acre) 2016 Apr 18	Yield (tons/acre) 2016 May 13	Yield (tons/acre) 2016 Jun 9	Yield (tons/acre) 2016 Jul 5	Yield (tons/acre) Total
Commercial Varieties-Available for Farm Use																	
Melquatro	4.4	100	100	100	100	2.3	14	31.8	52.0	56.0	0.75	0.45	1.93	2.07	1.32	0.33	6.85*
Barmultra II	3.5	100	100	100	100	2.3	15	32.5	51.0	55.0	0.95	0.57	2.10	1.45	0.93	0.37	6.36*
Nelson	4.8	100	56	45	1	5.5	13	31.8	56.0	56.0	1.10	0.91	0.78	1.42	0.99	0.16	5.35
TetraPrime	1.9	99	100	100	100	0.9	14	32.0	50.0	51.0	0.26	0.42	1.64	1.90	0.59	0.46	5.27
Meroa	4.1	100	99	94	94	3.5	14	32.0	53.5	59.0	0.74	0.57	1.41	1.46	0.81	0.20	5.20
Oryx	4.1	100	100	99	96	4.3	13	31.3	51.0	56.5	0.79	0.52	1.40	1.35	0.74	0.28	5.08
Marshall	3.8	99	99	44	0	1.1	18	32.0	52.5	55.0	0.95	0.54	1.57	1.36	0.59	0.08	5.08
Jackson	3.6	100	97	14	0	4.3	15	32.0	53.5	55.5	0.91	0.68	1.40	1.38	0.61	0.04	5.02
Kowinearly	2.0	100	99	43	0	2.8	16	32.0	56.0	57.0	0.48	0.73	1.59	1.26	0.73	0.09	4.88
Bruiser	4.1	100	97	78	4	4.0	16	32.0	55.5	57.0	0.69	0.71	1.26	1.41	0.68	0.07	4.81
Kospeed	3.3	100	87	15	1	4.5	15	32.5	54.5	57.5	0.92	0.61	1.36	1.24	0.49	0.07	4.68
Feast II	4.1	100	13	48	35	9.0	6	29.0	54.0	58.0	0.55	0.80	0.33	1.36	1.11	0.29	4.45
Fria	3.3	100	90	19	0	5.3	15	31.8	55.5	55.5	0.65	0.72	0.92	1.30	0.70	0.04	4.33
Gulf	4.6	100	6	1	1	9.0	5	29.5	56.5	60.0	0.62	0.77	0.23	0.86	0.54	0.01	3.03
Experimental Varieties																	
BAR LM 15425	1.8	99	100	98	94	1.8	17	32.3	52.0	57.5	0.38	0.61	2.08	1.66	1.06	0.35	6.14*
BAR LM 15426	1.5	95	95	96	68	1.5	17	32.5	52.0	55.5	0.45	0.61	1.73	1.79	0.87	0.30	5.75
BAR LM 15427	1.6	100	100	100	94	0.9	17	32.3	52.5	57.0	0.43	0.62	1.82	1.66	0.83	0.38	5.75
BAR LM 15371	2.1	99	100	100	99	2.5	15	32.0	53.0	55.0	0.47	0.43	1.78	1.50	0.91	0.34	5.44
ME4	3.6	100	100	60	0	2.5	19	32.5	53.0	56.0	0.90	0.52	1.72	1.39	0.53	0.13	5.19
M2CVS	3.5	99	100	61	1	0.8	19	32.5	51.0	56.5	0.77	0.57	1.56	1.30	0.85	0.13	5.18
ME94	5.0	100	100	39	1	3.8	16	32.3	54.5	55.5	0.83	0.69	1.52	1.16	0.73	0.06	4.99
PPG-TAR113	1.3	100	100	90	38	1.8	11	31.3	54.0	57.0	0.07	0.09	0.88	1.42	0.70	0.31	3.48
Mean	3.3	99	88	66	42	3.4	14	32.0	53.0	56.0	0.67	0.60	1.41	1.44	0.79	0.20	5.11
CV,%	15.9	2	9	24	21	37.2	12	2.0	3.0	2.0	36.33	27.67	25.23	18.22	35.21	43.96	14.14
LSD,0.05	0.7	3	11	22	12	1.8	2	1.0	2.0	2.0	0.34	0.23	0.50	0.37	0.39	0.13	1.02

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
[2] Winter injury score based on a scale of 1 to 9 with 9 being the greatest amount of injury.
[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.

- Festulolium Hybrid Grass (see the UK Forage website under publications and grasses)

Authors

G.L. Olson is a research specialist, S.R. Smith is an Extension professor and C.D.Teutsch is an Extension associate professor of Forages. T.D. Phillips is an associate professor of Tall Fescue Breeding.

Table 6. Dry matter yields, seedling vigor, plant height, maturity, and stand persistence of annual ryegrass varieties sown September 7, 2016, at Lexington, Kentucky (see Table 14 for designation of Italian or Westerwolds type commercial varieties).

Variety	Seedling Vigor[1] Oct 4, 2016	Plant Height (in) Apr 18, 2017	Maturity[2] 2017		Percent Stand 2016	Percent Stand 2017	Yield (tons/acre) 2017			
			Apr 18	May 18	Oct 4	Mar 14	Apr 18	May 18	Jun 20	Total
Commercial Varieties-Available for Farm Use										
Barmultra II	4.0	16	32.0	54.5	98	100	1.55	1.49	0.66	3.69*
Ugne	3.8	14	35.5	56.0	95	97	1.50	1.44	0.55	3.49*
Centurion	4.8	20	39.0	52.5	100	100	1.95	1.21	0.28	3.44*
Marshall	4.9	21	40.5	54.0	100	100	1.89	1.19	0.35	3.43*
Fria	4.8	20	42.0	53.5	100	100	1.90	1.01	0.46	3.36*
Jackson	4.6	20	40.5	54.0	99	99	1.82	1.21	0.30	3.34*
Nelson	4.8	19	37.5	56.5	98	99	1.67	1.19	0.45	3.32*
TetraPrime	3.9	14	32.0	51.5	97	99	1.20	1.54	0.36	3.11
Gulf	4.9	21	45.0	56.5	99	99	1.77	0.94	0.27	2.98
Bruiser	5.0	21	40.5	53.0	100	100	1.86	0.92	0.19	2.96
Feast II	5.0	12	31.8	54.5	99	98	1.21	1.19	0.35	2.75
Experimental Varieties										
M2CVS	4.1	21	39.0	53.5	99	99	1.88	1.35	0.36	3.59*
ME94	4.9	22	43.5	54.0	100	100	1.96	1.06	0.29	3.31*
SARG-FL	4.0	21	40.5	54.0	99	99	1.91	1.14	0.23	3.28*
ME4	5.0	22	40.5	54.0	100	100	2.00	1.07	0.20	3.27*
PPG-LWT105	2.9	10	31.8	51.0	100	100	0.96	1.27	0.30	2.53
Mean	4.4	18	38.2	53.9	99	99	1.69	1.20	0.35	3.24
CV,%	7.4	7	7.0	3.2	1	1	9.20	18.95	37.75	9.28
LSD,0.05	0.5	2	3.8	2.5	2	2	0.22	0.32	0.19	0.43

[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 7. Dry matter yields, seedling vigor, winter injury, maturity, and stand persistence of perennial ryegrass varieties sown September 3, 2015, at Lexington, Kentucky (see Table 15 for designation of diploid or tetraploid type commercial varieties).

Variety	Seedling Vigor[1] Oct 15, 2015	Winter Injury[2] Jan 29, 2016	Maturity[3] 2016 May 13	Maturity[3] 2016 Jun 24	Maturity[3] 2017 May 15	Percent Stand 2015 Oct 15	Percent Stand 2016 Mar 18	Percent Stand 2016 Oct 17	Percent Stand 2017 Mar 24	Percent Stand 2017 Oct 31	Yield (tons/acre) 2016 Total	Yield (tons/acre) 2017 May 15	Yield (tons/acre) 2017 Jun 26	Yield (tons/acre) 2017 Oct 26	Yield (tons/acre) 2017 Total	Yield (tons/acre) 2-year Total
Commercial Varieties-Available for Farm Use																
Remington	3.3	0.6	45.0	29.0	45.0	100	100	100	90	94	4.67	1.53	0.87	0.43	2.83	7.50*
Power	3.6	1.3	53.5	29.0	53.5	100	100	96	65	63	4.62	1.30	0.59	0.35	2.24	6.86*
Barvitra	5.0	2.0	55.5	62.0	57.0	100	100	35	11	5	5.60	0.68	0.33	0.06	1.06	6.67*
Albion	2.9	0.9	46.3	29.0	45.0	86	99	95	80	71	4.60	1.03	0.59	0.33	1.95	6.55*
Calibra	4.1	0.6	51.5	29.0	49.3	100	100	94	68	71	4.59	1.15	0.37	0.25	1.77	6.36
Remington PLUS NEA2	2.9	0.6	46.8	29.0	45.0	100	100	100	95	95	4.43	0.95	0.48	0.45	1.88	6.31
Linn (certified)	3.4	3.0	56.0	29.0	58.0	100	100	73	71	23	3.79	1.37	0.34	0.15	1.86	5.66
BG-34	3.8	1.0	49.8	29.0	45.0	100	100	90	50	45	3.54	0.90	0.56	0.17	1.62	5.17
Experimental Varieties																
BARLP 1526	2.5	0.8	47.5	37.3	45.0	100	100	100	94	93	4.35	1.10	0.55	0.28	1.93	6.27
GPT-14021	2.5	0.8	48.0	37.3	46.8	99	100	100	95	93	4.18	0.98	0.70	0.31	1.98	6.16
GPD-14017	3.1	2.5	55.0	37.3	56.5	100	100	79	65	54	3.97	1.19	0.30	0.14	1.62	5.60
GPD-14018	3.3	1.8	48.0	29.0	47.3	100	100	97	85	85	3.56	0.72	0.51	0.44	1.68	5.24
GPT-14023	3.0	6.0	55.5	62.0	55.3	100	55	70	44	15	3.47	0.45	0.27	0.19	0.91	4.38
TAL-PR-04	3.9	4.5	56.0	62.0	57.0	100	85	71	31	4	3.25	0.69	0.12	0.07	0.88	4.14
TAL-PR-02	3.8	6.0	56.0	62.0	57.5	100	74	69	43	11	3.07	0.60	0.14	0.13	0.87	3.95
GPD-14019	2.8	6.8	50.8	62.0	56.0	99	40	68	20	3	2.75	0.10	0.32	0.14	0.57	3.32
TAL-PR-03	1.8	4.3	56.0	37.3	56.0	100	97	30	16	5	2.46	0.18	0.23	0.07	0.48	2.94
Mean	3.2	2.5	51.8	41.9	51.4	99	92	80	61	47	4.02	0.86	0.42	0.22	1.51	5.53
CV,%	17.3	26.3	4.1	18.8	3.4	1	10	22	27	33	13.59	44.24	49.89	49.87	30.63	13.03
LSD,0.05	0.8	0.9	3.0	11.1	2.8	2	13	25	24	22	0.78	0.54	0.30	0.16	0.66	1.02

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
[2] Winter injury score based on a scale of 1 to 9 with 9 being the greatest amount of injury.
[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.

Table 8. Dry matter yields, seedling vigor, maturity, and stand persistence of perennial ryegrass varieties sown September 7, 2016, at Lexington, Kentucky (see Table 15 for designation of diploid or tetraploid type commercial varieties).

Variety	Seedling Vigor[1] Oct 5, 2016	Maturity[2] 2017		Percent Stand 2016	Percent Stand 2017		Yield (tons/acre)			
		May 15	Jun 26	Oct 5	Mar 14	Oct 31	May 15	Jun 26	Oct 26	Total
Commercial Varieties-Available for Farm Use										
TetraMag	4.4	52.5	58.0	100	100	97	3.91	1.25	0.61	5.77*
Elena	4.0	54.0	57.0	100	100	98	3.43	1.01	0.70	5.14*
Remington	4.3	46.8	29.0	100	100	100	3.15	0.85	0.82	4.83*
Calibra	4.0	50.5	29.0	100	100	99	2.76	0.99	0.56	4.31
TetraSweet	4.8	51.5	29.0	100	100	99	2.85	0.78	0.53	4.16
Melpetra	3.1	46.3	29.0	100	100	99	2.33	1.01	0.59	3.93
PayDay	4.3	52.5	29.0	100	100	99	2.58	0.81	0.48	3.87
Linn	4.4	58.0	29.0	100	100	100	2.32	0.58	0.35	3.26
Experimental Varieties										
BARLP15261	4.0	46.3	29.0	100	100	100	3.26	0.78	0.92	4.96*
BARLP16237	3.8	45.0	29.0	100	100	100	2.77	0.94	0.74	4.44
BARLP16238	4.0	55.5	29.0	100	100	100	2.64	0.84	0.55	4.02
BARLP15COW	4.1	55.0	29.0	100	100	100	2.70	0.49	0.70	3.89
Mean	4.1	51.1	33.8	100	100	99	2.89	0.86	0.63	4.38
CV,%	14.9	3.5	1.0	0	0	1	17.17	33.93	34.26	17.55
LSD,0.05	0.9	2.6	0.5	0	0	2	0.71	0.42	0.31	1.11

[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 9. Dry matter yields, seedling vigor, winter injury, maturity, and stand persistence of festulolium varieties sown September 3, 2015, at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 15, 2015	Winter Injury[2] Jan 29, 2016	Maturity[3] 2016 May 11	Maturity[3] 2016 Jun 20	Maturity[3] 2017 May 15	Maturity[3] 2017 Jun 22	Percent Stand 2015 Oct 15	Percent Stand 2016 Mar 18	Percent Stand 2016 Oct 17	Percent Stand 2017 Mar 24	Percent Stand 2017 Oct 31	Yield (tons/acre) 2016 Total	Yield (tons/acre) 2017 May 15	Yield (tons/acre) 2017 Jun 22	Yield (tons/acre) 2017 Aug 11	Yield (tons/acre) 2017 Oct 26	Yield (tons/acre) 2017 Total	Yield (tons/acre) 2-year Total
Commercial Varieties-Available for Farm Use																		
Perseus	3.4	1.3	50.0	56.5	54.0	62.0	100	100	50	18	41	7.91	1.18	0.59	0.37	0.31	2.44	10.35*
Hykor	1.5	0.5	57.0	29.0	64.0	29.0	100	100	100	100	100	5.44	1.74	0.67	0.83	0.81	4.05	9.49*
Spring Green	3.0	1.0	51.5	57.0	54.5	61.5	100	100	95	94	94	7.09	1.57	0.26	0.21	0.28	2.33	9.42*
Perun	4.1	1.6	51.0	56.5	54.7	62.0	100	100	38	9	18	7.68	0.80	0.42	0.23	0.29	1.73	9.41*
Barfest	2.9	0.9	50.5	40.5	53.5	62.0	100	100	95	94	93	5.86	2.02	0.24	0.29	0.22	2.77	8.63*
Lofa	4.3	1.3	50.5	56.0	52.0	62.0	100	100	97	87	85	6.25	1.37	0.52	0.16	0.13	2.18	8.43*
Duo	4.3	4.3	56.0	60.0	53.5	61.5	100	96	96	91	89	5.81	1.61	0.17	0.13	0.17	2.09	7.90*
Fojtan	1.3	0.5	56.0	29.0	60.5	29.0	100	100	100	100	100	4.46	1.53	0.43	0.63	0.59	3.18	7.64
Experimental Varieties																		
KYFL1013	4.1	1.3	50.0	53.5	54.0	62.0	100	100	98	96	88	7.24	2.25	0.26	0.13	0.30	2.94	10.17*
PPG-FEST-102	2.4	1.0	53.5	57.0	49.0	61.5	100	100	97	89	92	5.85	1.41	0.28	0.28	0.15	2.12	7.97*
Mean	3.1	1.4	52.6	49.5	55.0	55.3	100	100	84	77	80	6.36	1.55	0.38	0.33	0.33	2.58	8.94
CV,%	15.9	31.5	1.8	9.0	5.3	1.0	0	0	16	6	12	21.06	30.97	40.83	55.39	47.42	25.22	19.96
LSD,0.05	0.7	0.6	1.4	6.5	4.3	0.8	1	1	20	7	14	1.94	0.70	0.23	0.26	0.22	0.95	2.59

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
[2] Winter injury score based on a scale of 1 to 9 with 9 being the greatest amount of injury.
[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.

Table 10. Dry matter yields, seedling vigor, maturity, and stand persistence of festulolium varieties sown September 7, 2016, at Lexington, Kentucky.

Variety	Seedling Vigor[1]	Maturity[2]		Percent Stand			Yield (tons/acre)				
		2017		2016	2017		2017				
	Oct 5, 2016	May 11	Jun 20	Oct 5	Mar 14	Oct 31	May 11	Jun 20	Aug 11	Oct 26	Total
Commercial Varieties-Available for Farm Use											
Hostyn	2.5	54.0	62.0	100	100	98	3.08	1.68	0.67	0.90	6.33*
Perseus	4.8	48.8	62.0	100	100	99	3.25	1.70	0.38	0.68	6.00*
Lofa	4.5	50.5	62.0	100	100	99	3.36	1.55	0.27	0.60	5.78*
Hykor	2.3	59.0	29.0	100	100	100	1.97	1.26	1.33	1.00	5.56*
Perun	4.1	50.5	62.0	100	100	97	2.68	1.55	0.42	0.86	5.51*
Mahulena	2.6	60.0	29.0	100	100	100	1.97	1.14	1.23	1.10	5.45*
Fojtan	1.9	56.5	29.0	100	100	100	1.66	1.29	1.11	1.10	5.16
Barfest	3.1	48.8	57.0	100	100	100	2.83	1.09	0.27	0.72	4.92
InaMerlin	4.0	52.5	61.0	100	100	99	2.27	1.34	0.52	0.79	4.92
Spring Green	4.0	55.0	62.0	100	100	99	2.82	1.07	0.25	0.62	4.75
Duo	3.8	57.5	62.0	99	100	100	2.59	0.79	0.19	0.66	4.23
Experimental Varieties											
KYFL1301	4.3	47.5	61.0	100	100	100	2.84	1.60	0.48	0.61	5.53*
ORRUFEST	3.3	50.5	59.5	100	100	99	2.53	1.46	0.25	0.75	4.99
ORBSTFEST	3.1	48.8	58.5	100	100	99	2.77	1.08	0.24	0.46	4.55
KYFL1013	3.5	47.5	56.0	100	100	100	2.60	1.06	0.33	0.56	4.55
PPGFEST-102	3.0	55.0	62.0	100	100	99	2.54	1.18	0.30	0.41	4.42
Mean	3.4	52.6	54.6	100	100	99	2.61	1.30	0.52	0.74	5.17
CV,%	20.6	3.3	2.3	1	0	1	15.39	22.38	42.30	30.38	12.41
LSD,0.05	1.0	2.5	1.8	1	0	1	0.57	0.42	0.31	0.32	0.91

[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. Performance of annual ryegrass varieties sown in 2016 at Lexington, Kentucky.[1]

Variety	Type	Proprietor/KY Distributor	2016[2] 2017[3]
Commercial Varieties-Available for Farm Use			
Barmultra II	Italian tetraploid	Barenbrug USA	*
Bruiser	Westerwold diploid	Ampac Seed	x[4]
Centurion	Westerwold diploid	Mountain View Seeds	*
Feast II	Italian tetraploid	Ampac Seed	x
Fria	Westerwold diploid	Allied Seed	*
Gulf	Westerwold diploid	Public	x
Jackson	Westerwold diploid	The Wax Company	*
Marshall	Westerwold diploid	The Wax Company	*
Nelson	Westerwold tetraploid	The Wax Company	*
TetraPrime	Italian tetraploid	Mountain View Seeds	x
Ugne	Italian tetraploid	Hood River Seed	*
Experimental Varieties			
ME4	Westerwold diploid	The Wax Company	*
ME-94	Westerwold diploid	The Wax Company	*
M2CVS	Westerwold diploid	The Wax Company	*
SARG-FL	Westerwold diploid	Smith Seed	*
PPG-LWT105	Westerwold tetraploid	Mountain View Seeds	x

[1] See Table 14 for summary of yield data on named varieties from 2000-2017.
[2] Establishment year.
[3] Harvest year.
[4] "x" in the box indicates the variety was in the test but yielded significantly less than the top yielding variety.
*Not significantly different from the highest yielding variety in the test.

Table 12. Performance of perennial ryegrass across years at Lexington, Kentucky.

Variety	Type	Proprietor/KY Distributor	2015[1]		2016
			2016[2]	2017	2017
Commercial Varieties-Available for Farm Use					
Albion	tetraploid	Grassland Oregon	x[3]	x	
Barvitra	hybrid	Barenbrug USA	*	x	
BG34	diploid	Barenbrug USA	x	x	
Calibra	tetraploid	DLF International	x	x	x
Elena	tetraploid	Allied Seed			*
Linn (certified)	diploid	Public	x	x	x
Melpetra	tetraploid	Hood River Seed			x
Remington PLUS NEA2	tetraploid	Barenbrug USA	x	x	
PayDay	tetraploid	Mountain View Seeds			x
Power	tetraploid	Ampac Seed Company	x	*	
Remington	tetraploid	Barenbrug USA	x	*	*
TetraMag	tetraploid	Mountain View Seeds			*
TetraSweet	tetraploid	Mountain View Seeds			x
Experimental Varieties					
BAR LP 15261	tetraploid	Barenbrug USA	x	x	*
BARLP16237	–	Barenbrug USA			x
BARLP16238	–	Barenbrug USA			x
BARLP15COW	–	Barenbrug USA			x
GPD-14017AR1	diploid	Ag. Research	x	x	
GPD-14018AR1	diploid	Ag. Research	x	x	
GPD-14019	diploid	Ag. Research	x	x	
GPT-14021	tetraploid	Ag. Research	x	x	
GPT-14023AR5	tetraploid	Ag. Research	x	x	
TAL-PR-02	diploid	Ag. Research	x	x	
TAL-PR-03	diploid	Ag. Research	x	x	
TAL-PR-04	diploid	Ag. Research	x	x	

[1] Establishment year.
[2] Harvest year.
[3] "x" in the box indicates the variety was in the test but yielded significantly less than the top yielding variety. Open boxes indicate the variety was not in the test.
*Not significantly different from the highest yielding variety in the test.

Table 13. Performance of festulolium varieties across years at Lexington, Kentucky.

Variety	Type[2]	Proprietor/KY Distributor	2015[1]		2016
			2016[3]	2017	2017
Commercial Varieties-Available for Farm Use					
Barfest	MF x PR	Barenbrug USA	x[4]	x	x
Duo	MF x PR	Ampac Seed	x	x	x
Fojtan	(TF x IR) x TF	DLF International	x	*	x
Hostyn	MF x IR	DLF International			*
Hykor	(TF x IR) x TF	DLF International	x	*	*
InaMerlin	–	Hood River Seed			x
Lofa	(TF x Int) x Int	DLF International	*	x	*
Mahulena	(TF x IR) x TF	DLF International			*
Perseus	MF x IR	DLF International	*	x	*
Perun	MF x IR	DLF International	*	x	*
Spring Green	MF x PR	Turf Seed	*	x	x
Experimental Varieties					
KYFL1013	MF x IR	KY Agric. Exp. Station	*	x	x
KYFL1301	–	KY Agric. Exp. Station			*
ORBSTFEST	–	Oregro Seeds			x
ORRUFEST	–	Oregro Seeds			x
PPG-FEST-102	PR x MF	Mountain View Seeds	x	x	x

[1] Establishment year.
[2] MF=meadow fescue, TF=tall fescue, IR=Italian ryegrass, PR=perennial ryegrass, Int=intermediate ryegrass
[3] Harvest year.
[4] "x" in the box indicates the variety was in the test but yielded significantly less than the top yielding variety. Open boxes indicate the variety was not in the test.
*Not significantly different from the highest yielding variety in the test.

Table 14. Summary of Kentucky annual ryegrass yield trials 2000-2017 (yield shown as a percentage of the yield value of Marshall).

			Lexington[1]																Princeton		Mean[4] (#trials)
Variety	Type	Proprietor	03[2,3]	04	05	06	07	08	09	10	10	11	12	12	13	14	15	16	00	02	
Abundant	tetraploid	Ampac Seed				12															–
Acrobat	–	Proseeds Marketing						144													–
AE110	Westerwold tetraploid	Pickseed USA, Inc.										89	100								95(2)
Amp	Westerwold tetraploid	Columbia Seeds													75						–
Andy	Westerwold tetraploid	DLF International																	97		–
Assist	Westerwold diploid	SaddleButte													88						–
Attain	Westerwold tetraploid	Smith Seed Services								111					52	69					90(2)
Avance	Westerwold diploid	DLF International																	107		–
Barextra	Italian tetraploid	Barenbrug USA																		121	–
Barmultra II	Italian tetraploid	Barenbrug USA								133				103	95		125	108			117(4)
Big Bang	–	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							88	87	88(5)
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			93(8)
Common	–	Public																	83	87	85(2)
Centurion	Westerwold diploid	Mountain View Seeds											97			132		100			110(3)
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						–
Domino	Italian tetraploid	DLF International																		120	–
Dyna-Gain	Westerwold diploid	Columbia Seeds													71						–
Ed	Westerwold diploid	Smith Seed Services								96					101	100					98(2)
Fantastic	Westerwold diploid	Ampac Seed				48	84												88		86(3)
Feast II	Italian tetraploid	Ampac Seed						35	113	109		81	93	71	47	56	88	80		127	85(10)
Flying A	Westerwold diploid	Oregro Seeds				39		59													–
Fox	Italian diploid	DLF International								109											–
Fria	Westerwold diploid	Allied Seed								95		87	89		104	81	85	98			89(6)
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					–
Gulf	Westerwold diploid	Public					67	26	87	78		76	72		27	69	60	87	79	79	71(11)
Hercules	Westerwold tetraploid	Barenbrug USA												91	68				108		100(2)
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		90	92(14)
Jumbo	Westerwold tetraploid	Barenbrug USA	112																		–
KB Royal	Italian diploid	KB SeedSolutions								83											–

continued

Table 14. *continued*

Variety	Type	Proprietor	Lexington[1]																Princeton		Mean[4] (#trials)
			03[2,3]	04	05	06	07	08	09	10	10	11	12	12	13	14	15	16	00	02	
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								–
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(18)
Maximo	Intermediate tetraploid	Pickseed USA, Inc.										101									–
Melquatro	Italian tetraploid	Hood River Seed															135				–
Meroa	Westerwold diploid	Smith Seed Services														93	102				98(2)
MX 108	Westerwold tetraploid	Pickseed USA, Inc.										95	114								105(2)
Nelson	Westerwold tetraploid	The Wax Co.									86			93	65	77	105	97			90(5)
Oryx	Italian diploid	Hood River Seed															100				–
Passerel Plus	Westerwold diploid	Pennington Seed																		103	–
Primecut	Westerwold brand	Oregro Seeds										94									–
Rio	Westerwold diploid	–																	98	99	99(2)
Stockaid	diploid	–				82															–
Striker	Westerwold tetraploid	Seed Research of OR					90														–
TAMTBO	Italian tetraploid	Tex. Ag Exp Sta.						47		101		108	95			79					86(5)
Tam 90	Italian diploid	Tex. Ag Exp Sta.						49								78				88	72(3)
TetraPrime	Italian tetraploid	Mountain View Seeds											101			96	104	91			98(4)
TetraPro	Italian tetraploid	Tex. Ag Exp Sta.						40													–
TillageRootMax	Westerwold diploid	Cover Crop Solutions										82	90								86(2)
TillageMax-Bristol[5]	Westerwold diploid	Cover Crop Solutions										90	91								91(2)
TillageMax-INDY[5]	Westerwold diploid	Cover Crop Solutions										89	90								90(2)
T-Rex	Westerwold tetraploid	SaddleButte				11															–
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					108(4)
Winter Star	Italian tetraploid	Ampac Seed																		99	–
Zorro	Italian tetraploid	DLF International																	132	134	133(2)

[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 2015 was harvested one year, so the final report would be "2016 Annual and Perennial Ryegrass and Festulolium Report" archived in the KY Forage website at www.uky.edu/Ag/Forage.
[4] Mean only presented when respective variety was included in two or more trials.
[5] These are TillageRootMax that included crimson clover and/or tillage radish.

Table 15. Summary of Kentucky perennial ryegrass yield trials 2000-2017 (yield shown as a percentage of the mean of the commercial varieties in the trial).

			Lexington														Princeton		Bowling Green		Mean[3,4] (#trials)
			01[1,2]	03	04	05	06	07	08	09	10	11	12	13	14	15	00	02	00	03	
Variety	Type	Proprietor	2yr[5]	2yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	2yr	2yr	3yr	2yr	2yr	
Aires	diploid	Ampac Seed	95															93			94(2)
Albion	tetraploid	Grasslands Oregon													105	103					104(2)
Amazon	tetraploid	AgriBioTech			99													107			103(2)
Anaconda	tetraploid	Caudill Seed															95		103		99(2)
Aubisque	tetraploid	Seed Research of OR		144																99	122(2)
Bandit	tetraploid	Grassland West															106		114		110(2)
Barvitra	diploid	Barenbrug USA														104					–
Bastion C-2	tetraploid	Seed Research of OR			91																–
Bestfor	tetraploid	Improved Forages															113	107	120		113(3)
Best for Plus	hybrid tetraploid	Improved Forages		116	108	118														136	120(4)
BG-34	diploid	Barenbrug USA				83	85				86		87	84	85	81					84(7)
Bison	hybrid tetraploid	International Seeds																		140	–
Boost	tetraploid	Allied Seed						130	125	120	143	110	103	102							119(7)
Boxer	tetraploid	AgriBioTech															106				–
Calibra	tetraploid	DLF International							96	109	81	99	103	96	87	100		112			98(9)
CAS MP64	diploid	Cascade International	97																		–
Citadel	tetraploid	Ag Canada															94	113	103		103(3)
Crave	tetraploid	Ampac Seed											95								–
Derby	–	Public																	74		–
Elena DS	tetraploid	Allied Seed											110								–
Eurostar	tetraploid	Seed Research of OR						112													–
Everlast	diploid	Caudill Seed												104							–
Feeder	diploid	Seed Research of OR						76													–
Grand Daddy	tetraploid	Smith Seed	118				101	109		76	92	84	86		107			111			98(9)
Green Gold	tetraploid	Grasslands Oregon					96														–
Herbal	–	ProSeeds Marketing							77												–
Impressario	tetraploid	DLF International								107			92								100(2)
Kentaur	tetraploid	DLF International										106		117							112(2)
Lactal	tetraploid	Brett Young								102											–

continued

Table 15. *continued*

Variety	Type	Proprietor	Lexington														Princeton		Bowling Green		Mean[3,4] (#trials)
			01[1,2]	03	04	05	06	07	08	09	10	11	12	13	14	15	00	02	00	03	
			2yr[5]	2yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	3yr	3yr	3yr	2yr	2yr	2yr	3yr	2yr	2yr	
Lasso	diploid	DLF International	98																		–
LHT-102	tetraploid	Ampac Seed											114								–
Linn (certified)	diploid	Public	98	98	102		98	85	84	101	92	93	80	95	83	89	87	88	77		91(16)
Manhatten	diploid	–																85			–
Mara	diploid	Barenbrug USA																	85		–
Matrix	diploid	Cropmark seeds		77																64	–
Maverick Gold	hybrid tetraploid	Ampac Seed	97															71			84(2)
Orantas	diploid	DLF International								82											–
Ortet	tetraploid	Oregro Seeds							114												–
PayDay	tetraploid	Mountain View Seeds											101	103	99						101(3)
Polly II	tetraploid	FS Growmark															110		125		118(2)
Polly Plus	hybrid tetraploid	Allied Seed		64																60	62(2)
Power	tetraploid	Ampac Seed						110	103	102	100	109	104	95	101	107					104(9)
Polim	tetraploid	DLF International									106										–
Quartermaster	tetraploid	Radix Research				122															–
Quartet	tetraploid	Ampac Seed	97			56		46										113			78(4)
RAD-CPS212	hybrid tetraploid	Radix Research				134															–
RAD-MI125	hybrid tetraploid	Mountain View Seeds					120														–
Remington	tetraploid	Barenbrug USA													95	117					106(2(
Remington PLUS NEA2	tetraploid	Barenbrug USA													119	99					109(2)
Sierra	diploid	Lewis Seed Co.				89															–
TetraGain	tetraploid	Pure Seed											111								–
TetraMag	tetraploid	Mountain View Seeds											110		136						123(2)
Tonga	tetraploid	Kings AgriSeeds				96				103											100(2)
Verseka	tetraploid	Allied Seed											75								–
Victorian	diploid	Caudill Seed												104	83						94(2)
Yatsyn	diploid	Barenbrug USA															89				–

[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 2012 was harvested three years, so the final report would be "2015 Annual and Perennial Ryegrass and Festulolium Report" archived in the KY Forage website at www.uky.edu/Ag/Forage.
[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.

Table 16. Summary of Kentucky festulolium yield trials 2001-2017 (yield shown as a percentage of the mean of the commercial varieties in the trial).[1]

			Lexington										
			2001[3,4]	2005	2008	2009	2010	2011	2012	2013	2014	2015	Mean[5]
Variety	Type[2]	Proprietor	2yr[6]	3yr	3yr	3yr	3yr	3yr	2yr	3yr	2yr	2yr	(#trials)
Agula	MF x IR	Allied Seed					94		–				
Barfest	MF x PR	Barenbrug USA					105	101	107	119	91	97	103(6)
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	89	97(9)
Felina	(TF x IR) x TF	DLF International	104				132	118	134	114	96		116(6)
Fojtan	(TF x IR) x TF	DLF International					112	101	124	92	72	86	98(6)
Gain	MF x IR	Allied Seed					103	77	52	75			77(4)
Hostyn	MF xIR	DLF International							107	110	106		108(3)
Hykor	(TF x IR) x TF	DLF International					133	141	153	131	119	107	131(6)
Lofa	(TF x Int) x Int	DLF International					105	107	110	128	112	95	110(6)
Mahulena	(TF x IR) x TF	DLF International							131	109	107		116(3)
Meadow Green	–	Pure Seed							37	34			36(2)
Perseus	MF x IR	DLF International					132	114	126	123	110	116	120(6)
Perun	MF x IR	DLF International					127	114	107	131	110	106	116(6)
Rebab	(TFxIR) xTF	DLF International								94	77		86(2)
Spring Green	MF x PR	Turf-Seed	96	111	114	101	113	112	114	110	103	106	108(10)
Sweet Tart	MF x IR	ProSeeds Marketing			88		82	63	62				74(4)

[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 2012 was harvested three years, so the final report would be "2015 Annual and Perennial Ryegrass and Festulolium Report" archived in the KY Forage website at www.uky.edu/Ag/Forage.
[5] Mean only presented when respective variety was included in two or more trials.
[6] Number of years of data.

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