

2013 Annual and Perennial Ryegrass and Festulolium Report

G.L. Olson, S.R. Smith, T.D. Phillips, and G.D. Lacefield, 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.

Annual ryegrasses are increasing in use across Kentucky as more winter-hardy varieties are released and promoted. Annual ryegrass is productive for three to four 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. In Kentucky, winter survival can be an issue for Westerwolds varieties, so before planting one of these varieties, review winter survival results for Kentucky.

Italian ryegrass is native to Southern Europe and is not a true annual. In Kentucky most varieties behave as biennials or short-lived perennials, depending on environmental conditions. 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

Table 1. Temperature and rainfall at Lexington, Kentucky, in 2011, 2012, and 2013.

	2011				2012				2013 ²			
	Temp		Rainfall		Temp		Rainfall		Temp		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	29	-2	2.10	-0.76	38	+7	4.80	+1.94	38	+7	4.50	+1.64
FEB	39	+4	6.34	+3.13	40	+5	5.39	+2.18	36	+1	1.78	-1.43
MAR	47	+3	4.76	+0.36	56	+12	5.64	+1.24	39	-5	5.47	+1.07
APR	58	+3	12.36	+8.48	56	+1	3.26	-0.62	55	0	4.46	+0.58
MAY	64	0	6.72	+2.25	69	+5	4.02	-0.45	65	+1	5.23	+0.76
JUN	74	+2	2.61	-1.05	73	+1	2.42	-1.24	72	0	7.32	+3.66
JUL	80	+4	6.29	1.29	81	+5	2.50	-2.50	72	-4	9.33	+4.33
AUG	75	0	2.89	-1.04	75	0	1.68	-2.25	72	-3	3.68	-0.25
SEP	66	-2	5.52	+2.32	67	-1	6.40	+3.20	67	-1	2.21	-0.99
OCT	55	-2	4.10	+1.53	55	-2	2.00	-0.57	55	-2	8.10	+5.53
NOV	50	+5	9.53	+6.14	43	-2	1.81	-0.65				
DEC	41	+5	5.58	+1.60	42	+6	9.57	+4.94				
Total			68.80	+24.25			49.49	+4.94			52.08	+14.90

¹ DEP is departure from the long-term average.

² 2013 data is for the ten months through October.

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.

Both forage and turf types of annual 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.

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 would be similar to those of perennial ryegrass.

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.

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 festu-

tulolium varieties tested in Kentucky for the last 10-plus years. The UK Forage Extension Web site at www.uky.edu/Agric/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 pasture (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.

Description of the Tests

Data from nine studies are reported. Annual ryegrass tests were established in the fall of 2010, 2011, and 2012 at Lexington. Perennial ryegrass tests were established in 2011 and 2012 and festulolium tests were established in 2010, 2011 and 2012 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 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, weed control, and harvest timing were in accordance with University of Kentucky recommendations.

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	
•	
19	9 or more leaves unfolded	
Sheath elongation		
20	No elongated sheath	
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	
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	
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	Preatthesis	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.

Table 3. Dry matter yields, seedling vigor, maturity and stand persistence of annual ryegrass varieties sown September 6, 2010, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 14, 2010	Maturity ²				Percent Stand						Yield (tons/acre)						
		2011			2010	2011			2011				2011					
		Apr 21	May 19	Jun 7	Jun 28	Oct 14	Jan 5	Mar 16	Jul 13	Aug 23	Jan 5	Apr 21	May 19	Jun 7	Jun 28	Jul 22	Total	
Commercial Varieties—Available for Farm Use																		
Barmultra II	3.0	33.3	41.8	53.5	62	99	100	100	100	83	0.16	1.99	1.36	1.01	0.38	0.13	5.03*	
GR-AS10	4.0	32.5	39.0	52.0	62	100	100	100	100	58	0.20	1.76	1.12	0.80	0.25	0.11	4.25	
Attain	3.6	33.0	49.8	59.0	62	100	100	100	99	0	0.36	1.95	1.07	0.63	0.17	0.00	4.18	
Feast II	4.8	32.0	39.0	52.0	62	100	100	98	99	91	0.20	1.49	1.12	0.86	0.31	0.14	4.11	
Fox	4.3	32.8	43.8	53.5	62	100	100	99	99	71	0.18	1.66	0.99	0.81	0.31	0.12	4.07	
Winterhawk	3.4	33.3	49.8	57.5	62	100	100	100	100	0	0.28	1.91	0.96	0.56	0.22	0.01	3.93	
TAMTBO	3.8	33.0	47.0	58.0	62	100	100	100	100	0	0.22	1.88	0.90	0.65	0.16	0.01	3.82	
Marshall	4.3	33.0	51.3	56.5	62	100	100	100	100	0	0.39	1.64	0.99	0.58	0.17	0.00	3.77	
Bruiser	4.3	33.5	48.8	60.5	62	100	100	100	100	3	0.40	1.85	0.87	0.49	0.14	0.00	3.76	
Jackson	3.3	33.3	46.5	58.0	62	100	100	100	100	0	0.42	1.91	0.80	0.49	0.11	0.01	3.74	
Big Boss	3.8	33.8	55.0	62.0	62	99	100	99	99	0	0.29	1.61	0.98	0.68	0.12	0.00	3.68	
Ed	2.5	33.8	50.3	61.0	62	99	100	100	100	0	0.22	1.92	0.87	0.50	0.12	0.00	3.62	
Fria	3.1	33.0	46.0	59.0	62	100	100	100	99	5	0.31	1.85	0.84	0.46	0.12	0.00	3.58	
Brangus	4.0	32.3	55.5	60.5	62	100	100	99	99	0	0.29	1.42	1.02	0.57	0.24	0.01	3.56	
Big Daddy	3.5	33.0	56.0	61.0	62	100	100	98	98	0	0.23	1.32	0.99	0.56	0.14	0.02	3.25	
Verdure	4.3	32.5	56.0	62.0	62	100	100	99	99	1	0.32	1.31	0.93	0.54	0.12	0.01	3.23	
KB Royal	4.3	32.8	54.0	59.0	62	100	100	100	100	1	0.35	1.31	0.86	0.47	0.12	0.01	3.12	
Gulf	4.1	32.8	55.5	61.0	62	100	100	99	100	0	0.31	1.34	0.83	0.34	0.10	0.00	2.93	
HS-1	4.6	32.0	56.0	60.0	62	100	100	97	96	0	0.25	1.13	0.86	0.41	0.07	0.00	2.72	
Experimental Varieties																		
BAR LMF9881	3.0	33.5	41.8	54.0	62	100	100	100	100	48	0.20	2.17	1.20	0.92	0.31	0.12	4.91*	
BAR LMF9876	2.6	33.0	43.8	56.0	62	98	100	100	100	13	0.16	2.05	1.09	0.75	0.26	0.08	4.39	
PPG-LMT103	1.6	31.8	41.8	52.0	62	99	100	100	100	100	0.19	1.54	1.32	0.79	0.33	0.12	4.28	
BAR LMF9740	3.4	33.5	43.5	56.0	62	100	100	98	98	6	0.20	1.75	1.13	0.81	0.25	0.02	4.16	
B-7.1366	3.5	33.0	42.0	57.0	62	100	100	99	100	0	0.25	2.03	0.91	0.68	0.15	0.02	4.04	
PPG-LMT102	2.0	33.8	49.3	56.0	62	98	100	100	100	0	0.17	1.70	0.89	0.58	0.17	0.01	3.51	
Mean	3.6	33.0	48.1	57.5	62	100	100	99	99	19	0.26	1.70	1.00	0.64	0.19	0.04	3.83	
CV%	22.1	1.8	8.8	3.3	0	1	0	1	1	49	42.91	14.16	11.56	14.01	26.30	60.61	9.01	
LSD,0.05	1.1	0.8	6.0	2.7	0	1	0	2	2	13	0.16	0.34	0.16	0.13	0.07	0.03	0.49	

¹ Vigor score based on scale of 1 to 5 with 5 being the most vigorous seedling growth² 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.

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 2013 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 12, 13, and 14 summarize information about distributors and yield performance for all annual and perennial ryegrass and festulolium varieties cur-

rently 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 12, 13, and 14, 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 relative spring maturity and the distribution of yield across the growing season when evaluating productivity of ryegrass varieties (tables 3 through 11).

Table 4. Dry matter yields, seedling vigor, plant height, maturity and stand persistence of annual ryegrass varieties sown September 14, 2011, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 11, 2011	Percent Stand			Height (inches)				Maturity ²			Yield (tons/acre)					
		2011		2012	2011		2012		2012			2011		2012			
		Oct 11	Mar 21	Jun 4	Dec 2	Apr 5	May 10	Apr 5	May 10	Jun 4	Dec 2	Apr 6	May 10	Jun 4	Total		
Commercial Varieties—Available for Farm Use																	
Winterhawk	5.0	100	100	100	10	23	15	34	52	58	1.06	1.61	0.62	0.44	3.72*		
TAMTBO	2.8	100	100	100	10	20	18	34	54	59	0.92	1.45	0.68	0.41	3.46*		
Jackson	4.0	100	100	100	10	23	15	34	53	61	0.94	1.53	0.54	0.38	3.39*		
MX 108	3.5	100	100	100	9	19	16	33	48	56	0.75	1.44	0.72	0.44	3.35*		
Bruiser	4.5	100	100	100	10	24	16	34	54	59	0.98	1.47	0.54	0.33	3.32*		
Maximo	3.5	100	100	100	9	19	15	33	45	57	0.63	1.52	0.66	0.42	3.23		
Marshall	4.0	100	100	100	10	24	18	34	50	59	0.76	1.48	0.62	0.32	3.19		
Primecut	3.0	100	100	100	10	22	14	34	53	60	0.78	1.42	0.50	0.29	2.99		
TillageMax-Bristol	3.3	100	100	100	9	20	14	33	51	58	0.67	1.26	0.61	0.34	2.87		
TillageMax-INDY	3.3	100	100	100	10	22	15	33	50	60	0.63	1.37	0.48	0.38	2.85		
DH3	4.3	100	100	100	10	20	18	34	56	59	0.77	1.17	0.55	0.35	2.85		
AE110	2.6	100	100	100	9	21	17	33	48	58	0.56	1.38	0.61	0.29	2.84		
Fria	3.3	100	100	100	10	25	15	34	54	60	0.64	1.43	0.43	0.29	2.79		
Big Daddy	3.5	100	100	100	9	19	18	33	56	61	0.68	1.10	0.55	0.29	2.62		
TillageRootMax	3.8	100	100	100	10	19	14	33	49	58	0.74	1.01	0.54	0.32	2.61		
Feast II	2.0	100	100	100	8	15	13	33	46	59	0.44	1.10	0.55	0.48	2.57		
Gulf	3.8	100	100	100	10	22	16	34	56	59	0.63	1.17	0.41	0.22	2.43		
Experimental Varieties																	
07-2 AR	3.5	100	100	100	10	22	15	33	46	61	0.79	1.76	0.72	0.49	3.76*		
PS-AR-09-1	3.0	100	100	100	9	20	16	33	45	61	0.74	1.39	0.70	0.48	3.32*		
PS-Lm-09-2	3.5	100	100	100	11	21	15	33	48	59	0.77	1.46	0.60	0.45	3.27*		
XLFLOLHY	4.3	100	100	100	10	18	17	34	52	58	0.91	1.27	0.69	0.37	3.23		
XLFDARG	2.0	100	100	100	6	20	12	33	51	60	0.28	1.47	0.52	0.43	2.70		
Mean	3.5	0	0	0	9.4	20.6	15.2	33.3	50.6	59.0	0.73	1.38	0.58	0.37	3.06		
CV,%	18.3	0	0	0	9.0	7.6	11.6	2.2	4.7	3.3	21.47	14.25	18.11	26.67	11.51		
LSD,0.05	0.9	0	0	0	1.2	2.2	2.5	1.1	3.4	2.8	0.22	0.28	0.15	0.14	0.50		

¹ Vigor score based on 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.

Tables 15, 16, and 17 are summaries of yield data from 1999 to 2013 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 15, 16, and 17, but these comparisons do help to identify varieties for further consideration. Varieties that have performed better than average over many years and at several locations have stable performance; others may have performed well in wet years or on particular soil types. These details may influence variety choice and the information can be found in the yearly reports. See the footnotes in tables 15, 16, and 17 to determine to which yearly report to refer.

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 Web site, 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 Seedlings for Kentucky Horse Farms (ID-142)
- Rotational Grazing (ID-143)
- Establishing and Managing Horse Pastures (ID-147)

Authors

G.L. Olson is a research specialist and S.R. Smith and G.D. Lacefield are Extension professors in Forages. T.D. Phillips is an associated professor in Tall Fescue Breeding.

Table 5. Dry matter yields, seedling vigor, plant height, maturity and stand persistence of annual ryegrass varieties sown August 31, 2012, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 11, 2012	Maturity ² 2013			Percent Stand 2013			Height (inches) 2013			Yield (tons/acre) 2013									
		2012			2013			2012			2012									
		Apr 22	May 21	Jun 11	Mar 20	Jul 22	Aug 21	Apr 22	May 21	Jun 11	Jun 25	Dec 14	Apr 23	May 21	Jun 11	Jun 25	Jul 23	Total		
Commercial Varieties—Available for Farm Use																				
MX108(Max)	4.6	32.0	47.3	56.0	56.5	100	100	100	100	8	14	19	18	13	0.95	1.82	1.25	0.45		
LHT-102	4.0	31.5	49.3	53.0	56.0	100	100	100	100	6	12	19	10	11	0.44	1.77	1.55	0.22		
Marshall	4.6	32.8	50.8	59.5	62.0	100	100	20	4	9	16	21	14	7	1.28	1.90	0.99	0.44		
AE110	3.4	32.5	50.8	56.5	61.0	100	94	89	56	8	15	21	16	12	0.85	1.59	1.28	0.51		
TAMTBO	4.1	32.8	55.5	57.5	62.0	100	93	25	7	7	14	22	13	7	0.97	1.69	1.36	0.38		
Feast II	4.9	31.3	53.5	55.0	56.0	100	70	93	92	8	9	24	13	13	0.96	0.98	1.41	0.49		
Winterhawk	4.8	32.5	49.3	62.0	62.0	100	100	24	10	9	17	16	16	7	1.09	1.82	0.94	0.37		
Jackson	4.1	32.8	52.0	62.0	62.0	100	100	13	4	10	16	20	14	8	1.20	1.69	0.98	0.36		
TillageMaxBristol	2.3	32.3	54.0	57.5	62.0	89	87	18	4	7	14	21	12	9	0.98	1.60	1.20	0.38		
TillageMaxNDY	2.1	32.3	51.3	59.5	62.0	91	90	14	3	6	15	21	14	10	0.76	1.74	1.20	0.41		
TillageRootMax	2.3	33.0	48.8	60.0	62.0	98	100	13	1	7	17	19	15	9	0.65	1.97	1.07	0.42		
Fria	4.9	33.3	50.8	62.0	62.0	100	100	20	1	9	16	17	15	8	1.09	1.66	0.92	0.41		
Bruiser	5.0	32.5	51.3	61.0	62.0	100	100	23	5	9	15	17	14	8	1.24	1.51	0.93	0.29		
Gulf	4.8	31.3	62.0	59.0	62.0	100	63	6	1	8	9	28	9	7	1.06	0.76	1.26	0.19		
Experimental Varieties																				
PS-Lm-09-2	4.6	33.3	49.3	57.0	56.5	100	100	97	8	17	18	18	11	0.82	2.00	1.12	0.64	0.15		
Lh 4x-1PS	3.8	32.3	53.5	57.0	59.0	100	100	94	91	8	14	20	17	13	0.74	1.83	1.34	0.53		
PPG-LMT-103	3.5	31.8	46.8	57.0	57.0	100	100	6	13	18	15	13	0.51	1.78	1.34	0.49	0.23	0.37		
PPG-LWD-101	4.0	33.3	46.3	60.0	62.0	100	100	30	8	9	17	17	9	0.99	2.12	0.86	0.46	0.09	0.00	
Amp	3.1	33.0	56.0	60.0	62.0	99	98	30	11	7	17	21	15	8	0.79	1.80	1.29	0.47	0.08	0.00
IS-LWT 12	4.0	32.5	57.0	59.5	62.0	100	85	31	18	8	14	24	14	8	1.05	1.44	1.22	0.41	0.05	0.00
IS-LWT 14	3.6	32.0	55.5	58.5	62.0	100	99	36	16	8	14	21	15	8	0.86	1.54	1.24	0.48	0.06	0.00
IS-LWT 13	3.8	32.8	56.0	57.0	62.0	93	84	35	14	7	13	23	15	8	0.78	1.50	1.30	0.47	0.07	0.00
Mean	3.9	32.4	52.1	58.5	60.5	99	94	46	34	8	14	20	14	9	0.91	1.66	1.18	0.44	0.10	0.12
CV,%	15.2	2.1	5.6	3.5	1.4	4	12	20	23	13	10	10	13	13	22.83	12.34	12.54	22.47	44.11	9.99
LSD0.05	0.9	0.9	4.1	2.9	1.2	5	16	13	11	1	2	3	3	2	0.29	0.29	0.21	0.14	0.04	0.07
																		0.62		

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 6. Dry matter yields, seedling vigor, plant height, maturity and stand persistence of annual ryegrass varieties sown September 11, 2012, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ , Oct 12,		Maturity ² , 2013		Percent Stand 2013		Plant Height (inches) 2013		Yield (tons/acre)								
	Apr 29	May 25	Jun 11	Jun 28	Oct 12	Mar 20	Jul 18	Apr 29	May 25	Jun 11	Jun 28	May 25	Jun 11	Jun 28	Jul 29	Total	
Commercial Varieties—Available for Farm Use																	
Barmultra II	3.5	32.8	55.5	55.0	54.5	100	100	14	16	12	12	1.61	1.17	0.22	0.21	0.17	
Marshall	4.6	34.8	48.0	56.0	58.5	100	100	6	17	15	11	13	1.92	1.07	0.15	0.15	
Nelson	2.9	33.0	53.0	56.0	58.0	100	100	19	15	17	11	13	1.59	1.17	0.13	0.17	
Hercules	3.4	32.3	59.5	56.0	56.5	100	71	75	13	23	13	16	1.26	0.19	0.21	0.08	
BigBoss	2.8	32.5	58.5	56.0	58.5	100	94	6	15	19	10	12	1.46	1.15	0.15	0.06	
Jackson	4.0	34.3	61.5	56.5	57.5	100	67	11	14	24	11	12	1.20	1.08	0.12	0.12	
Feast II	2.8	31.0	58.0	54.0	57.0	100	35	73	9	23	10	15	0.81	1.20	0.10	0.17	
Experimental Varieties																	
ME4	3.3	33.5	49.8	56.0	57.0	100	100	13	19	16	10	12	1.90	1.02	0.15	0.11	
M2CVS	4.4	33.0	49.3	58.0	58.5	100	100	14	16	15	11	13	1.72	0.99	0.14	0.12	
ME-94	4.4	34.5	52.0	56.0	58.0	100	100	21	17	16	10	14	1.68	1.02	0.09	0.14	
Mean	3.6	33.2	54.5	56.0	57.4	100	87	34	15	18	11	13	1.51	1.11	0.15	0.03	
CV%	22.1	5.1	4.5	1.8	1.6	0	11	25	8	13	11	10	7.91	10.00	31.42	39.80	
LSD0.05	1.2	2.5	3.5	1.4	1.3	0	14	12	2	4	2	0.17	0.16	0.07	0.08	0.03	
																0.34	

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, maturity and stand persistence of perennial ryegrass varieties sown September 14, 2011, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 11, 2011	Maturity ²		Percent Stand				Yield (tons/acre)							
		2012	2013	2011	2012		2013		2012	2013				2-year Total	
		May 4	May 24	Oct 11	Mar 21	Oct 23	Mar 20	Oct 21	Total	May 24	Jun 25	Aug 5	Oct 21	Total	
Commercial Varieties—Available for Farm Use															
Kentaur	3.5	48.0	50.5	100	100	95	84	93	2.88	0.75	0.63	0.40	0.63	2.40	5.29*
Boost	4.8	54.5	56.8	100	100	93	88	92	2.98	1.17	0.31	0.34	0.45	2.27	5.24*
Power	3.3	53.0	56.5	100	100	96	91	94	2.65	0.83	0.51	0.36	0.48	2.18	4.83*
Calibra	3.8	48.8	54.5	100	100	97	95	97	2.49	0.70	0.48	0.34	0.44	1.96	4.45
Granddaddy	2.8	52.0	57.0	100	100	95	94	94	2.15	0.73	0.34	0.34	0.44	1.85	4.00
Linn	3.8	59.0	59.5	100	100	100	85	86	2.12	0.88	0.24	0.34	0.38	1.84	3.96
Experimental Varieties															
XLFETPRG	4.3	55.0	56.5	100	100	94	86	91	3.12	1.21	0.30	0.37	0.41	2.29	5.41*
Mean	3.7	52.9	55.9	100	100	96	89	92	2.63	0.89	0.40	0.35	0.46	2.11	4.74
CV,%	11.9	3.0	4.3	0	0	2	9	5	14.71	22.98	16.48	27.69	20.85	13.87	12.90
LSD,0.05	0.7	2.4	5.6	0	0	3	12	7	0.57	0.31	0.10	0.12	0.14	0.44	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 8. Dry matter yields, seedling vigor, maturity and stand persistence of perennial ryegrass and festulolium (FL) varieties sown September 7, 2012, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 15, 2012	Maturity ²		Percent Stand				Yield (tons/acre)							
		2013	2012	2013	2012	2013	2012	2013	May 20	Jun 28	Aug 6	Oct 24	Total		
		May 20	Oct 15	Mar 20	Oct 22	May 20	Jun 28	Aug 6	Oct 24	Total					
Commercial Varieties—Available for Farm Use															
Perseus (FL)	4.3	54.5	100	100	98	3.51	1.52	0.46	0.72	6.21*					
LHT-102	4.8	54.0	100	100	100	3.36	1.39	0.43	0.71	5.89*					
Hostyn (FL)	3.0	58.5	99	100	100	3.09	1.42	0.51	0.70	5.72*					
Elena DS	3.3	54.5	98	98	98	3.17	1.20	0.32	0.55	5.24					
TetraGain	3.0	56.0	97	98	98	3.15	1.06	0.39	0.56	5.16					
Boost	3.0	56.0	91	99	95	3.04	0.93	0.29	0.61	4.87					
Crave	3.3	53.0	100	100	100	2.79	0.90	0.26	0.75	4.70					
Power	3.8	54.5	100	100	100	2.64	0.90	0.36	0.67	4.57					
Calibra	4.0	54.0	100	100	100	2.83	0.84	0.29	0.57	4.53					
Impressario	4.1	55.5	100	100	100	2.42	0.92	0.30	0.87	4.51					
Verseka	3.6	55.0	100	100	100	2.76	0.86	0.30	0.44	4.35					
Granddaddy	3.3	56.5	99	99	100	2.64	0.77	0.27	0.65	4.33					
BG34	4.4	50.3	100	100	100	2.27	0.78	0.24	0.70	4.00					
Linn	3.3	58.5	100	100	100	2.33	0.52	0.21	0.57	3.62					
Experimental Varieties															
PPG-LHT 104	4.6	52.5	100	100	100	3.33	1.30	0.40	0.66	5.69*					
PPG-FPRT 105	2.9	53.5	100	100	100	2.73	1.00	0.31	0.69	4.72					
IS-FLPT 5	3.4	53.0	100	100	100	2.58	1.01	0.32	0.80	4.71					
IS-FLPT 6	3.0	52.5	100	100	100	2.45	0.93	0.31	0.74	4.43					
PPG-FPRD 104	3.9	57.0	100	100	100	2.65	0.70	0.29	0.62	4.25					
IS-FLPD 6	3.6	55.0	100	100	99	2.17	0.74	0.21	0.54	3.66					
Mean	3.6	54.7	99	100	99	2.79	0.98	0.32	0.66	4.76					
CV,%	19.1	3.2	3	1	2	12.85	15.15	20.56	18.82	11.48					
LSD,0.05	1.0	2.4	5	1	3	0.51	0.21	0.09	0.17	0.77					

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, maturity and stand persistence of festulolium varieties sown September 7, 2010, at Lexington, Kentucky.

Variety	Seedling Vigor ¹		Maturity ²		Percent Stand		Height (in)		Yield (tons/acre)			3-year Total										
	Oct 14, 2010		May 5		2011		2012		2013		2011		2012		2013							
	Commercial Varieties—Available for Farm Use		May 7		May 24		Oct 14		Mar 11		Nov 7		Mar 21		Oct 22							
Hykor	1.8	56.0	29.5	68.0	60.0	95	97	97	98	97	97	97	97	32	4.00	1.94	2.21	0.53	0.85	1.11	4.70	10.63*
Felina	1.4	55.5	29.5	68.0	60.0	95	98	99	100	99	99	99	99	30	3.86	2.12	2.10	0.42	0.91	1.20	4.64	10.61*
Persens	4.0	43.0	54.0	49.8	56.0	98	75	99	99	75	68	79	24	5.46	2.15	1.61	0.23	0.46	0.68	2.97	10.58*	
Perun	3.0	47.5	56.5	53.5	56.5	97	100	95	96	59	46	63	23	5.13	1.78	1.85	0.23	0.61	0.56	3.25	10.15*	
SpringGreen	2.8	52.0	58.5	54.0	56.0	99	100	98	98	95	86	89	22	4.57	1.69	1.80	0.12	0.41	0.46	2.79	9.05	
Foitan	1.0	52.5	29.0	68.0	60.0	91	96	99	99	98	98	98	20	3.17	1.79	2.04	0.34	0.71	0.91	4.00	8.97	
Barfest	2.4	38.3	48.8	51.3	55.3	96	100	100	100	96	79	80	20	4.02	2.33	1.19	0.08	0.29	0.53	2.10	8.44	
Lofa	2.8	34.3	54.0	52.7	56.7	97	100	97	97	80	70	83	23	4.76	1.49	1.40	0.17	0.36	0.23	2.16	8.41	
Gain	2.8	45.0	57.5	46.3	57.5	95	99	96	96	53	46	65	23	4.40	1.18	1.53	0.19	0.41	0.52	2.65	8.23	
Duo	5.0	53.3	62.0	55.3	56.0	100	100	92	94	90	67	83	30	3.80	1.68	1.29	0.11	0.30	0.43	2.13	7.61	
Aquila	2.1	46.3	60.0	46.3	57.5	92	99	97	97	55	53	56	23	4.18	1.12	1.09	0.17	0.43	0.52	2.21	7.51	
Bonus	2.2	44.0	58.7	49.0	57.0	96	100	82	89	68	57	63	21	3.69	1.39	1.30	0.19	0.47	0.43	2.39	7.46	
SweetTart	3.4	42.5	43.3	55.0	56.7	99	100	99	83	58	73	20	3.73	1.45	0.72	0.10	0.20	0.39	1.40	6.59		
Experimental Varieties																						
KYFA9819/E1	1.8	33.0	59.0	52.0	56.5	95	97	97	97	92	84	86	19	3.96	1.88	1.66	0.11	0.36	0.43	2.57	8.41	
KYFA9819/E2	2.0	35.0	56.0	52.5	54.7	92	96	96	96	95	80	80	19	3.78	2.07	1.19	0.10	0.26	0.42	1.97	7.83	
KYFA9819/E3	1.3	34.0	58.5	52.0	56.0	92	97	98	98	87	80	78	19	3.69	1.69	1.18	0.08	0.38	0.38	2.02	7.39	
KYFA9819EF	2.1	33.0	58.5	54.0	56.0	95	99	97	97	92	68	66	21	3.85	1.71	0.64	0.09	0.13	0.34	1.20	6.76	
Mean	2.4	43.8	51.0	54.7	57.1	95	97	97	97	83	73	79	23	4.12	1.74	1.46	19.19	0.45	0.57	2.68	8.54	
CV%	22.3	9.4	12.0	4.0	1.8	3	13	5	3	13	20	17	9	9.29	18.49	41.76	43.26	26.92	23.46	28.06	10.55	
LSD0.05	0.8	6.0	8.9	3.2	1.7	4	19	7	4	16	23	20	3	0.56	0.47	0.90	0.12	0.17	0.20	1.10	1.32	

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 10. Dry matter yields, seedling vigor, maturity and stand persistence of *festulolium* varieties sown September 14, 2011, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 11, 2011		Maturity ²			Percent Stand			Height (in)			Yield (tons/acre)			2-year Total			
			2012		2013	2011		2012	2013		2012	2013		2012	Total			
	Apr 10	Apr 30	May 20	May 24	Oct 11	Mar 21	Oct 19	Mar 28	Oct 22	May 24	Jun 28	Aug 5	Oct 22	Total				
Commercial Varieties—Available for Farm Use																		
Perseus	3.3	32.8	45.0	49.5	55.0	100	100	87	91	15	3.75	1.84	0.77	0.68	0.50	3.80	7.55*	
Hylkor	1.8	31.5	55.5	29.0	60.0	100	100	100	100	11	2.31	2.21	1.03	0.99	0.98	5.20	7.51*	
Lofa	3.0	32.8	49.3	49.3	55.5	100	100	91	91	15	3.44	2.03	0.69	0.58	0.25	3.56	7.00*	
Perun	3.0	32.5	48.5	46.8	56.0	100	100	97	79	14	3.47	1.81	0.65	0.64	0.37	3.48	6.95*	
Spring Green	3.0	32.5	56.0	52.0	56.0	100	100	88	94	17	3.36	1.94	0.40	0.50	0.48	3.32	6.68*	
Felina	1.3	30.8	54.5	29.0	60.0	100	100	100	100	9	1.74	2.12	0.92	0.89	0.84	4.77	6.51*	
Duo	4.3	48.8	—	62.0	56.0	100	98	91	91	26	2.90	2.35	0.35	0.48	0.33	3.50	6.40	
Barfest	2.6	32.0	43.5	44.0	56.0	100	100	94	97	12	2.85	1.76	0.45	0.55	0.45	3.21	6.06	
Fojtan	1.0	30.8	53.0	29.0	59.5	100	100	100	100	9	1.88	1.93	0.73	0.68	0.70	4.03	5.92	
Gain	4.6	50.0	—	62.0	58.5	100	100	56	23	20	2.60	1.46	0.78	0.47	0.11	2.81	5.42	
Sweet Tart	3.0	31.8	50.3	38.8	56.5	100	100	9	74	14	2.22	0.81	0.47	0.51	0.32	2.11	4.34	
Bonus	4.5	50.0	—	62.0	60.0	100	100	10	2	1	25	2.48	0.62	0.24	0.16	0.00	3.50	
Experimental Varieties																		
KYFA 016	2.6	32.3	39.0	51.5	56.0	100	100	96	97	12	2.77	1.80	0.42	0.42	0.33	2.96	5.74	
KYFA 015	2.3	32.3	39.0	51.5	56.0	100	100	96	97	12	2.71	1.80	0.43	0.44	0.32	2.99	5.70	
KYFA 819	2.0	32.0	40.5	52.0	56.0	100	100	96	95	12	2.42	1.47	0.37	0.48	0.27	2.60	5.02	
XLFFL	4.3	48.8	—	62.0	59.5	100	100	4	1	1	2.55	1.11	0.46	0.22	0.00	1.79	4.35	
Mean	2.9	36.3	47.8	48.1	57.2	100	100	85	72	77	16	2.72	1.69	0.57	0.54	0.39	3.20	5.91
CV, %	15.3	2.9	5.5	9.5	1.1	0	0	6	7	6	10	11.73	27.32	16.33	26.57	45.58	19.01	13.23
LSD, 0.05	0.6	1.5	3.8	6.3	1.0	0	0	8	7	7	2	0.45	0.54	0.13	0.21	0.25	0.87	1.12

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

² Maturity rating scale: 37 = flag leaf emergence, 45 = boot swollen, 50 = beginning of inflorescence, 58 = complete emergence of inflorescence, 58 = 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 7, 2012, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 15, 2012	Maturity ²	Percent Stand			Yield (tons/acre)						
			2013	2012	2013	2013			May 20	Jun 28	Aug 6	Oct 24
		May 20	Oct 15	Mar 20	Oct 22	May 20	Jun 28	Aug 6	Oct 24			Total
Commercial Varieties—Available for Farm Use												
Hykor	2.5	60.0	98	98	100	3.32	1.50	1.10	1.39	7.31*		
Perseus	4.0	55.0	99	100	96	4.04	1.78	0.57	0.61	7.01*		
Hostyn	3.0	59.0	99	100	99	3.47	1.86	0.79	0.66	6.79*		
Perun	3.3	55.5	100	100	98	3.67	1.62	0.67	0.68	6.64*		
Felina	1.3	60.0	95	96	99	2.90	1.45	1.00	1.27	6.61*		
Lofa	4.5	54.5	100	100	86	3.69	1.97	0.40	0.35	6.41		
Spring Green	4.1	57.5	100	100	100	3.41	1.47	0.46	0.69	6.03		
Mahulena	1.4	60.0	92	93	95	2.70	1.21	0.84	1.21	5.96		
Fojtan	2.0	57.5	97	97	100	2.73	1.15	0.76	1.17	5.80		
Duo	3.9	60.0	100	100	100	3.49	1.21	0.32	0.60	5.62		
Barfest	3.8	55.5	100	100	100	3.60	1.08	0.30	0.60	5.57		
SweetTart	4.6	56.5	100	85	93	2.34	1.19	0.32	0.60	4.44		
Gain	4.9	61.5	100	78	18	2.25	1.15	0.34	0.20	3.94		
Meadow Green	4.8	56.0	100	66	0	2.50	1.00	0.02	0.00	3.53		
Bonus	5.0	60.0	100	38	2	1.95	0.80	0.06	0.04	2.86		
Experimental Varieties												
KYFA1016	3.1	55.5	100	100	100	3.84	1.34	0.50	0.71	6.38		
Amp1427	2.4	56.0	96	99	100	3.73	1.40	0.40	0.61	6.14		
KYFA1015	3.0	55.5	100	100	100	3.62	1.13	0.40	0.71	5.86		
KYFA9819	3.0	55.5	98	99	99	3.56	1.13	0.38	0.62	5.69		
XLFFL	4.9	59.5	100	89	0	2.41	1.03	0.08	0.00	3.51		
Mean	3.5	57.5	99	92	79	3.16	1.32	0.49	0.64	5.61		
CV,%	13.6	2.3	2	10	8	11.30	19.06	20.96	21.31	9.57		
LSD,0.05	0.7	1.9	2	12	9	0.51	0.36	0.14	0.19	0.76		

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

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

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

Table 12. Performance of festulolium varieties at Lexington, Kentucky.

Variety	Type ²	Proprietor/KY Distributor	2010 ¹			2011			2012		
			2011 ³	2012	2013	2012	2013	2013	2012	2013	2013
Commercial Varieties—Available for Farm Use											
Agula	MF x IR	Allied Seed	x ⁴	x	x						
Barfest	MF x PR	Barenbrug USA	x	*	x	x	x	x	x	x	
Duo	MF x PR	Ampac Seed	x	*	x	x	x	x	x	x	
Felina	(TF x IR) x TF	DLF International	x	*	*	x	*	*			
Gain	MF x IR	Allied Seed	x	x	x	x	x	x	x	x	
Fojtan	(TF x IR) x TF	DLF International	x	x	*	x	x	x	x	x	
Hostyn	MF x IR	DLF International									*
Hykor	(TF x IR) x TF	DLF International	x	*	*	x	*	*			
Lofa	(TF x Int) x Int	DLF International	x	x	x	*	*	x	x	x	
Mahulena	(TF x IR) x TF	DLF International								x	
Meadow Green	—	Pure Seed								x	
Perseus	MF x IR	DLF International	*	*	x	*	x	*	x	*	
Perun	MF x IR	DLF International	*	x	x	*	x	*	x	*	
Spring Green	MF x PR	Turf Seed	x	x	x	*	x	x	x	x	
Bonus	MF x IR	Allied Seed	x	x	x	x	x	x	x	x	
Sweet Tart	MF x IR	ProSeeds Marketing	x	x	x	x	x	x	x	x	
Experimental Varieties											
Amp1427	—	Ampac Seed								x	
KYFA1015	MF x IR	KY Agric. Exp. Station					x	x	x	x	
KYFA1016	MF x IR	KY Agric. Exp. Station					x	x	x	x	
KYFA9819EF	MF x IR	KY Agric. Exp. Station	x	x	x	x	x	x	x	x	
KYFA9819E1	MF x IR	KY Agric. Exp. Station	x	*	x						
KYFA9819E2	MF x IR	KY Agric. Exp. Station	x	*	x						
KYFA9819E3	MF x IR	KY Agric. Exp. Station	x	x	x						
XLF FL	—	ProSeeds Marketing						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 13. Performance of annual ryegrass varieties sown in 2012 at Lexington, Kentucky.¹

Variety	Type	Proprietor/KY Distributor	Lexington		
			2012 ²	2012	2013 ³
			2013 ³	2013	
Commercial Varieties—Available for Farm Use					
AE110	Westerwold tetraploid	Pickseed USA, Inc	x ⁴		
Barmultra II	Italian tetraploid	Barenbrug		*	
Big Boss	Westerwold tetraploid	Smith Seed Services		x	
Bruiser	Westerwold diploid	Ampac Seed	x		
Feast II	Italian tetraploid	Ampac Seed	x	x	
Fria	Westerwold diploid	Allied Seed	x		
Gulf	Westerwold diploid	Public	x		
Hercules	Westerwold diploid	Barenbrug		x	
Jackson	Westerwold diploid	The Wax Company	x	x	
LHT-102	Intermediate	Ampac Seed	x		
Marshall	Westerwold diploid	The Wax Company	x	*	
MX 108(Max)	Westerwold tetraploid	Pickseed USA, Inc	*		
Nelson	Westerwold tetraploid	The Wax Company		*	
TAMTBO	Italian tetraploid	Texas Ag Exp Sta	x		
TillageRootMax	Westerwold diploid	Cover Crop Solutions	x		
TillageMax-Bristol	Westerwold diploid	Cover Crop Solutions	x		
TillageMax-INDY	Westerwold diploid	Cover Crop Solutions	x		
Winterhawk	Westerwold diploid	Oregro Seeds	x		
Experimental Varieties					
Amp	Westerwold tetraploid	Columbia Seeds	x		
IS-LWT 12	Westerwold tetraploid	DLF International	x		
IS-LWT 13	Westerwold tetraploid	DLF International	x		
IS-LWT 14	Westerwold tetraploid	DLF International	x		
Lh 4x-1PS	Intermediate tetraploid	Pickseed USA, Inc	*		
ME4	Westerwold diploid	The Wax Company		*	
ME-94	Westerwold diploid	The Wax Company		x	
M2CVS	—	The Wax Company		x	
PPG-LMT-103	Italian tetraploid	Mountain View Seeds	*		
PPG-LWD-101	Westerwold diploid	Mountain View Seeds	x		
PS-Lm-09-2	Westerwold tetraploid	Pickseed USA, Inc	*		

¹ See Table 15 for summary of yield data on named varieties from 2000-2013.² 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. Open boxes indicate the variety was not in the test.

*Not significantly different from the highest yielding variety in the test.

Table 14. Performance of perennial ryegrass across years.

Variety	Type	Proprietor/KY Distributor	Lexington		
			2011 ¹	2012	2013
			2012 ²	2013	
Commercial Varieties—Available for Farm Use					
BG34	diploid	Barenbrug USA			x ³
Boost	tetraploid	Allied Seed	*	*	x
Calibra	tetraploid	DLF International	x	*	x
Crave	tetraploid	Ampac Seed Company			x
Elena DS	tetraploid	Allied Seed			x
Granddaddy	tetraploid	Smith Seed Services	x	x	x
Impressario	tetraploid	DLF International			x
Kentaur	tetraploid	DLF International	*	*	
LHT-102	tetraploid	Ampac Seed Company			*
Linn	diploid	Public	x	x	x
Power	tetraploid	Ampac Seed Company	*	*	x
TetraGain	tetraploid	Pure Seed			x
Verseka	tetraploid	Allied Seed			x
Experimental Varieties					
IS-FLPD6	diploid	DLF International			x
IS-FLPT5	tetraploid	DLF International			x
IS-FLPT6	tetraploid	DLF International			x
PPG-FPRD 104	diploid	Mountain View Seeds			x
PPG-FPRT 105	tetraploid	Mountain View Seeds			x
PPG-LHT 104	tetraploid	Mountain View Seeds			*
XLFTETPRG	tetraploid	ProSeeds Marketing	*	*	

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 15. Summary of Kentucky annual ryegrass yield trials 2000-2013 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Type	Proprietor	Lexington ¹												Princeton			Mean⁴ (# trials)	
			0323	04	05	06	07	08	09	10	11	12	13	00	02	04	00	03	
Abundant	tetraploid	Ampac Seed				26													-
Acrobat	-	Proseeds Marketing					244												-
AE110	Westerwold tetraploid	Pickseed USA, Inc.								95	107								101(2)
Andy	Westerwold tetraploid	DLF International																	-
Angus I	Westerwold tetraploid	DLF International																	-
Attain	Westerwold tetraploid	Smith Seed Services							113										-
Aurelia	Italian tetraploid	Forage Genetics										130							-
Avance	Westerwold diploid	DLF International									109								-
Barextra	Italian tetraploid	Barenbrug USA																	-
Barmultira II	Italian	Barenbrug USA							136										126(2)
Big Boss	Westerwold tetraploid	Smith Seed Services							99										98(2)
Big Daddy	Westerwold tetraploid	FFR/Sou. St.							88	102	87								93(6)
Brangus	Italian diploid	KB SeedSolutions							96										-
Bruiser	Westerwold diploid	Ampac Seed							111	104	102	110							104(5)
Common	-	Public																	88(4)
DH-3	Italian tetraploid	Allied Seed							106	45			95						82(3)
Diamond T	Italian tetraploid	Oregro Seeds							18										-
Domino	Italian tetraploid	DLF International																	-
Ed	Westerwold diploid	Smith Seed Services							98										-
Fantastic	Westerwold diploid	Ampac Seed																	-
Feast II	Italian tetraploid	Ampac Seed																	95(3)
Flying A	Westerwold diploid	Oregro Seeds							85	100									96(7)
Fox	Italian diploid	DLF International									110								-
Fria	Westerwold diploid	Allied Seed									97								95(3)
GR-A510	Italian	Ampac Seed										115							-
Graze-N-Gro	Westerwold diploid	Seed Research of OR							78										93(3)
Gulf	Westerwold diploid	Public							78	44	86	79	81	77	81	77	57	86	75(10)
Hercules	Westerwold tetraploid	Barenbrug USA																	107(2)
HS-1	Italian diploid	KB SeedSolutions								73									-
Jackson	Westerwold diploid	The Wax Co.																	199(13)
Jumbo	Westerwold tetraploid	Barenbrug USA																	104(2)
KB Royal	Italian diploid	KB SeedSolutions								84									-
LHT-102	Intermediate	Ampac Seed												108					-
Marshall	Westerwold diploid	The Wax Co.																	110(16)
Maximo	Intermediate tetraploid	Pickseed USA, Inc.																	-
Monarque	Italian tetraploid	Seed Research of OR																	-
MX 108	Westerwold tetraploid	Pickseed USA, Inc.																	117(2)
Nelson	Westerwold tetraploid	The Wax Co.																	96(3)
Passerel Plus	Westerwold diploid	Pennington Seed																	-
Primecut	Westerwold brand	Oregro Seeds																	-
Rio	Westerwold diploid	-																	100(3)
Spark	diploid	DLF International																	-
Stockaid	Westerwold tetraploid	Seed Research of OR																	-
Striker	Westerwold tetraploid	181																	-
		104																	-

continued

Table 15. (continued)

Variety	Type	Proprietor	Lexington ¹										Princeton	Bowling Green	Mean ⁴ (# trials)
			032 ³	04	05	06	07	08	09	10	11	12			
TAMBO	Italian tetraploid	Tex. Ag Exp Sta.						80	103	115	102				100(4)
Tam 90	Italian diploid	Tex. Ag Exp Sta.						82					85		84(2)
TetraPro	Italian tetraploid	Tex. Ag Exp Sta.						67					122		—
Tetrelite II	Intermediate	DLF International													92(2)
TillageRootMax	Westerwold diploid	Cover Crop Solutions													97(2)
TillageMax-Bristol	Westerwold diploid	Cover Crop Solutions													96(2)
TillageMax-INDY	Westerwold diploid	Cover Crop Solutions													—
T-Rex	Westerwold tetraploid	SaddleButte	25												—
Verdure	Westerwold tetraploid	Smith Seed Services													—
Winterhawk	Westerwold diploid	Oregro Seeds													109(3)
Winter Star	Italian tetraploid	Ampac Seed													—
Zorro	Italian tetraploid	DLF International													128(3)

¹ In annual ryegrass, low yielding varieties usually result from winterkill. Note: Due to severe winterkill, yield results from the 2006 planting 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 2003 was harvested one year, so the final report would be "2004 Annual and Perennial Ryegrass Report" archived in the KY Forage Web site at www.uky.edu/AgrForage.

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

Table 16. Summary of Kentucky festulolium yield trials 1999-2013 (yield shown as a percentage of the mean of the commercial varieties in the trial).¹

Variety	Type ²	Proprietor	Lexington										Princeton	Bowling Green	Mean ⁵ (# trials)
			1999 ^{3,4}	2001	2003	2005	2007	2008	2009	2010	2011	2000			
Aquila	MF x IR	Allied Seed													—
Barfest	MF x PR	Barenbrug USA													102(2)
Bonus	MF x IR	Allied Seed													75(2)
Duo	MF x PR	Ampac Seed	104												98(6)
Felina	(TF x IR) x TF	DLF International	101												119(2)
Fojtan	(TF x IR) x TF	DLF International													104(2)
Gain	MF x IR	Allied Seed													96(2)
Hykor	(TF x IR) x TF	DLF International													98(6)
Lofa	(TF x Int) x Int	DLF International													115(2)
Perseus	MF x IR	DLF International													128(2)
Perun	MF x IR	DLF International													120(2)
Spring Green	MF x PR	Turf-Seed	88												103(8)
Sweet Tart	MF x IR	ProSeeds Marketing													80(3)
Vorage	—	Improved Forages													—

¹ The festuloliums were in fescue trials from 1999-2005.

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 1999 was harvested two years, so the final report would be "2001 Tall Fescue Report" archived in the KY Forage Web site at www.uky.edu/AgrForage.

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

⁶ Number of years of data

Table 17. Summary of Kentucky perennial ryegrass yield trials 1999-2013 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Type	Proprietor	Lexington						Princeton						Bowling Green	
			01 2yr ⁵	03 2yr	04 3yr	05 2yr	06 3yr	07 3yr	08 2yr	09 3yr	10 2yr	11 2yr	02 3yr	00 2yr	03 2yr	Mean ^{3,4} (#trials)
Aires	diploid	Ampac Seed	95													94(2)
Amazon	tetraploid	AgriBioTech	108													104(3)
Anaconda	tetraploid	Caudill Seed	113													103
Aubisque	tetraploid	Seed Research of OR		144												99
Bandit	tetraploid	Grassland West														110(2)
Bastion C-2	tetraploid	Seed Research of OR			91											–
Bestfor	tetraploid	Improved Forages														113(3)
Best for Plus	hybrid tetraploid	Improved Forages	116	108	118											136
BG-34	diploid	Barenbrug USA			83	85					86					85(3)
Bison	hybrid tetraploid	International Seeds														140
Boost	tetraploid	Allied Seed														–
Boxer	tetraploid	AgriBioTech	121													126(5)
Calibra	tetraploid	DLF International														114(2)
CAS MP64	diploid	Cascade International	97													99(5)
Citadel	tetraploid	Ag Canada	101													–
Derby	–	Public														103(4)
Eurostar	tetraploid	Seed Research of OR														–
Feeder	diploid	Seed Research of OR														–
Granddaddy	tetraploid	Smith Seed	118													99(7)
Green Gold	tetraploid	Grasslands Oregon														–
Herbal	–	ProSeeds Marketing														–
Impressario	tetraploid	DLF International														–
Kentaur	tetraploid	DLF International														–
Lactal	tetraploid	Brett Young														–
Lasso	diploid	DLF International	98	98	102											–
Linn	diploid	Public	87	98												91(13)
Manhattan	diploid	–														–
Mara	diploid	Barenbrug USA														–
Matrix	diploid	Cropmark Seeds	77													64
Maverick Gold	hybrid tetraploid	Ampac Seed	97													84(2)
Orantas	diploid	DLF International														–
Ortet	tetraploid	Oregro Seeds														–
Polly II	tetraploid	FFR/Sou. St.	104													113(3)
Polly Plus	hybrid tetraploid	Allied Seed	64													62(2)
Power	tetraploid	Ampac Seed														104(5)

continued

Table 17. (continued)

Variety	Type	Proprietor	Lexington						Princeton						Bowling Green		
			99 ^{1,2}	01	03	04	05	06	07	08	09	10	11	00	02	00	03
			2yr ⁵	2yr	2yr	3yr	2yr	3yr	2yr	2yr	3yr	2yr	2yr	3yr	2yr	2yr	Mean ^{3,4} (#trial/s)
Polim	tetraploid	DLF International															—
Quartermaster	tetraploid	Radix Research					122										—
Quartet	tetraploid	Ampac Seed	97				56										78(4)
RAD-CPS212	hybrid tetraploid	Radix Research				134											—
RAD-MI125	hybrid tetraploid	Mountain View Seeds				120											—
Sampson	diploid	International Seeds	87														—
Sierra	diploid	Lewis Seed Co.					89										—
Tonga	tetraploid	Kings AgriSeeds					96					103					100(2)
Yatsyn	diploid	Barenbrug USA	80										89				85(2)

¹ Year trial was established.² Use this summary table as a guide in making variety decisions, but refer to specific yearly reports to determine statistical differences in forage yield between varieties. To find actual yields, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in 1999 was harvested two years, so the final report would be "2001 Annual and Perennial Ryegrass Report" archived in the KY Forage Web site at www.uky.edu/AgricForage.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



Mention or display of a trademark, proprietary product, or firm in text or figures does not constitute an endorsement and does not imply approval to the exclusion of other suitable products or firms.