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2010 Annual and Perennial Ryegrass and Festulolium Report

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Introduction

Annual ryegrass (*Lolium multiflorum*) and perennial ryegrass (*Lolium perenne*) are high-quality, productive cool-season grasses used in Kentucky. Both have exceptionally high seedling vigor and are highly palatable to livestock.

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. There is also increased interest in this crop for high quality baleage. There are two main types of annual ryegrasses. 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, there will be no or few seed heads 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.

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. There are both diploid (two sets of chromosomes) and tetraploid (four sets of chromosomes) varieties of perennial ryegrass. 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

Table 1. Temperature and rainfall at Lexington, Kentucky in 2007, 2008, 2009, and 2010.

	2007				2008				2009				2010[2]			
	Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall		Temperature		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	37	+6	2.93	+0.07	32	+2	3.91	+1.05	28	-3	2.45	-0.41	29	-2	2.40	-0.46
FEB	27	-8	1.83	-1.38	36	+1	6.11	+2.90	38	+3	2.86	-0.35	29	-6	1.38	-1.83
MAR	52	+8	1.97	-2.43	44	+1	6.51	+1.91	48	+4	2.19	-2.21	47	+3	1.05	-3.35
APR	53	-2	3.87	-0.01	55	0	5.89	+2.01	55	0	4.48	+0.60	59	+4	2.74	-1.14
MAY	68	+4	1.45	-3.02	62	-2	4.33	+0.14	64	0	5.05	+0.58	67	+3	7.84	+3.37
JUN	74	+2	1.77	-1.89	74	+2	3.59	-0.07	74	+2	5.41	-1.75	76	+4	4.61	+0.95
JUL	74	-2	6.90	+1.90	76	0	3.41	-1.59	71	-5	5.89	+0.89	78	+2	5.49	+0.49
AUG	80	+5	2.56	-1.37	75	0	2.18	-1.75	73	-2	5.38	+1.45	78	+3	1.54	-2.39
SEP	72	+4	1.15	-2.05	72	+4	1.42	-1.78	68	0	5.37	+2.17	71	+3	1.14	-2.06
OCT	63	+6	5.28	+2.71	57	0	1.53	-1.04	54	-3	4.83	+2.26	59	+2	1.22	-1.35
NOV	46	+1	2.86	--0.53	43	-2	2.53	-0.86	49	+4	0.94	-2.45				
DEC	40	+4	5.29	+1.31	35	-1	6.03	+2.05	36	0	3.86	-0.12				
Total			37.86	-6.69			47.24	+2.69			48.71	+4.16			29.41	-7.77

[1] DEP is departure from the long-term average.
[2] 2010 data is for 10 months through October.

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 12, 13, and 14 show summaries of all annual and perennial ryegrass and festulolium varieties tested in Kentucky for the last 10-plus years. The UK Forage Extension web site 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 a listing 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.

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)*	Applicable to primary growth of seedlings or to single-tiller transplants.
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	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	Inflorescence-bearing internode is visible. No anthers are visible.
60	Preanthesis	
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. pp. 416-418. 14th International Grasslands Conference Proc. 1981. June 14-24, 1981, Lexington, Kentucky.

Description of the Tests

Data from six studies are reported. Annual ryegrass tests were established in the fall of 2007, 2008 and 2009 at Lexington. Perennial ryegrass (with festulolium) tests were established at Lexington in the fall of 2007, 2008 and 2009. 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 lb/A into a prepared seedbed with a disk drill. Plots were 5 by 20 feet in a randomized complete block design with four replications with a harvested plot area of 5 by 15 feet. Nitrogen was topdressed at 60 lb/A of actual N in March, May, and

Table 3. Dry matter yields, seedling vigor, maturity, and stand persistence of annual ryegrass varieties sown September 6, 2007 at Lexington, Kentucky.

Variety	Seedling Vigor[1]	Maturity[2]			Percent Stand		Yield (tons/acre)					
		2008			2007	2008	2007	2008				
	Oct 25, 2007	Apr 23	May 17	Jun 11	Oct 25	Mar 27	Dec 18	Apr 23	May 17	Jun 11	Jul 1	Total
Commercial Varieties—Available for Farm Use												
Jackson	4.3	32.8	45.0	62.0	100	98	0.61	1.58	0.74	0.68	0.13	3.74*
Marshall	3.5	33.0	46.3	61.5	100	100	0.39	1.56	0.81	0.75	0.13	3.63*
DH-3	3.3	32.8	52.0	61.5	100	95	0.55	1.17	0.77	0.68	0.13	3.30
Striker	4.3	32.3	52.5	61.0	98	89	0.54	1.03	0.83	0.70	0.16	3.26
Fantastic	2.3	33.3	46.8	62.0	97	99	0.30	1.47	0.68	0.53	0.07	3.06
Gulf	4.0	31.5	58.0	61.5	100	66	0.63	0.55	0.62	0.54	0.10	2.45
Graze-N-Gro	3.5	31.8	54.5	61.0	99	63	0.53	0.54	0.70	0.51	0.15	2.43
Experimental Varieties												
LM5005B	2.8	31.0	48.8	60.0	96	75	0.28	0.75	0.89	0.79	0.24	2.94
Mean	3.5	32.3	50.5	61.3	98.6	85.5	0.48	1.08	0.75	0.65	0.14	3.10
CV,%	31.6	2.1	4.7	1.4	2.6	12.4	31.0	15.1	10.5	8.4	30.2	8.2
LSD, 0.05	1.6	1.0	3.5	1.3	3.8	15.5	0.22	0.24	0.12	0.08	0.06	0.37

[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.

August. 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.

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 8. Yields are given by cutting date for 2010 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.

The perennial ryegrass tests contained several festuloliums that are hybrids of meadow fescue and perennial ryegrass and have some of the characteristics of both. The festuloliums were in fescue trials from 1999-2005.

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 9, 10, and 11 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 9, 10, and 11, 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 8).

Tables 12, 13, and 14 are summaries of yield data from 1999 to 2010 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 12, 13, and 14, 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 very stable performance; others may have performed very well in wet years or on particular soil types. These details may

Table 4. Dry matter yields, seedling vigor, maturity, and stand persistence of annual ryegrass varieties sown September 11, 2008 at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 21, 2008	Maturity[2] 2009		Percent Stand 2008	Percent Stand 2009	Yield (tons/acre) 2008	Yield (tons/acre) 2009				
		May 10	Jun 5	Oct 21	Apr 6	Dec 22	May 10	Jun 5	Jun 29	Aug 7	Total
Commercial Varieties—Available for Farm Use											
Acrobat	3.0	49.8	53.0	100	98	0.06	1.96	1.02	1.02	0.88	4.94*
Marshall	4.3	54.0	55.0	98	99	0.21	2.01	0.96	0.15	0.09	3.42
Bruiser	4.8	54.7	54.7	98	73	0.25	1.25	0.58	0.12	0.05	2.24
Jackson	4.3	54.7	55.3	98	74	0.14	1.33	0.44	0.07	0.05	2.02
Flying A	4.1	54.0	59.0	98	49	0.19	1.03	0.61	0.13	0.06	2.02
Tam 90	3.3	54.5	56.5	100	49	0.07	1.05	0.32	0.06	0.15	1.66
TAMTBO	3.5	54.0	57.0	97	21	0.20	0.85	0.39	0.12	0.05	1.61
TetraPro	4.0	56.0	56.0	97	14	0.14	0.61	0.34	0.09	0.19	1.36
Feast II	3.5	45.0	56.0	99	2	0.04	0.24	0.20	0.20	0.51	1.19
DH-3	4.3	55.5	60.7	100	13	0.14	0.47	0.26	0.01	0.04	0.92
Gulf	3.8	56.0	60.0	100	9	0.25	0.29	0.19	0.01	0.14	0.89
Experimental Varieties											
IS-LMT 6	3.3	47.5	52.8	97	87	0.13	2.02	1.12	1.11	0.86	5.24*
IS-LMT 5	3.6	45.0	55.0	98	95	0.07	2.14	0.84	0.90	0.74	4.68*
IS-LMD 7	3.5	45.0	51.5	100	100	0.07	1.84	0.75	0.68	0.88	4.23*
FL/NE2006 (misc2X)LRLT	2.8	52.5	54.0	98	98	0.11	2.14	0.78	0.15	0.09	3.27
ME 4	3.5	53.0	55.5	99	100	0.13	1.69	0.91	0.13	0.10	2.97
PSG 29 BF06	2.5	45.0	52.0	96	61	0.05	1.26	0.46	0.59	0.45	2.81
ME 94	3.0	52.5	55.5	98	98	0.05	1.77	0.84	0.11	0.04	2.81
07-WW	4.0	54.0	55.0	99	85	0.12	1.67	0.55	0.18	0.14	2.66
AM-4N-06	4.0	55.3	57.3	96	5	0.17	0.39	0.27	0.09	0.15	1.07
TXR 2006-T22	3.0	50.3	60.0	96	1	0.07	0.19	0.30	0.05	0.04	0.64
Mean	3.6	51.7	55.5	98.1	58.4	0.13	1.25	0.58	0.28	0.27	2.51
CV,%	21.1	3.5	3.9	2.7	35.7	94.59	36.58	42.24	50.31	65.82	30.49
LSD, 0.05	1.1	2.8	3.5	3.7	29.5	0.17	0.64	0.35	0.20	0.25	1.08

[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.

Table 5. Dry matter yields, seedling vigor, maturity and stand persistence of annual ryegrass varieties sown September 30, 2009 at Lexington, Kentucky.

Variety	Seedling Vigor[1] Oct 30, 2009	Maturity[2] 2010		Percent Stand 2010			Yield (tons/acre) 2010				
		Apr 20	May 24	Oct 30	Apr 13	Jul 20	Apr 20	May 24	Jun 22	Jul 20	Total
Commercial Varieties—Available for Farm Use											
Feast II	3.5	33.0	54.0	95	100	97	1.58	1.76	1.13	0.22	4.69*
Bruiser	4.8	36.5	54.5	100	100	2	2.07	1.54	0.74	0.00	4.35*
Jackson	4.0	36.0	55.5	99	100	2	1.89	1.58	0.71	0.00	4.18
Marshall	4.8	34.3	55.5	100	100	2	1.89	1.55	0.72	0.00	4.15
Gulf	5.0	39.3	56.5	100	100	0	1.85	1.41	0.38	0.00	3.63
Experimental Varieties											
ME4	3.8	33.3	54.0	96	100	4	1.72	1.67	0.83	0.00	4.21
ME-94	4.8	33.5	55.0	99	100	4	1.83	1.57	0.73	0.00	4.14
FLx2003(New3)LRCT	4.4	33.3	56.0	100	100	3	1.79	1.61	0.70	0.00	4.10
Mean	4.4	34.9	55.1	98.6	100.0	14.3	1.83	1.58	0.74	0.03	4.18
CV,%	11.9	10.9	2.2	1.6	0.0	18.6	9.55	9.70	15.95	33.96	7.04
LSD, 0.05	0.8	5.6	1.7	2.4	0.0	3.9	0.26	0.23	0.17	0.02	0.43

[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.

influence variety choice and the information can be found in the yearly reports. See footnotes in Tables 12, 13, and 14 to determine which yearly report to refer to.

Summary

Selecting a good variety of annual or perennial ryegrass 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.

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

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Table 6. Dry matter yields, seedling vigor, maturity, and stand persistence of perennial ryegrass and festulolium (FL) varieties sown September 6, 2007 at Lexington, Kentucky.

		Maturity[2]			Percent Stand						Yield (tons/acre)				
	Seedling Vigor[1]	2008	2009	2010	2007	2008	2009		2010		2008	2009	2010		3-year
Variety	Oct 25, 2007	May 13	May 21	May 24	Oct 25	Mar 26	Oct 21	Apr 7	Oct 30	Apr 13	Nov 10	Total	Total	May 24	Jul 29	Total[3]	Total
Commercial Varieties—Available for Farm Use																	
SpringGreen (FL)	2.8	51.0	55.0	60.5	98	100	97	40	59	64	34	4.85	3.09	2.36	0.35	2.71	10.66*
Boost	3.3	50.3	54.5	60.5	98	99	97	43	59	81	25	4.50	3.24	2.55	0.18	2.72	10.46*
Eurostar	1.8	37.8	50.3	56.5	97	99	98	58	84	81	18	3.90	3.12	1.84	0.15	1.99	9.01
Power	1.8	46.3	52.5	58.0	98	100	98	45	71	75	25	4.10	2.65	1.95	0.16	2.11	8.87
Granddaddy	2.3	51.5	56.0	59.5	98	100	99	50	88	90	11	3.60	2.96	2.08	0.15	2.23	8.79
Linn	3.0	56.0	57.0	61.0	100	100	100	26	51	60	17	3.18	1.83	1.64	0.22	1.86	6.88
Feeder	1.8	36.3	32.0	52.0	100	100	97	28	46	68	6	3.17	1.50	1.34	0.13	1.47	6.14
Quartet	4.3	32.8	–	56.7	100	73	80	0	2	5	1	2.43	0.28	0.77	0.23	1.00	3.71
Experimental Varieties																	
KYFA 9819 (FL)	1.8	49.8	54.0	61.0	93	99	97	26	31	51	14	4.76	2.46	2.26	0.14	2.41	9.62*
KYFA 0236 (FL)	3.0	46.3	45.0	55.5	99	100	100	1	10	24	4	4.83	1.77	1.99	0.40	2.39	8.99
LP2006DA	4.0	43.3	–	58.7	100	31	56	0	3	6	3	2.60	0.40	0.95	0.21	1.16	4.17
Mean	2.7	45.5	51.6	58.2	98.3	90.7	92.5	28.8	45.9	54.8	14.3	3.81	2.12	1.79	0.21	2.01	7.94
CV,%	26.0	9.4	3.3	4.1	1.9	16.4	10.6	57.4	41.3	30.3	73.3	9.36	24.58	20.06	61.17	20.55	11.96
LSD, 0.05	1.0	6.2	2.7	3.6	2.8	21.5	14.2	23.9	27.4	24.0	15.1	0.52	0.75	0.52	0.19	0.60	1.37

[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.
[3] Due to very dry weather, there was not enough growth for a late summer or fall harvest.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 7. Dry matter yields, seedling vigor, maturity, and stand persistence of perennial ryegrass, festulolium (FL), and tall fescue (TF) varieties sown September 11, 2008 at Lexington, Kentucky.

Variety	Seedling Vigor[1]	Maturity[2]		Percent Stand					Yield (tons/acre)				
		2009	2010	2008	2009		2010		2009	2010			2-year
	Oct 21, 2008	May 21	May 12	Oct 21	Apr 7	Oct 30	Apr 13	Oct 15	Total	May 14	Jun 23	Total[3]	Total
Commercial Varieties—Available for Farm Use													
SpringGreen (FL)	4.3	57.0	52.0	100	100	98	99	99	5.78	1.86	0.50	2.36	8.14*
Boost	3.5	55.5	53.5	99	100	99	100	99	5.37	2.13	0.57	2.70	8.07*
Ortet	3.9	56.0	52.5	97	100	98	98	98	5.05	1.80	0.56	2.37	7.42*
Duo (FL)	5.0	59.0	53.0	100	100	89	87	86	4.99	1.93	0.45	2.38	7.37*
Power	3.8	55.0	51.5	100	100	100	100	100	4.36	1.51	0.55	2.05	6.41
Sweet Tart (FL)	4.8	57.0	54.5	100	100	98	98	98	4.41	1.47	0.44	1.91	6.33
Calibra	3.8	52.8	50.5	100	100	100	100	100	4.07	1.50	0.48	1.98	6.04
Linn	3.5	58.5	57.5	99	100	100	100	100	3.38	1.82	0.29	2.11	5.49
Herbal	3.1	47.8	33.0	100	100	100	98	98	3.42	0.75	0.50	1.25	4.67
Experimental Varieties													
RAD-CPS211	3.8	55.5	50.0	99	100	98	98	98	5.63	1.79	0.64	2.43	8.06*
PSG 47 MOL	4.0	56.0	51.5	78	100	98	100	100	5.03	1.64	0.70	2.34	7.38*
PSG AM 108	4.0	56.0	54.5	100	100	99	100	100	4.85	1.77	0.48	2.25	7.11*
AGRFA 174 (TF)	1.8	58.0	58.0	98	99	100	100	100	4.10	2.03	0.76	2.79	6.89
WFLS (FL)	5.0	57.0	55.0	100	73	26	54	39	3.97	1.47	0.46	1.93	5.90
KFA 605 (TF)	1.8	57.0	56.0	98	99	100	99	100	3.69	1.47	0.63	2.11	5.80
Mean	3.7	55.9	52.2	97.7	98.0	93.4	95.2	94.3	4.54	1.66	0.53	2.20	6.74
CV,%	12.8	4.5	2.0	12.1	7.2	3.9	5.5	11.6	12.71	14.13	19.27	13.73	10.81
LSD, 0.05	0.7	3.6	1.5	16.8	10.1	5.2	7.5	15.6	0.82	0.34	0.15	0.43	1.04

[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.
[3] Due to very dry weather, there was not enough growth for a late summer or fall harvest.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 8. Dry matter yields, seedling vigor, maturity and stand persistence of perennial ryegrass and festulolium (FL) varieties sown September 11, 2009 at Lexington, Kentucky.

Variety	Seedling Vigor[1]	Maturity[2]	Percent Stand			Yield (tons/acre)		
		2010	2009	2010		2010		
	Oct 13, 2009	May 5	Oct 13	Apr 13	Oct 18	May 5	Jun 10	Total[3]
Commercial Varieties—Available for Farm Use								
Duo (FL)	4.5	58.0	100	100	94	2.45	1.08	3.54*
SpringGreen (FL)	3.4	54.5	99	100	99	2.24	0.90	3.14*
Boost	3.1	49.0	99	100	100	2.15	0.82	2.96
Tonga	3.5	55.0	99	100	100	2.06	0.55	2.62
Linn	2.8	56.0	99	100	99	2.24	0.37	2.60
Impressario	2.5	50.5	97	100	100	1.92	0.63	2.54
Granddaddy	2.8	53.5	100	100	100	1.58	0.79	2.37
Calibra	3.1	39.0	100	100	100	1.60	0.73	2.34
Power	3.3	46.5	100	100	100	1.60	0.71	2.31
Lactal	2.6	42.0	100	100	99	1.42	0.78	2.21
Orantas	2.6	39.0	100	100	100	1.38	0.59	1.97
Experimental Varieties								
RAD-ERP214	2.3	55.0	98	100	100	1.95	0.48	2.43
Mean	3.0	49.8	99.1	100.0	99.1	1.88	0.70	2.59
CV,%	20.2	5.6	1.8	0.0	1.0	12.73	15.55	11.20
LSD,0.05	0.9	4.0	2.6	0.0	1.4	0.34	0.16	0.42

[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.
[3] Due to very dry weather there was not enough growth for a late summer or fall harvest.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.

Table 9. Performance of annual ryegrass varieties sown in 2009 at Lexington.[1]			
			Lexington
			2009[2]
Variety	Type	Proprietor/KY Distributor	2010[3]
Commercial Varieties—Available for Farm Use			
Bruiser	Westerwold diploid	Ampac Seed	*
Feast II	Italian tetraploid	Ampac Seed	*
Gulf	Westerwold diploid	Public	x[4]
Jackson	Westerwold diploid	The Wax Company	x
Marshall	Westerwold diploid	The Wax Company	x
Experimental Varieties			
FLx2003(New3)LCRT		Allied Seed	x
ME4	Westerwold diploid	The Wax Company	x
ME-94	Westerwold diploid	The Wax Company	x

[1] See Table 12 for yield data on named varieties from 1999-2010.
[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 10. Performance of perennial ryegrass across years.								
			Lexington					
			2007[1]			2008		2009
Variety	Type	Proprietor/KY Distributor	2008[2]	2009	2010	2009	2010	2010
Commercial Varieties—Available for Farm Use								
Boost	tetraploid	Allied Seed	*	*	*	*	*	*
Calibra	tetraploid	DLF International				x[3]	x	x
Eurostar	tetraploid	Seed Research of Oregon	x	*	x			
Feeder	diploid	Seed Research of Oregon	x	x	x			
Granddaddy	tetraploid	Smith Seed Services	x	*	*			x
Herbal		ProSeeds Marketing				x	x	
Impressario	tetraploid	DLF International						*
Lactal	tetraploid	Brett Young						x
Linn	diploid	Public	x	x	x	x	*	*
Orantas	diploid	DLF International						x
Ortet	tetraploid	Oregro Seeds, Inc.				*	*	
Power	tetraploid	Ampac Seed Company	x	*	*	x	*	x
Quartet	tetraploid	Ampac Seed Company	x	x	x			
Tonga	tetraploid	Kings AgriSeeds						*
Experimental Varieties								
LP2006DA	tetraploid	Cropmark Seeds	x	x	x			
PSG AM 108	tetraploid	Pickseed West				x	*	
PSG 47 MOL	tetraploid	Pickseed West				*	*	
RAD-CPS211	tetraploid	Radix Research				*	*	
RAD-ERF214	diploid	Radix Research						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 11. Performance of festulolium varieties at Lexington.

Variety	Proprietor/KY Distributor	Lexington					
		2007[1]			2008		2009
		2008[2]	2009	2010	2009	2010	2010
Commercial Varieties—Available for Farm Use							
Duo	Ampac Seed				*	*	*
SpringGreen	Turf Seed	*	*	*	*	*	*
Sweet Tart	ProSeeds Marketing				x[3]	x	
Experimental Varieties							
KYFA 0236	KY. Agric. Exper. Sta.	*	*	*			
KYFA 9819	KY. Agric. Exper. Sta.	*	x	*			
WFLS	Rose AgriSeed				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 12. Summary of Kentucky Annual Ryegrass Yield Trials 1999-2010 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Type	Proprietor	Lexington[1]									Princeton			Bowling Green		Mean[4] (#trials)
			99[2,3]	01	03	04	05	06	07	08	09	00	02	04	00	03	
			All trials are 1 year yields														
Abundant	tetraploid	Ampac Seed						26									–
Acrobat		Proseeds Marketing								244							–
Andy	Westerwold tetraploid	DLF International	112	105								99					105(3)
Angus I	Westerwold tetraploid	DLF International												80			–
Aurelia	Italian tetraploid	Forage Genetics		120										130			125(2)
Avance	Westerwold diploid	DLF International	113									109					111(2)
Barextra	Italian tetraploid	Barenbrug											117				–
Big Daddy	Westerwold tetraploid	FFR/Sou. St.	87	86								90	85		104		90(5)
Bruiser	Westerwold diploid	Ampac Seed								111	104						108(2)
Common		Public										85	85		95	87	88(4)
DH-3	Italian tetraploid	Allied Seed							106	45							76(2)
Diamond T	Italian tetraploid	Oregro Seeds						18									–
Domino	Italian tetraploid	DLF International											121				–
Fantastic	Westerwold diploid	Ampac Seed	83					105	98			90			97		92(4)
Feast	Italian tetraploid	Ampac Seed		90													–
Feast II	Italian tetraploid	Ampac Seed		98						59	112		123				98(4)
Flying A	Westerwold diploid	Oregro Seeds						85		100							–
Graze-N-Gro	Westerwold diploid	Seed Research of OR			105				78					94		107	96(4)
Gulf	Westerwold diploid	Public		72					78	44	86	81	77	57	86		73(8)
Hercules	Westerwold tetraploid	Barenbrug	114									110					112(2)
Jackson	Westerwold diploid	The Wax Co.				80	100	138	120	100	100		87			96	98(7)
Jeanne	Italian tetraploid	DLF International		124													–
Jumbo	Westerwold tetraploid	Barenbrug			103											104	104(2)
King	Westerwold diploid	Lewis Seed		92													–
Marshall	Westerwold diploid	The Wax Co.	87		92	120	100	221	116	169	99	102	97		114	106	109(11)
Monarque	Italian tetraploid	Seed Research of OR												117			–
Passerel Plus	Westerwold diploid	Pennington Seed											100				–
Rio	Westerwold diploid		88									100	97		102		97(4)
Spark	tetraploid	DLF International	87												83		85(2)
Stockaid	diploid							181									–
Striker	Westerwold tetraploid	Seed Research of OR							104								–
TAMTBO	Italian tetraploid	Tex. Ag Exp Sta.								80							–
Tam 90	Italian diploid	Tex. Ag Exp Sta.								82			85				84(2)
TetraPro	Italian tetraploid	Tex. Ag Exp Sta.								67							–
Tetrelite II	Intermediate	DLF International												122			–
T-Rex	Westerwold tetraploid	SaddleButte						25									–
Winter Star	Italian tetraploid	Ampac Seed		87									96				92(2)
Zorro	Italian tetraploid	DLF International	120	127								135	130		118		126(5)

[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 1999 was harvested 1 year, so the final report would be "2000 Annual and Perennial Ryegrass 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.

Table 13. Summary of Kentucky Perennial Ryegrass Yield Trials 1999-2010 (yield shown as a percentage of the mean of the commercial varieties in the trial).

			Lexington								Princeton		Bowling Green		
			99[1,2]	01	03	04	05	06	07	08	00	02	00	03	Mean[3,4]
Variety	Type	Proprietor	2yr[5]	2yr	2yr	3yr	3yr	2yr	3yr	2yr	2yr	3yr	2yr	2yr	(#trials)
Aires	diploid	Ampac Seed		95								93			94(2)
Amazon	tetraploid	AgriBioTech	108			99						107			104(3)
Anaconda	tetraploid	Caudill Seed	113								95		103		104(3)
Aubisque	tetraploid	Seed Research of OR			144									99	122(2)
Bandit	tetraploid	Grassland West									106		114		110(2)
Bastion C-2	tetraploid	Seed Research of OR				91									–
Bestfor	tetraploid	Improved Forages									113	107	120		113(3)
Bestfor Plus	hybrid tetraploid	Improved Forages			116	108	118							136	120(4)
BG-34	diploid	Barenbrug					83	85							84(2)
Bison	hybrid tetraploid	International Seeds												140	–
Boost	tetraploid	Allied Seed							130	127					129(2)
Boxer	tetraploid	AgriBioTech	121								106				114(2)
Calibra	tetraploid	DLF International								95		112			104(2)
CAS MP64	diploid	Cascade International		97											–
Citadel	tetraploid	Ag Canada	101								94	113	103		103(4)
Derby		Public											74		–
Eurostar	tetraploid	Seed Research of OR							112						–
Feeder	diploid	Seed Research of OR							76						–
Granddaddy	tetraploid	Smith Seed		118				101	109			111			110(4)
GreenGold	tetraploid	Grasslands Oregon						96							–
Herbal		ProSeeds Marketing								74					–
Lasso	diploid	DLF International		98											–
Linn	diploid	Public	87	98	98	102		98	85	86	87	88	77		91(10)
Manhatten	diploid											85			–
Mara	diploid	Barenbrug											85		–
Matrix	diploid	Cropmark seeds			77									64	–
Maverick Gold	hybrid tetraploid	Ampac Seed		97								71			84(2)
Ortet	tetraploid	Oregro Seeds								117					–
Polly II	tetraploid	FFR/Sou. St.	104								110		125		113(3)
Polly Plus	hybrid tetraploid	Allied Seed			64									60	62(2)
Power	tetraploid	Ampac Seed							110	101					106(2)
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							–
Sampson	diploid	International Seeds	87												–
Sierra	diploid	Lewis Seed Co.					89								–
Tonga	tetraploid	Kings AgriSeeds					96								–
Yatsyn	diploid	Barenbrug	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 2 years, so the final report would be "2001 Annual and Perennial Ryegrass 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 14. Summary of Kentucky Festulolium Yield Trials 1999-2010 (yield shown as a percentage of the mean of the commercial varieties in the trial).[1]

		Lexington						Princeton	Quicksand		
		1999[2,3]	2001	2003	2005	2007	2008	2000	2001	2003	Mean[4]
Variety	Proprietor	2-yr[5]	3-yr	2-yr	3-yr	3yr	2yr	2-yr	2-yr	2-yr	(#trials)
Duo	Ampac Seed	104			84		101				96(23)
Felina	DLF International		101								–
Hykor	DLF International			98						98	98(2)
Spring Green	Turf-Seed		88		105	100	112		97		100(5)
Sweet Tart	ProSeeds Marketing						87				–
Vorage	Improved Forages							99			–

[1] The festuloliums were in fescue trials from1999-2005.
[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 1999 was harvested 2 years, so the final report would be "2001 Tall Fescue 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] Number of years of data.

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