

2006 Annual and Perennial Ryegrass 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 there is little regrowth 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 grow throughout 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 a biennial or a short-lived perennial, 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. 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. Both forage and turf types are available, so plant only forage types for grazing, hay, or silage. All turf types are infected with a fungal endophyte.

Intermediate or hybrid ryegrass (*Lolium hybridum*, Hausska.) is the result of a cross between Italian ryegrass and perennial ryegrass. It is less winter hardy but higher yielding than perennial ryegrass and more persistent and winter hardy than Italian ryegrass. Its uses would be similar to perennial ryegrass.

This report provides current yield data on annual and perennial ryegrass varieties in trials in Kentucky as well as guidelines for selecting varieties. New for 2006, Tables 8 and 9 show summaries of all annual and perennial ryegrass varieties tested in Kentucky for the last seven years. Go to the UK Forage Extension Web site at <www.uky.edu/Ag/Forage> to obtain electronic versions of all forage variety testing reports from Kentucky and surrounding states and from 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 of perennial ryegrass. The endophyte level will be stated on a green

Table 1. Temperature and rainfall at Lexington, Kentucky, in 2003, 2004, 2005, and 2006.

	2003				2004				2005				2006			
	Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall	
	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	26	-5	0.96	-1.90	30	-1	3.14	+0.28	37	+6	4.35	+1.49	42	+11	4.77	+1.91
FEB	32	-3	3.59	+0.38	36	+1	1.32	-1.89	39	+4	1.68	-1.53	36	+1	2.13	-1.08
MAR	47	+3	2.09	-2.31	47	+3	3.43	-0.97	41	-3	2.79	-1.61	44	0	3.05	-1.35
APR	57	+2	3.14	-0.74	55	0	3.06	-0.82	56	+1	3.30	-0.58	59	+4	3.52	-0.36
MAY	63	-1	6.68	+2.21	68	+4	9.79	+5.32	61	-3	1.78	-2.69	62	-2	2.99	-1.48
JUN	69	-3	4.85	+1.19	72	0	3.13	-0.53	75	+3	1.33	-2.33	70	-2	1.82	-1.84
JUL	74	-2	2.68	-2.32	73	-3	7.65	+2.65	77	+1	3.30	-1.70	76	0	5.13	+0.13
AUG	75	0	5.26	+1.33	71	-4	2.91	-1.02	78	+3	3.34	-0.59	76	+1	3.23	-0.70
SEP	65	-3	4.22	+1.02	68	0	2.61	-0.59	72	+4	0.59	-2.21	64	-4	9.27	+6.07
OCT	56	-1	1.61	-0.96	58	+1	5.65	+3.08	58	+1	0.92	-1.65	54	-3	4.88	+2.31
NOV	50	+5	4.63	+1.24	49	+4	6.29	+2.90	47	+2	1.54	-1.85	47	+2	1.78	-1.61
DEC	36	0	3.26	-0.72	36	0	3.20	-0.78	32	-4	2.19	-1.79				
Total			42.97	-1.58			52.18	+7.63			27.51	-17.04			42.57	+2.00

DEP is departure from the long-term average.

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 four studies are reported. In the fall of 2005, an annual ryegrass test was established at Lexington. Perennial ryegrass tests were established at Lexington in the fall of 2003, 2004 and 2005. The soil at Lexington is a well-drained silt loam (Maury) and is well suited for ryegrass production.

Seedlings were made at the rate of 25 lb/A into a prepared seedbed with a disk drill. Plots were 5 by 15 feet in a randomized complete block design with four replications. Nitrogen was topdressed at 60 lb/A of actual N in March, June, and 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.

Table 2. Dry matter yields, seedling vigor, and stand rating of annual ryegrass varieties sown Sept. 16, 2005, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Nov. 7, 2005	Percent Stand Apr 14	2006 Yields (tons/acre)				Total
			Apr 14	May 12	Jun 1	Jun 21	
Commercial Varieties—Available for Farm Use							
Jackson	5.0	100	1.50	1.24	0.35	0.34	3.44*
Marshall	4.5	90	1.49	1.21	0.31	0.34	3.34*
Experimental Varieties							
WMN97	4.5	99	1.66	1.28	0.38	0.36	3.68*
ME-94	4.5	99	1.58	1.40	0.38	0.26	3.61*
ME4	3.0	95	1.63	1.30	0.36	0.30	3.59*
Mean	4.3	96.5	1.57	1.29	0.36	0.32	3.53
CV,%	11.2	6.6	7.51	13.81	37.46	32.36	12.30
LSD,0.05	0.7	9.9	0.18	0.27	0.21	0.16	0.67

*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
¹ Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

Table 3. Dry matter yields, seedling vigor, maturity, and stand persistence of perennial ryegrass varieties sown Sept. 16, 2003, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Oct 31, 2003	Maturity ²		Percent Stand			Yield(tons/acre)		
		May 13 2004	May 18 2005	2005		2006	2004 Total	2005 Total	2-yr Total
				Apr 8	Oct 18				
Commercial Varieties—Available for Farm Use									
Aubisque	4.0	52.0	46.5	26	68	65	5.32	2.53	7.86*
Remington	3.5	48.5	41.5	50	75	68	5.31	2.30	7.61*
Bestfor Plus	5.0	57.0	56.0	0	0	0	5.74	0.59	6.34
Linn	3.8	58.5	56.0	9	8	8	4.50	0.84	5.34
Matrix	4.0	53.5		6	1	0	4.12	0.09	4.21
Polly Plus	5.0	62.0	56.0	0	1	0	3.36	0.15	3.51
Experimental Varieties									
Kentaur B	4.5	45.0	40.5	21	70	68	5.87	2.33	8.20*
EFP 122	4.0	57.0	45.5	6	1	3	3.91	0.29	4.21
Mean	4.2	54.2	46.1	15	28	26	4.77	1.14	5.91
CV,%	8.4	3.3	12.7	88	57	65	17.16	64.87	21.00
LSD,0.05	0.5	2.6	14.0	19	23	24	1.20	1.09	1.82

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

Table 4. Dry matter yields, seedling vigor, maturity, and stand persistence of perennial ryegrass varieties sown Sept. 13, 2004, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Nov 8, 2004	Maturity ² May 12	Percent Stand				Yield (tons/acre)						
			2005		2006		2005 Total	2006				2-yr Total	
			Mar 15	Oct 28	Apr 14	Oct 17		May 12	Jun 21	Jul 27	Oct 5		Total
Commercial Varieties—Available for Farm Use													
Best for Plus	5.0	52.5	5	63	63	45	4.06	1.39	1.04	0.13	0.42	2.98	7.04*
Linn	3.3	58.5	100	99	100	96	3.80	1.63	0.20	0.18	0.64	2.65	6.44*
Amazon	3.0	45.0	100	99	99	98	3.82	1.13	0.37	0.23	0.63	2.36	6.19*
Bastion C-2	3.0	56.5	100	98	98	88	3.36	1.34	0.30	0.12	0.58	2.35	5.70*
Mean	3.6	53.1	76	89	89.7	81.6	3.76	1.37	0.48	0.17	0.57	2.58	6.34
CV,%	7.0	1.6	0	6	7.1	15.2	14.94	15.68	19.60	29.96	27.72	14.44	13.92
LSD,0.05	0.4	1.3	0	8	10.2	19.9	0.90	0.34	0.15	0.08	0.25	0.64	1.41

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

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.

Results and Discussion

Weather data for Lexington are presented in Tables 1.

Ratings for maturity and dry matter yields (tons/acre) are reported in Tables 2 through 5. Yields are given by cutting date and as total annual production. Stated yields are adjusted for percent weeds; therefore, the value listed 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 two or more growing seasons.

The perennial ryegrass tests contained several festuloliums that are hybrids of meadow fescue and perennial ryegrass, having some of the characteristics of both.

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.

Table 5. Dry matter yields, seedling vigor, maturity, and stand persistence of perennial ryegrass varieties sown Sept. 12, 2005, at Lexington, Kentucky.

Variety	Seedling Vigor ¹ Nov. 7, 2005	Maturity ² May 17	Percent Stand		2006 Yields (tons/acre)				
			Apr 17	Oct 17	May 17	Jun 21	Jul 27	Oct 5	Total
Commercial Varieties—Available for Farm Use									
RAD-CPS212	4.8	45.5	99	93	3.66	1.47	0.29	0.58	6.01*
Best for Plus	5.0	56.0	100	90	3.68	1.23	0.34	0.71	5.96*
Quartermaster	4.3	53.0	99	94	3.35	0.98	0.30	0.58	5.20
Tonga	4.5	56.5	99	96	2.44	0.46	0.24	0.57	3.70
BG 34	3.5	48.8	96	96	2.26	0.31	0.21	0.54	3.32
Sierra	3.5	58.0	98	96	2.40	0.19	0.26	0.43	3.27
Quartet	4.8	34.0	99	99	1.44	0.56	0.32	0.75	3.09
Experimental Varieties									
SW ER3579	4.8	48.8	100	100	2.98	0.67	0.34	0.73	4.73
SW ER3575	3.8	45.0	99	98	2.85	0.52	0.30	0.50	4.18
SW ER3508FRI	3.3	34.0	98	96	2.29	0.49	0.39	0.67	3.83
Mean	4.2	48.0	98.5	96.8	2.74	0.69	0.30	0.61	4.33
CV,%	13.4	11.6	2.8	4.6	14.12	24.64	25.30	19.14	12.26
LSD,0.05	0.8	8.1	3.9	6.4	0.56	0.25	0.11	0.17	0.77

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

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.

Table 6. Performance of annual ryegrass varieties at Lexington.

Variety	Type	Proprietor	Lexington 2005 ¹ 2006 ²
Commercial Varieties—Available for Farm Use			
Jackson	Westerwold	The Wax Company	*
Marshall	Westerwold	The Wax Company	*
Experimental Varieties			
ME4	Westerwold	The Wax Company	*
ME-94	Westerwold	The Wax Company	*
WMN 97	Westerwold	The Wax Company	*

*Not significantly different from the highest yielding variety in the test. Open box indicates the variety was not in the test, while an (x) in the box indicates the variety was in the test but yielded significantly less than the top yielding variety.

¹ Establishment year.

² Harvest year.

Low variability is desirable, and increased variability within a study results in higher CVs and larger LSDs.

Tables 6 and 7 summarize information about distributors and yield performance for all annual and perennial ryegrass 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, while commercial varieties can be purchased from agricultural distributors. In Tables 6 and 7, an open block indicates that the variety was not in that particular test (labeled at the top of the column), while 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. 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 2 through 5).

Tables 8 and 9 are summaries of yield data from 1999-2006 of commercial varieties that have been entered in the Kentucky trials. The data is 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% - 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 8 and 9, 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, while others may have performed very 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 footnote in Tables 8 and 9 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 you county Extension office.

- AGR-1 *Lime and Fertilizer Recommendations*
- AGR-18 *Grain and Forage Crop Guide for Kentucky*
- AGR-64 *Establishing Forage Crops*
- AGR-179 *Annual Ryegrass*

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Table 7. Performance of perennial ryegrass across years.						
Variety (ploidy)/Proprietor		Lexington				
		2003¹		2004		2005
		2004²	2005	2005	2006	
Commercial Varieties—Available for Farm Use						
Amazon (tetraploid)	ProSeeds Marketing			*	*	
Aubisque (tetraploid)	SeedResearch of Oregon	*	*			
Bastion C-2 (tetraploid)	SeedResearch of Oregon			*	*	
Bestfor Plus (hybrid tetraploid)	Smith Seed Services	*	x	*	*	*
BG 34 (diploid)	Barenbrug USA					x
Linn (diploid)	Public	x	x	*	*	
Matrix (diploid)	Cropmark Seeds LTD	x	x			
Polly Plus (hybrid tetraploid)	Allied Seed, L.L.C.	x	x			
Quartermaster (tetraploid)	Radix Research, Inc.					x
Quartet (tetraploid)	Ampac Seed Company					x
RAD-CPS212 (hybrid tetraploid)	Radix Research, Inc.					*
Remington (tetraploid)	Barenbrug USA	*	*			
Sierra (diploid)	Lewis Seed Co.					x
Tonga (tetraploid)	Kings AgriSeeds					x
Experimental Varieties						
EFP 122 (diploid)	Radix Research, Inc.	x	x			
SW ER3508FRI	SW Seed Ltd.					x
SW ER3575	SW Seed Ltd.					x
SW ER3579	SW Seed Ltd.					x
Kentaur B	DLF Internatiional Seeds	*	*			
*Not significantly different from the highest yielding variety in the test. Open box indicates that the variety was not in the test, while an (x) in the box indicates the variety was in the test but yielded significantly less than the top yielding variety.						
¹ Establishment year.						
² Harvest year.						

Table 8. Summary of Kentucky Annual Ryegrass Yield Trials, 1999-2006 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety/Proprietor		Lexington					Princeton			Bowling Green		Mean ^{3,4} (# trials)
		1999 ^{1,2}	2001	2003	2004	2005	2000	2002	2004	2000	2003	
Andy	DLF International	112	105				99					105(3)
Angus I	DLF International								80			-
Aurelia	Forage Genetics		120						130			125(2)
Avance	DLF International	113					109					111(2)
Barextra	Barenbrug							117				-
Big Daddy	FFR/Sou. St.	87	86				90	85		104		90(5)
Common	Public						85	85		95	87	88(4)
Domino	DLF International							121				-
Fantastic	Ampac Seed	83					90			97		90(3)
Feast	Ampac Seed		90									-
Feast II	Ampac Seed		98					123				111(2)
Graze-N-Gro	Seed Research of OR			105					94		107	102(3)
Gulf	Public		72				81	77	57	86		75(5)
Hercules	Barenbrug	114					110					112(2)
Jackson	The Wax Co.				80	100		87			96	91(4)
Jeanne	DLF International		124									-
Jumbo	Barenbrug			103							104	104(2)
King	Lewis Seed		92									-
Marshall	The Wax Co.	87		92	120	100	102	97		114	106	102(8)
Monarque	Seed Research of OR								117			-
Passerel Plus	Pennington Seed							100				-
Rio		88					100	97		102		97(4)
Spark	DLF International	87								83		85(2)
Tam 90								85				-
Tetrelite II	DLF International								122			-
Winter Star	Ampac Seed		87					96				92(2)
Zorro	DLF International	120	127				135	130		118		126(5)

¹ Year trial was established. All trials are 1 year yields.

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 one year, so the final report would be "2000 Annual and Perennial Ryegrass Report" archived in the Kentucky Forage Web site at <www.uky.edu/Ag/Forage>.

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

⁴ In annual ryegrass, low yielding varieties usually result from winterkill.

Table 9. Summary of Kentucky Perennial Ryegrass Yield Trials, 1999-2006 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety/Proprietor		Lexington				Princeton		Bowling Green		Mean ^{3,4} (# trials)
		1999 ^{1,2} 2yr ⁵	2001 2yr	2003 2yr	2004 2yr	2000 2yr	2002 3yr	2000 2yr	2003 2yr	
Aires	Ampac Seed		95				93			94(2)
Amazon	AgriBioTech	108			98		107			104(3)
Anaconda	Caudill Seed	113				95		103		104(3)
Aubisque	Seed Research of OR			144					99	122(2)
Bandit	Grassland West					106		114		110(2)
Bastion C-2	Seed Research of OR				90					-
Bestfor	Improved Forages					113	107	120		113(3)
Bestfor Plus	Improved Forages			116	111				136	121(3)
Bison	International Seeds								140	-
Boxer	AgriBioTech	121				106				114(2)
Calibra	DLF International						112			-
CAS MP64	Cascade International		97							-
Citadel	Ag Canada	101				94	113	103		103(4)
Derby	Public							74		-
Granddaddy	Smith seed		118				111			115(2)
Lasso	DLF International		98							-
Linn	Public	87	98	98	102	87	88	77		91(7)
Manhattan							85			-
Mara	Barenbrug							85		-
Matrix	Cropmark seeds			77					64	-
Maverick Gold	Ampac Seed		97				71			84(2)
Polly II	FFR/Sou. St.	104				110		125		113(3)
Polly Plus	Allied Seed			64					60	62(2)
Quartet	Ampac Seed		97				113			105(2)
Sampson	International Seeds	87								-
Yatsyn	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 two years, so the final report would be "2001 Annual and Perennial Ryegrass Report" archived in the Kentucky Forage Web site 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.



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