

2023 Cool-Season Grass Horse-Grazing Tolerance Report

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Introduction

Cool-season forages such as Kentucky bluegrass, tall fescue, and orchardgrass are dominant pasture grasses for horses in Kentucky. Variety evaluations for yield have been carried out for many years, but little work has been done to evaluate varieties of these grasses for persistence when subjected to close, continuous grazing by horses.

The purpose of this report is to summarize current research on the grazing tolerance of varieties of tall fescue, orchardgrass, and other species when subjected to continuous heavy grazing pressure by horses within the growing season. The main focus will be on stand survival but data on seedling vigor and grazing preference are also included.

Consult the UK Forage Extension website (<https://forages.ca.uky.edu>) to access all forage variety testing reports from Kentucky and surrounding states as well as several other forage publications.

Important Selection Considerations

Local adaptation and seasonal yield. Select a variety that is adapted to Kentucky as indicated by good performance across years and locations in replicated trials, such as those presented in this publication. Grazing persistence data should be used in combination with yield data to select the best variety for pasture use. Refer to the appropriate yield trial reports for data on specific varieties of interest.

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. Take note of other information on the label including the test date (which must

be within the previous nine months), 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 pasture for horses of any kind, insist on an endophyte-free variety. The endophyte level should be stated on a green tag on every bag of seed. Most forage types of perennial ryegrass are endophyte free, but most new turf types are infected. The ryegrass endophyte is similar to that of tall fescue and produces alkaloids that are toxic to horses and cattle. Similarly, when seeding tall fescue insist on endophyte-free or novel endophyte varieties (the endophyte level will be stated on a green tag on every bag of seed). Seed of novel endophyte varieties should be handled carefully to preserve the infection (keep the endophyte fungus alive), which means keeping seed cool and planting as soon as possible. Novel endophyte tall fescue varieties are good options for horses because of their improved persistence and absence of the toxic alkaloid ergovaline. The exception is the novel endophyte variety BarOptima PLUS E34. It contains low levels of the alkaloid ergovaline and therefore should never be seeded in pastures where pregnant mares are grazing, since they are very sensitive to ergovaline during their last trimester.

Description of the Tests

Tests were established in Lexington in the fall of 2019, 2020, 2021, and 2022. The soils at this location are well-drained silt loams and are well suited to tall fescue, orchardgrass, and other cool-season grasses. Plots were 5 feet by 15 feet in a randomized complete block design, with each variety replicated six times. Plots were seeded at the recommended seeding rate per acre and were planted into a prepared seedbed using a disk drill. Grazing was continuous from April to October.

Table 1. Temperature and rainfall at Lexington, Kentucky, in 2020, 2021, 2022, and 2023².

	2020				2021				2022				2023 ²			
	Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall		Temp.		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP	°F	DEP	IN	DEP
JAN	40	+9	3.72	+0.86	34	+3	4.51	+1.65	29	-2	4.93	+2.07	44	+13	6.28	+3.42
FEB	38	+3	5.14	+1.93	31	-4	4.60	+1.39	38	+3	7.69	+4.48	47	+12	3.73	+0.52
MAR	51	+7	3.79	-0.61	50	+6	5.12	+0.72	49	+5	4.27	-0.13	48	+4	4.45	+0.05
APR	52	-3	4.92	+1.04	54	-1	2.72	-1.16	55	0	3.71	-0.17	58	+3	2.36	-1.52
MAY	62	-2	5.69	+1.22	62	-2	4.34	-0.13	69	+5	3.84	-0.63	65	+1	2.53	-1.94
JUN	72	0	2.56	-1.10	73	+1	6.26	+2.60	76	+4	2.10	-1.56	72	0	6.75	+3.09
JUL	79	+3	3.23	-1.77	75	-1	5.90	+0.90	80	+4	6.46	+1.46	78	+2	5.32	+0.32
AUG	75	0	3.41	-0.52	76	+1	6.16	+2.23	77	+2	4.27	+0.34	76	+1	2.40	-1.53
SEP	68	0	4.43	+0.83	69	+1	3.03	-0.17	70	+2	1.50	-1.70	71	+3	0.99	-2.21
OCT	57	0	4.98	+2.41	62	+5	4.64	+2.10	57	0	0.96	-1.61	61	+4	2.30	-0.27
NOV	49	+4	2.18	-1.21	43	-2	2.13	-1.26	49	+4	2.1	-1.29				
DEC	36	0	2.27	-1.71	47	+11	4.41	+0.43	40	+4	3.46	-0.52				
Total			45.92	+1.37			53.85	+9.30			45.29	+0.74			37.11	-0.07

¹ DEP is departure from the long-term average.

² 2023 data is for ten months through October.

In spring, plots were grazed down to below 4 inches quickly and were maintained at 1 to 3 inches for the remainder of the grazing season. Individual trials were occasionally clipped to remove seedheads or weed growth not controlled by herbicides. Supplemental hay was fed during periods of slowest growth. Visual ratings of percent stand were made in the fall several weeks after the horses were removed and in the spring prior to resuming grazing to assess winter survival and spring growth. Since trials were seeded in rows, persistence ratings were based on density within a row and not total ground cover. Grass plots were fertilized with 30 pounds of actual N per acre in March, 30 pounds of actual N in May, and 40 pounds of actual N in early November after horses were removed from the pasture. Other fertilizers (lime, P, and K) were applied as needed according to the University of Kentucky soil test recommendations.

Results and Discussion

Weather data for Lexington are presented in Table 1. Data on percent stand are presented in Tables 2, 3, 4, and 5. Statistical analyses were performed on all entries (including experimentals) to determine if numerical differences are truly due to variety. To determine if two varieties are truly different, compare the difference between the two varieties 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 a given location. 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, and increased variability within a study results in higher CVs and larger LSDs.

In general, commercial varieties of tall fescue and orchardgrass tolerated overgrazing well (Tables 2, 3, and 4), but the varieties of timothy in these trials did not. The sensitivity of timothy to heavy grazing was not surprising, as it is an erect species and sensitive to frequent, close defoliation. Perennial ryegrasses, Kentucky bluegrasses, and festuloliums vary in tolerance to grazing by horses.

The lack of a defined “grazing-tolerant variety” for these species makes absolute interpretation difficult. For example, endophyte-infected Kentucky 31 (KY31+) is known to be grazing tolerant. (Note: KY31+ is not recommended for late term mares because of toxicity issues associated with ergovaline production.) However, there are no proven grazing-tolerant varieties for the other species. Still, certain varieties were clearly more tolerant than others.

Differences in tolerance among varieties could be due to true grazing tolerance but also to preference, especially when highly palatable species such as Kentucky bluegrass and perennial ryegrass were in the same test as tall fescue. Horses tend to graze the preferred species and varieties more intensely than others. Because of potential preference between species, comparison between varieties is most accurate within a species. These data should be taken as an indication of tolerance to periods of overgrazing. For best pasture stands, forage grasses should not be abused as in this study.

Tables 2, 3, 4, and 5 include preference ratings made two to three weeks after horses started grazing. These ratings do not provide information on initial preference but do provide a good indication of the varieties that the horses repeatedly grazed during the first few weeks on pasture.

Table 6 shows information about proprietors/distributors for all varieties in these tests. Varieties are listed in alphabetical order, with experimental varieties at the bottom.

How to Interpret the Summary Tables

Tables 7, 8 and 9 are summaries of stand persistence data from 1999 to 2023 of commercial tall fescue, orchardgrass, and perennial ryegrass (festuloliums are included with perennial ryegrass) varieties that have been entered in the Kentucky trials. In Table 7 the data for each is listed as a percentage of endophyte-free KY31 (KY31-). In other words, the stand persistence values for all varieties in the tall fescue trials are set as a percentage of KY31- whose value is set as 100 percent. Varieties with percentages over 100 persisted better than KY31-, and varieties with percentages less than 100 persisted less well than KY31-. In Table 8 and 9 the data is listed as a percentage of the mean of the commercial varieties entered in each specific trial. In other words, values for persistence of the varieties in the trial is expressed as a percentage of the mean value for that trial. Varieties with percentages over 100 persisted better than average, and varieties with percentages less than 100 persisted less well than average. Statistical differences between varieties cannot be determined using the data in Tables 7, 8 and 9, but comparisons can help identify varieties for further consideration. Varieties that have performed better than average over many years have very stable performance; others may have performed well in wet years or on particular soil types. These details can influence variety choice, and more information can be found in the yearly reports. See the footnotes in Tables 7, 8 and 9 to determine which yearly report should be referenced

Summary

These studies indicate there are varieties of cool-season grasses that can tolerate overgrazing by horses for three to four seasons and maintain reasonable stands. This information should be used along with yield and other information (for example, relative maturity in spring) in selecting the best grass variety for each individual use. See yield variety trials on the UK Forage website (<https://forages.ca.uky.edu>) or the summary publication 2023 Long-Term Summary of Kentucky Forage Variety Trials (PR-846) that shows variety comparisons over all species. Tall fescue, orchardgrass, or other cool-season grasses should not be continually overgrazed as was done in this trial. Although several varieties expressed tolerance to the level of grazing pressure in these trials, overgrazing greatly reduces forage production and stand persistence. This information should be used as an indication of those varieties which will better withstand overgrazing when it occurs.

Good management for maximum production and stand life from any grass would be to allow complete establishment before grazing and to avoid overgrazing during times of extreme stress, such as drought. For further information about grazing management, refer to the following College of Agriculture publications, available at the local county Extension office or in the publication section of the UK Forage website at www.forages.ca.uky.edu.

- Rotational Grazing (ID-43)
- Tall Fescue (AGR-59)
- Fescue Toxicosis (ID-221)
- Broadleaf Weeds of Kentucky Pastures (AGR-207)
- Weed Management in Grass Pastures, Hayfields and Other Farmstead Sites (AGR 172)

- Establishing Horse Pastures (ID-147)
- Improving Kentucky Horse Pastures
- Tall Fescue Novel Endophyte Varieties and Establishment for Livestock and Horse Pastures (AGR-275)
- Soil Sampling and Nutrient Management in Horse Pastures (AGR-200)

About the Authors

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Table 2. Seedling vigor, grazing preference, and stand persistence of forage grasses sown September 5, 2019, in a horse-grazing tolerance study at Lexington, Kentucky.

Variety	Species	Fescue Endophyte Status ¹	Seedling Vigor ² Oct 25, 2019	Grazing Preference ³				Percent Stand								
				2020	2021	2022	2023	2019	2020		2021		2022		2023	
				May 20	May 4	May 6	Jun 3	Oct 25	Mar 19	Oct 13	Mar 29	Oct 22	Mar 25	Oct 24	Mar 21	Oct 17
Commercial Varieties-Available for Farm Use																
KY31+	tall fescue	toxic	3.6	2.3	1.0	1.2	1.0	100	100	100	100	100	100	100	100	100*
SS0705TFSL	tall fescue	free	3.5	2.3	1.2	1.2	1.0	100	100	99	99	99	99	99	100	100*
Lacefield MaxQII	tall fescue	novel	3.3	2.5	1.0	1.0	1.0	100	100	99	99	99	99	99	99	99*
Jesup MaxQII	tall fescue	novel	3.2	2.0	1.0	1.2	1.2	100	100	99	99	99	99	84	99	99*
Texoma MaxQII	tall fescue	novel	3.0	2.7	1.0	1.0	1.0	100	100	100	100	100	100	98	96	96*
Persist	orchardgrass	–	3.3	6.5	3.8	4.2	1.5	100	100	80	93	84	83	66	55	62
Remington PLUS NEA2 ⁴	perennial ryegrass	–	4.7	7.2	5.8	7.2	6.0	100	100	100	100	88	86	77	73	62
Remington	perennial ryegrass	–	4.8	6.7	6.7	6.2	4.0	100	100	100	100	88	88	80	73	55
Prairie	orchardgrass	–	3.2	6.3	4.2	3.2	1.5	100	100	90	91	73	68	68	46	49
Prodigy	orchardgrass	–	3.3	6.5	4.2	3.7	2.8	100	100	96	94	65	63	57	40	48
Linn	perennial ryegrass	–	5.0	3.2	4.0	4.2	2.7	100	100	100	100	87	83	67	47	45
PayDay	perennial ryegrass	–	4.8	5.2	5.0	5.3	2.7	100	100	100	100	85	79	61	38	37
Clair	timothy	–	2.8	7.8	6.7	6.0	2.0	97	98	80	83	37	25	12	6	3
Climax	timothy	–	3.2	7.3	7.3	7.2	3.2	98	100	80	86	43	40	11	6	3
MacBeth	bromegrass	–	2.3	5.2	4.8	6.2	1.8	96	93	24	23	14	14	7	4	3
KYEarly	timothy	–	1.0	6.5	5.2	6.3	2.2	– ⁵	76	35	42	22	18	8	5	3
Experimental Varieties																
KY31-	tall fescue	free	3.7	2.5	1.0	1.2	1.0	100	100	100	100	99	99	84	99	99*
KYFA9611	tall fescue	free	3.4	3.5	3.2	2.0	1.0	100	100	100	100	98	98	98	98	98*
11PHL4806	timothy	–	3.0	6.5	4.8	4.7	2.6	98	100	78	86	30	27	13	7	4
MB1302	bromegrass	–	3.0	5.2	4.3	5.0	1.2	94	94	38	36	15	15	19	7	4
Mean			3.4	4.9	3.8	3.9	2.1	99	98	85	86	71	69	60	55	53
CV,%			12.0	23.0	24.3	29.7	59.8	3	4	15	9	16	18	31	20	21
LSD,0.05			0.5	1.3	1.1	1.3	1.4	3	5	15	9	13	14	21	13	13

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle and horses.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

³ Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed. Grazing time before rating; 2020-30 days, 2021-15 days, 2022-22days, 2023-35 days.

⁴ Remington PLUS NEA2 contains a nontoxic (novel) endophyte.

⁵ Germination and seedling growth was very slow and could not get a good stand rating in the fall.

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

Table 3. Seedling vigor, grazing preference, and stand persistence of forage grasses sown September 8, 2020, in a horse-grazing tolerance study at Lexington, Kentucky.

Variety	Species	Fescue Endophyte Status ¹	Seedling Vigor ² Oct 2, 2020	Grazing Preference ³			Percent Stand						
				2021	2022	2023	2020	2021		2022		2023	
				May 4	May 6	Jun 2	Oct 2	Mar 29	Oct 22	Mar 25	Oct 24	Mar 21	Oct 18
Commercial Varieties-Available for Farm Use													
Cajun II	tall fescue	free	3.8	1.7	1.0	1.0	100	100	100	100	100	100	100*
Estancia Arkshield	tall fescue	novel	3.5	1.7	1.0	1.2	100	100	99	100	100	100	100*
Jesup MaxQII	tall fescue	novel	3.8	1.5	1.2	1.2	100	100	100	100	100	100	100*
KY31+	tall fescue	toxic	3.8	1.8	1.5	1.0	100	100	100	100	100	100	100*
Lacefield MaxQII	tall fescue	novel	3.7	2.0	1.0	1.0	100	100	100	100	100	100	100*
SS0505TFSL	tall fescue	free	3.7	2.0	1.0	1.0	100	100	100	100	100	100	100*
Persist	orchardgrass	–	3.8	4.3	4.0	2.0	100	100	96	95	92	88	89*
Remington	perennial ryegrass	–	4.5	5.0	7.8	6.8	100	100	98	98	94	91	88*
Profit	orchardgrass	–	3.4	4.0	5.2	3.8	100	100	93	93	87	83	76
Prairie	orchardgrass	–	3.7	3.8	4.7	3.3	100	100	92	92	88	75	75
Power	perennial ryegrass	–	4.7	4.8	6.7	6.0	100	100	94	94	87	61	44
Linn	perennial ryegrass	–	4.5	4.2	4.3	2.3	100	100	92	92	79	40	36
Ginger	Kentucky bluegrass	–	2.8	5.3	5.7	4.7	100	100	62	57	37	33	27
Isabel	Kentucky bluegrass	–	2.8	4.6	6.0	4.7	100	100	82	68	40	22	18
Experimental Varieties													
KY31-	tall fescue	free	4.0	2.2	1.2	1.2	100	100	100	100	100	100	100*
KYFA9611	tall fescue	free	3.6	2.3	3.7	1.0	100	100	100	100	100	100	100*
Mean			3.8	3.2	3.5	2.6	100	100	94	93	88	81	78
CV,%			17.8	24.7	19.2	35.8	0	0	8	7	8	15	14
LSD,0.05			0.8	0.9	0.8	1.1	0	0	9	7	8	14	13

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle and horses.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

³ Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed. Grazing time before rating; 2021-15 days, 2022-22days, 2023-35 days.

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

Table 4. Seedling vigor, grazing preference, and stand persistence of forage grasses sown September 10, 2021, in a horse-grazing tolerance study at Lexington, Kentucky.

Variety	Species	Fescue Endophyte Status ¹	Seedling Vigor ² Oct 5, 2021	Grazing Preference ³		Percent Stand				
				2022	2023	2021	2022		2023	
				May 6	Jun 2	Oct 5	Mar 24	Oct 24	Mar 21	Oct 18
Commercial Varieties-Available for Farm Use										
Cajun II	tall fescue	free	3.7	1.0	1.0	100	100	100	100	100*
Jesup MaxQII	tall fescue	novel	3.2	1.2	1.0	100	100	100	100	100*
KY31+	tall fescue	toxic	3.8	1.2	1.2	100	100	100	100	100*
Lacefield MaxQII	tall fescue	novel	4.0	1.3	1.0	100	100	100	100	100*
SS0705TFSL	tall fescue	free	3.8	1.3	1.2	100	100	100	100	100*
Texoma MaxQII	tall fescue	novel	3.5	1.0	1.0	100	100	100	100	100*
Remington	perennial ryegrass	–	4.8	6.7	7.5	100	100	100	99	99*
SS0708OGDT	orchardgrass	–	3.8	3.3	3.5	100	100	100	99	98*
Persist	orchardgrass	–	4.0	4.2	3.7	100	100	100	99	96*
Prairie	orchardgrass	–	3.8	3.3	3.7	100	100	98	97	96*
Profit	orchardgrass	–	4.0	4.8	5.5	100	100	100	98	92*
Prodigy	orchardgrass	–	4.0	4.8	4.7	100	100	98	92	86
PayDay	perennial ryegrass	–	4.6	6.2	6.0	100	100	99	84	82
TetragainSLT	perennial ryegrass	–	4.8	5.0	5.0	100	100	94	74	73
Linn	perennial ryegrass	–	4.9	4.0	4.0	100	100	86	65	66
Experimental Varieties										
KY31-	tall fescue	free	4.0	1.2	1.0	100	100	100	100	100*
Mean			4.0	3.2	3.2	100	100	98	94	93
CV,%			9.3	24.4	45.9	0	0	5	10	11
LSD,0.05			0.4	0.9	1.7	0	0	5	11	12

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle and horses.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

³ Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed. Grazing time before rating; 2022-22days, 2023-35 days.

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

Table 5. Seedling vigor, grazing preference, and stand persistence of forage grasses sown September 9, 2022, in a horse-grazing tolerance study at Lexington, Kentucky.

Variety	Species	Fescue Endophyte Status ¹	Seedling Vigor ² Sep 28, 2022	Grazing Preference ³ Jun 2, 2023	Percent Stand		
					2022 Sep 28	2023 Mar 21	2023 Oct 18
Commercial Varieties-Available for Farm Use							
Estancia Arkshield	tall fescue	novel	4.4	1.0	100	100	100
Jesup MaxQII	tall fescue	novel	4.4	1.2	100	100	100
KY31+	tall fescue	toxic	4.3	1.5	100	100	100
Lacefield MaxQII	tall fescue	novel	4.8	1.0	100	100	100
SS0705TFSL	tall fescue	free	4.7	1.2	100	100	100
Texoma MaxQII	tall fescue	novel	4.3	1.0	100	100	100
Persist II	orchardgrass	–	4.3	2.7	100	100	100
Persist	orchardgrass	–	4.9	2.8	100	100	100
Profit	orchardgrass	–	4.7	3.3	100	100	100
Profit	orchardgrass	–	4.7	3.3	100	100	100
SS0708OGDT	orchardgrass	–	4.5	3.0	100	100	98
Linn	perennial ryegrass	–	5.0	1.7	100	100	96
TetraMag	perennial ryegrass	–	5.0	3.5	100	100	93
PayDay	perennial ryegrass	–	5.0	5.2	100	100	90
Experimental Varieties							
KY31-	tall fescue	free	4.3	1.3	100	100	100
KYFA9732/AR584	tall fescue	novel	4.6	1.0	100	100	100
Mean							
CV,%			4.6	2.1	100	100	98
LSD,0.05			5.7	39.4	0	0	5

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle and horses.

² Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.

³ Preference score based on a scale of 1 to 9 with 9 indicating all forage was grazed. Grazing time before rating; 2023-35 days.

Table 6. Proprietors of forage grasses in current horse-grazing trials in Kentucky.

Variety	Species	Endophyte Status ¹	Proprietor/ KY Distributor
Commercial Varieties-Available for Farm Use			
Cajun II	tall fescue	free	Smith Seed Services
Clair	timothy	–	Turner Seed
Climax	timothy	–	Canada Agr. Res. Station
Estancia Arkshield	tall fescue	novel	Mountain View Seeds
Ginger	Kentucky bluegrass	–	Proseeds Marketing
Isabel	Kentucky bluegrass	–	Smith Seed Services
Jesup MaxQII	tall fescue	novel	Pennington Seed
KY Early	timothy	–	Smith Seed Services
KY 31+	tall fescue	toxic	Public
Lacefield MaxQII	tall fescue	novel	Pennington Seed
Linn (certified)	perennial ryegrass	–	Public
Macbeth	bromegrass	–	Cisco Seeds
PayDay	perennial ryegrass	–	Mountain View Seeds
Persist	orchardgrass	–	Smith Seed Services
Persist II	orchardgrass	–	Smith Seed Services
Power	perennial ryegrass	–	Ampac Seed
Prairie	orchardgrass	–	Turner Seed
Prodigy	orchardgrass	–	Caudill Seed
Profit	orchardgrass	–	Ampac Seed
Remington	perennial ryegrass	–	Barenbrug USA
Remington PLUS NEA2	perennial ryegrass	novel	Barenbrug USA
SS-0705TFSL	tall fescue	free	Southern States
SS-0708OGDT	orchardgrass	–	Southern States
TetragainSLT	perennial ryegrass	–	Smith Seed Services
TetraMag	perennial ryegrass	–	Mountain View Seeds
Texoma MaxQII	tall fescue	novel	Pennington Seed
Experimental Varieties²			
KY 31-	tall fescue	free	KY Agric. Exp. Station
KYFA9611	tall fescue	free	KY Agric. Exp. Station
KYFA9732/AR584	tall fescue	novel	KY Agric. Exp. Station
MB1302	bromegrass	–	Allied Seed
11PHL4806	timothy	–	Barenbrug USA

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle. Orchardgrass, bromegrass, timothy, and Kentucky bluegrass do not contain an endophyte and forage type perennial ryegrass varieties do not contain a toxic endophyte.

² Experimental varieties are not available commercially, but provide an indication of the progress being made by forage breeding companies.

Table 7. Summary of 2002-2023 Kentucky tall fescue horse-grazing tolerance trials with three or more years of data in Lexington (stand persistence shown as a percent of the stand rating of the endophyte free variety KY 31-).

Variety	Endophyte Status ¹	Proprietor/KY Distributor	2002 ^{2,3}	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Mean ⁴ (#trials)	
			4-yr ⁵	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	3-yr		
BarOptima PLUS E34 ⁶	novel	Barenbrug USA						107			101	101	95	104	99	99	101	100				101(9)	
Cajun II	free	Smith Seed Services												96			101				100	99(3)	
Cowgirl	free	Rose Agri-Seed							105				99									102(2)	
Estancia Arkshield	novel	Mountain View Seeds																			100	–	
Jesup MaxQ	novel	Pennington Seed	98			78			104	97	100	101	97	105	98	100	99	101	99			98(13)	
Jesup MaxQII	novel	Pennington Seed																		100	100	100(2)	
KY31+	toxic	KY Agri. Exp.Sta.				102	109	120	107	101	101	101	99	105	99	100	101	100	99	101	100	100	103(16)
KY31-	free	KY Agri. Exp.Sta.	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100(19)
Lacefield MaxQII	novel	Pennington Seed					105	110						104		100	100	100	98	100	100	102(10)	
Seine	free	Seed Research of Oregon			135																	–	
Select	free	Southern States	109	94	99	73	104	76	108	98	100	101	98	98	97	100						97(14)	
SS0705TFSL	free	Southern States													98	100	100	101	99	101	100	100(7)	
Stockman	free	Seed Research of Oregon			125																	–	
Texoma MaxQII	novel	Pennington Seed																		97		–	

¹ Free-varieties that do not contain an endophyte. Toxic-KY31+ contains a toxic endophyte. Novel-varieties that contain an endophyte that aids persistence but is not toxic to cattle.

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 stand persistence between varieties. To find actual persistence ratings, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in the fall of 2016 was grazed four years so the final report would be “2020 Cool-Season Grass Horse Grazing Tolerance Report” archived in the UK Forage website (<https://forages.ca.uky.edu>).

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

⁵ Number of years of data.

⁶ BarOptima PLUS E34 is not recommended for pregnant mares because it produces low levels of the alkaloid ergovaline.

Table 8. Summary of 1999-2023 Kentucky orchardgrass horse-grazing tolerance trials with three or more years of data in Lexington (stand persistence shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietor/KY Distributor	1999 ^{1,2}	2000	2001	2002	2005 ³	2006	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Mean ⁴ (#trials)		
		3-yr ⁵	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	4-yr	3-yr			
Albert	Univ. of Wisconsin			95																	–	
Ambrosia	Amer.Grass Seed Prod.						61															–
Benchmark	Southern States	104			85																	95(2)
Benchmark Plus	Southern States				111	157	139	111	114	121	121	137	105									120(8)
Crown Royale	Grassland Oregon			95																		–
Crown Royale Plus	Grassland Oregon				97																	–
Elise	Pure Seed									87												–
Haymate	Southern States	96	85		97																	93(3)
Persist	Smith Seed Services					114		103	101	92	112	146	95	123	109	116	138	116	111			114(12)
Potomac	Public				117											65						91(2)
Prairie	Turner Seed			100										92	95	112	91	92	94			97(7)
Prodigy	Caudill Seed											54					73	91				73(3)
Profit	Ampac Seed							93	86		92		108							95		95(5)
SS-0708OGDT	Southern States								104				92	77	95	107	99					96(6)
Tekapo	Ampac Seed	101	115		93	30		92	100	83	87	63		108								94(9)

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 stand persistence between varieties. To find actual persistence ratings, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in the fall of 2016 was grazed four years so the final report would be “2020 Cool-Season Grass Horse Grazing Tolerance Report” archived in the UK Forage website (<https://forages.ca.uky.edu>).

³ Due to high variation during 2005 these values are not included in the overall mean.

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

⁵ Number of years of data.

Table 9. Summary of 2000-2023 Kentucky perennial ryegrass and festulolium(FL) horse-grazing tolerance trials with three or more years of data in Lexington(stand persistence shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietor/KY Distributor	2000 ^{1,2} 4-yr ⁴	2004 4-yr	2007 4-yr	2009 4-yr	2010 4-yr	2011 4-yr	2012 4-yr	2014 4-yr	2015 4-yr	2019 4-yr	2020 3-yr	Mean ³ (#trials)
Aries	Ampac Seed		55										—
Duo(FL)	Ampac Seed	96					87			82			88(3)
Granddaddy	Smith Seed Services		145	100	83	96		75	80				97(6)
Linn (certified)	Public										90	64	77(2)
Mara	Barenbrug USA	104											—
PayDay	Mountain View Seeds										74		—
Power	Ampac Seed				118	103			120	136		78	111(5)
Quartet	Ampac Seed												—
Remington	Barenbrug USA										111	157	134(2)
Remington PLUS NEA2 ⁵	Barenbrug USA										125		—
Spring Green(FL)	Turf-Seed						113	140		82			112(3)
TetraGain	Pure Seed Testing							84					—

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 stand persistence between varieties. To find actual persistence ratings, look in the yearly report for the final year of each specific trial. For example, the Lexington trial planted in the fall of 2016 was grazed four years so the final report would be “2020 Cool-Season Grass Horse Grazing Tolerance Report” archived in the UK Forage website (<https://forages.ca.uky.edu>).

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

⁴ Number of years of data.

⁵ Remington PLUS NEA2 contains a nontoxic (novel) endophyte.

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