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

2018 Annual Grass Report Warm Season and Cool Season (Cereals)

G.L. Olson, S.R. Smith, C.D. Teutsch, J.C. Henning, and B. Bruening, Plant and Soil Sciences

Introduction

Summer annual grasses provide an important forage crop option for producers in Kentucky. These grasses are mainly used as emergency or supplemental hay and pasture crops, but little information is available on their yield potential. The purpose of this publication is to summarize the University of Kentucky 2013-2018 forage yield trials with sudangrass, sorghum/sudangrass, millets, teff, and cereal crops.

Sudangrass *(Sorghum bicolor* ssp. *drummondi)* is a rapidly growing annual grass in the sorghum family. It is medium yielding and well suited for grazing or hay because of its smaller stem size. Sudangrass regrows quickly after harvest and can be grazed several times during summer and early fall.

Sorghum x sudangrass hybrids are more vigorous and slightly higher yielding than sudangrass. A larger stem size makes these hybrids less useful for hay; therefore, they are commonly used for baleage and grazing.

Forage sorghum is used primarily as silage for livestock and is typically a one cut crop. It grows 9 to 12 feet tall and is typically harvested when the seed is in the milk to soft dough stage.

Pearl millet (*Pennisetum glaucum*) is the most widely grown type of millet. It is well adapted to production systems characterized by drought, low soil fertility, and high temperature. It is higher yielding than foxtail millet and regrows rapidly after harvest if an 8- to 10-inch stubble height is left. Dwarf varieties, which are leafier and better suited for grazing, are available.

The brown midrib or BMR trait is outward expression of a genetic mutation in forage sorghum, sorghum-sudangrass, sudangrass and pearl millet. In most cases, plants possessing the BMR trait contain less or altered lignin, making the plant more digestible and increasing animal production. Therefore, it is desirable to seed summer annuals which have the BMR trait in addition to other desirable characteristics like high yield. With BMR varieties, the midrib of the leaf appears brown or tannish in color.

Teff, also referred to as summer lovegrass (*Eragrostis tef*), is a warm-season annual grass native to Ethiopia and has been used as a grain crop for thousands of years. Recently, there has been considerable interest in teff as a forage crop. It is high quality, palatable, and fine-stemmed and, therefore, makes excellent hay.

Cool season annual grasses (specifically cereal crops) are also used as forages crops for hay, baleage or grazing. The cereal crops used in this report are wheat (*Triticum aestivum*), rye (*Secale cereale*), oats (*Avena sativa*) and triticale (*Triticum secale*).

Table 2. Temperature and rainfall at Princeton, Kentucky, in 2017 and 2018.

	2017				2018[2]			
	Temp		Rainfall		Temp		Rainfall	
	°F	DEP[1]	IN	DEP	°F	DEP	IN	DEP
JAN	43	+9	3.18	-0.62	32	-2	4.28	+0.48
FEB	49	+11	1.78	-2.65	45	+7	9.50	+5.07
MAR	50	+3	4.09	-0.85	47	0	9.53	-1.41
APR	63	+4	4.28	-0.52	53	-6	4.9	+0.10
MAY	67	0	4.43	-0.53	74	+7	4.69	-0.27
JUN	74	-1	5.39	+1.54	78	+3	7.80	+3.95
JUL	78	0	2.23	-2.06	78	0	2.58	-1.71
AUG	75	-2	1.39	-2.62	77	0	2.68	-1.33
SEP	71	0	3.93	+0.60	74	+4	5.61	+2.28
OCT	61	+2	6.65	+3.60	61	+2	2.96	-0.09
NOV	50	+2	2.96	-1.67				
DEC	37	-2	3.01	-2.03				
Total			43.32	-7.81			48.53	+7.07

[1] DEP is departure from the long-term average.
[2] 2018 data is for ten months through October.

Table 1. Temperature and rainfall at Lexington, Kentucky, in 2014, 2015, 2016, 2017, and 2018.

	2014				2015				2016				2017				2018[2]			
	Temp		Rainfall		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	°F	DEP	IN	DEP
JAN	25	-6	2.28	-.58	32	+1	2.17	-0.69	32	+1	0.80	-2.06	40	+9	6.81	+3.95	31	0	2.01	-0.85
FEB	30	-5	5.47	+2.26	26	-9	3.08	-0.13	38	+3	6.09	+2.88	47	+12	4.46	+1.25	45	+10	9.77	+6.56
MAR	39	-5	3.08	-1.32	45	+1	7.34	+2.94	52	+8	4.07	-0.33	48	+4	3.34	-1.06	42	-2.	5.16	+0.76
APR	58	+3	5.27	-1.89	57	+2	13.19	+9.31	57	+2	3.97	+0.09	62	+7	4.17	+0.29	50	-5	5.52	+1.64
MAY	66	+2	5.72	+1.25	69	+5	3.02	-1.45	64	0	9.17	+4.70	66	+2	7.74	+3.27	73	+9	8.39	+3.92
JUN	75	+3	2.93	-0.73	75	+3	8.20	+4.54	76	+4	5.09	+1.43	73	+1	7.68	+4.02	76	+4	6.42	+2.76
JUL	74	-2	3.18	-1.82	77	+1	10.22	+5.22	79	+3	7.43	+2.43	76	0	4.49	-0.51	77	+1	6.15	+1.15
AUG	76	+1	6.53	+2.60	74	-1	3.49	-0.44	79	+4	4.37	+0.44	74	-1	6.66	+2.73	77	+2	6.45	+2.52
SEP	69	+1	3.63	+.43	72	+4	3.49	+0.29	74	+6	2.18	-1.02	69	+1	4.72	+1.52	74	+6	12.88	+9.68
OCT	57	0	5.55	+2.98	59	+2	2.78	+0.21	64	+7	0.37	-2.20	60	+3	6.06	+3.49	59	+2	6.54	+3.97
NOV	41	-4	2.79	-0.60	51	+6	3.72	+0.33	51	+6	1.94	-1.45	47	+2	3.09	-0.30				
DEC	40	+4	2.47	-1.51	49	+13	8.42	+4.44	37	+1	9.4	+5.42	35	-1	2.66	-1.32				
Total			49.4	+4.85			69.12	+24.57			54.88	+10.33			61.88	+17.33			69.29	+32.11

[1] DEP is departure from the long-term average.
[2] 2018 data is for ten months through October.

Considerations in Selecting a Summer Annual Variety

The major factor in selecting a variety of summer annual grass is yield, both total and seasonal. Growth after first cutting is strongly dependent on available moisture and nitrogen fertilization. Summer annual grasses generally have different characteristics and uses. Pearl millets vary considerably in height and can be used for both pasture and hay. Pearl millet has the advantage of not producing prussic acid (HCN or cyanide). Forage sorghum, sorghum-sudangrass hybrids, and sudangrass are related grasses (in the sorghum family) and can produce prussic acid immediately after frost or when immature shoots are grazed during severe drought. Sudangrasses are considered to have the least potential for prussic acid poisoning. Sudangrass has smaller, finer stems than sorghum-sudangrass hybrids, which have finer stems than forage sorghums. Consequently, sudangrasses are more easily cured for hay. Pearl millets, sudangrass, sorghum-sudangrass, and teff are typically harvested multiple times during the growing season, and forage sorghum and foxtail millet are harvested only once. For more detailed management recommendations refer to *Warm Season Annual Grasses in Kentucky* (AGR-88), and *Teff,* which can be found at www.uky.edu/Ag/Forage under "Publications" in the "Grass" species.

Considerations in Selecting a Cool Season Cereal Variety

The major factors in selecting cool season cereal grass varieties are yield, winter survival and regrowth. If cutting a cereal grass for silage or baleage then yield at the first harvest of the season is most important. For all cereals, winter survival is an important factor as evidenced by the complete winterkill in one triticale variety (Tables 32 and 33) in comparison to the others in the test. Fortunately winter wheat and cereal rye rarely show winterkill in Kentucky regardless of the variety. Winter oats are a marginal crop in Kentucky because severe winterkill usually occurs one out of every two-three years. We have started testing spring plant spring oats and other cereals (Tables 34, 35, 36, and 37) to determine which species and which varieties have the best potential as short term cool season forage crops. Notice the very low yield of winter wheat when planted in the spring. Spring plantings of winter wheat are not recommended because the lack of vernalization temperatures prevent stem elongation and vigorous spring growth.

Table 3. Descriptive scheme for the stages of development in perennial forage grasses.

Code	Description	Remarks
	Leaf development	
11	First leaf unfolded	Applicable to regrowth of established (plants) and to primary growth of seedlings.
12	2 leaves unfolded	Further subdivision by means of leaf development index (see text).
13	3 leaves unfolded	
•	• • • • •	
19	9 or more leaves unfolded	
	Sheath elongation	
20	No elongated sheath	Denotes first phase of new spring growth after overwintering. This character is used instead of tillering which is difficult to record in established stands.
21	1 elongated sheath	
22	2 elongated sheaths	
23	3 elongated sheaths	
•	• • • • •	
29	9 or more elongated sheaths	
	Tillering (alternative to sheath elongation)	
21	Main shoot only	Applicable to primary growth of seedlingsor to single tiller transplants.
22	Main shoot and 1 tiller	
23	Main shoot and 2 tillers	
24	Main shoot and 3 tillers	
•	• • • • •	
29	Main shoot and 9 or more tillers	
	Stem elongation	
31	First node palpable	More precisely an accumulation of nodes. Fertile and sterile tillers distinguishable.
32	Second node palpable	
33	Third node palpable	
34	Fourth node palpable	
35	Fifth node palpable	
37	Flag leaf just visible	
39	Flag leaf ligule/collar just visible	
	Booting	
45	Boot swollen	
	Inflorescence emergence	
50	Upper 1 to 2 cm of inflorescence visible	
52	¼ of inflorescence emerged	
54	½ of inflorescence emerged	
56	¾ of inflorescence emerged	
58	Base of inflorescence just visible	
	Anthesis	
60	Preanthesis	Inflorescence-bearing internode is visible. No anthers are visible.
62	Beginning of anthesis	First anthers appear.
64	Maximum anthesis	Maximum pollen shedding.
66	End of anthesis	No more pollen shedding.
	Seed ripening	
75	Endosperm milky	Inflorescence green.
85	Endosperm soft doughy	No seeds loosening when inflorescence is hit on palm.
87	Endosperm hard doughy	Inflorescence losing chlorophyll; a few seeds loosening when inflorescence hit on palm.
91	Endosperm hard	Inflorescence-bearing internode-losing chlorophyll; seeds loosening in quantity when inflorescence hit on palm.
93	Endosperm hard and dry	Final stage of seed development; most seeds shed.

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

Description of the Tests

This report summarizes warm season annual studies (one in 2013, one in 2014, five in 2015, five in 2016, four in 2017 and four in 2018) and cool-season annual studies (four in 2013, one in 2015, one in 2016, two in 2017, and one in 2018) in Lexington. It also summarizes warm season annual studies (four in 2017

and two in 2018) in Princeton. The soils at Lexington (Maury) and Princeton (Crider) are well-drained silt loams and are well suited to annual grass production. Plots were 5 feet by 20 feet in a randomized complete block design with four replications with a harvested area of 5 feet by 15 feet. The wheat trial plots were 4 feet by 15 feet with a harvested area of 4 feet by 12 feet. All trials were sown into a prepared seedbed using a disk drill at the following rates (lb/acre): sudangrass (25), sorghum-sudangrass (30), forage sorghum (8), pearl millet (20), teff (5 for uncoated, 8 for coated), wheat (120), rye (110), oats (80) and triticale (100). Plots were harvested with a sickle-type forage plot harvester. Cutting height was 4 inches for teff and 6 inches for millet, sudangrass and sorghum-sudangrass. The cool season grasses were cut at a height of 3 inches. The forage sorghum was harvested by hand (the center 15 foot row). Fresh weight samples were taken at each harvest to calculate percent dry matter production. All tests were managed for establishment, fertility, pest control, and harvest according to University of Kentucky Cooperative Extension Service recommendations. See table footnotes for specific nitrogen application for each trial. Pests were controlled so that they would not limit yield. For example, for weed control in forage sorghum the herbicides atrazine and Dual were used, but using Dual requires that the seed first be treated with Concep to prevent seedling injury.

Table 4. Dry matter yields, percent stand, maturity and plant height of sudangrass varieties sown May 21, 2015, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Percent Stand Jun 17	Maturity[1] 2015 Jul 13	Plant Height (in)		Yield (DM tons/acre)			
				Jul 13	Sep 16	Jul 13	Aug 7	Sep 16	Total
Commercial Varieties-Available for Farm Use									
ProMax BMR[2]	Ampac Seed	100	33.8	57	39	1.37	1.00	0.95	3.31*
SS130 BMR	Cal/West Seeds	99	33.8	52	35	1.40	1.02	0.85	3.28*
FSG1000 BMR	Farm Science Genetics	94	33.3	50	35	1.06	1.06	0.89	3.01*
Monarch V	Public	100	33.5	52	31	1.30	1.05	0.60	2.95*
Piper	Public	98	33.5	53	39	1.13	0.91	0.78	2.82*
HayKing BMR	Cal/West Seeds	97	33.5	50	32	1.17	1.11	0.52	2.80*
Enorma BMR	Cal/West Seeds	97	33.0	47	32	1.14	0.99	0.61	2.73*
Experimental Varieties									
EG 666	Saddle Butte	100	33.0	42	42	0.99	1.14	1.15	3.28*
Mean		98	33.4	50	36	1.20	1.03	0.79	3.02
CV,%		2	1.8	7	15	17.96	14.77	27.25	15.32
LSD,0.05		3	0.9	6	8	0.32	0.22	0.32	0.68

[1] 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 3 for complete scale.
[2] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on June 3 and July 21 (Total of 100 lb of N/acre).

Results and Discussion

Weather data for Lexington and Princeton are presented in tables 1 and 2.

Yield data (on a dry-matter basis) for all tests are reported in tables 4 through 38. Varieties are listed in order from highest to lowest total production. Yields are given by cutting and as a total for the year. Statistical analyses were performed on all yield data to determine if the apparent differences are truly due to variety or just due to chance. Varieties not significantly different from the highest numerical value in a column are marked with one asterisk (*). 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

Table 5. Dry matter yields, seedling vigor, stand rating, plant height, and maturity of sudangrass varieties sown May 24, 2016, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 14	Percent Stand Jun 14	Maturity[2]		Plant Height (in)				Yield (DM tons/acre)				
				Jun 30	Jul 25	Jun 30	Jul 25	Aug 25	Oct 11	Jun 30	Jul 25	Aug 25	Oct 11	Total
Commercial Varieties-Available for Farm Use														
FSG1000 BMR[3]	Farm Science Genetics	4.9	100	32.3	32.0	44	39	38	32	0.99	1.19	0.99	0.86	4.03*
ProMax BMR	Ampac Seed	4.4	96	32.0	32.3	42	39	35	32	0.97	1.09	0.84	0.69	3.59*
SS130 BMR	Cal/West Seeds	4.9	100	31.8	31.5	37	33	34	28	0.88	0.94	0.95	0.75	3.52*
Enorma BMR	Cal/West Seeds	4.5	97	31.5	31.5	38	35	30	27	0.74	1.01	0.74	0.68	3.18
HayKing BMR	Cal/West Seeds	4.4	96	32.0	31.8	37	33	31	27	0.98	0.82	0.64	0.48	2.92
Piper	Public	4.9	100	31.8	31.5	41	35	29	29	0.94	0.68	0.54	0.56	2.73
Monarch V	Public	4.9	100	31.8	31.3	38	32	26	26	0.88	0.92	0.40	0.44	2.64
Experimental Varieties														
EG666	Saddle Butte	5.0	100	31.8	32.3	37	40	32	35	0.69	1.03	0.87	0.86	3.46*
Mean		4.7	99	31.8	31.8	39	36	32	29	0.88	0.96	0.75	0.67	3.26
CV,%		7.4	2	2.0	1.1	7	8	14	12	22.48	22.17	24.21	20.55	14.09
LSD,0.05		0.5	2	0.9	0.5	4	4	7	5	0.29	0.31	0.27	0.20	0.68

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on July 1, July 28 and August 31 (Total of 150 lb of N/acre).

Table 6. Dry matter yields, seedling vigor, percent stand, maturity, and plant height of sudangrass varieties sown May 17, 2017, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 14	Percent Stand		Maturity[2]			Plant Height (in)			Yield (DM tons/acre)			
			Jun 14	Oct 13	Jul 12	Aug 15	Oct 13	Jul 12	Aug 15	Oct 13	Jul 12	Aug 15	Oct 13	Total
Commercial Varieties-Available for Farm Use														
AS9302 BMR[3] (Brachytic Dwarf)	Alta Seeds/Ramer Seed	5.0	100	99	31.5	31.0	56.0	32	28	31	1.47	1.15	1.30	3.92*
FSG1000 BMR	Farm Science Genetics	4.1	99	80	33.3	33.3	47.5	44	44	33	1.17	1.46	0.83	3.46*
ProMax BMR	Ampac Seed	4.3	98	74	38.8	33.5	43.5	48	45	33	1.25	1.34	0.77	3.35*
SS130 BMR	Cal/West Seeds	4.8	100	73	33.3	33.0	47.3	43	41	28	1.40	1.26	0.46	3.12
Piper	Public	4.3	99	98	32.8	33.0	43.5	39	41	29	1.02	1.01	0.53	2.55
HayKing BMR	Cal/West Seeds	4.1	98	31	35.8	33.0	43.5	45	41	31	1.32	0.96	0.24	2.52
Mean		4.4	99	76	34.2	32.8	46.9	42	40	31	1.27	1.20	0.69	3.15
CV,%		12.9	1	25	10.3	.9	6.7	6	6	10	18.72	20.20	27.25	14.63
LSD,0.05		0.9	2	29	5.3	0.4	4.8	4	4	4	0.36	0.36	0.28	0.70

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 40 lb/A of actual nitrogen on May 18 and 60 lb/A of actual nitrogen on August 21 (Total of 100 lb of N/acre).

Table 7. Dry matter yields, seedling vigor, stand rating, maturity, and plant height of sudangrass varieties sown May 29, 2018, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 13	Percent Stand Jun 13	Maturity[2]				Plant Height (in)				Yield (tons/acre)				
				Jul 9	Aug 2	Aug 30	Oct 12	Jul 9	Aug 2	Aug 30	Oct 12	Jul 9	Aug 2	Aug 30	Oct 12	Total
Commercial Varieties-Available for Farm Use																
HayKing BMR[3]	Cal/West Seeds	4.6	99	34.0	32.5	37.5	45.0	66	53	46	47	2.38	2.11	1.31	1.37	7.16*
AS9302 BMR (Brachytic Dwarf)	Alta Seed / Ramer Seed	4.8	98	33.3	31.0	32.3	50.8	56	35	36	35	2.85	1.55	1.22	1.19	6.81*
ProMax BMR	Ampac Seed	3.8	93	34.0	32.8	45.0	45.0	69	56	49	41	2.16	2.09	1.35	1.06	6.66
Piper	Public	5.0	100	33.5	32.3	32.3	35.8	60	50	41	32	2.07	1.94	0.94	0.67	5.62
Mean		4.5	97	33.7	32.1	36.8	44.1	63	48	43	38	2.36	1.92	1.20	1.07	6.56
CV,%		7.9	2	1.0	1.2	15.3	7.6	3	5	5	10	5.73	7.60	16.30	15.83	4.26
LSD,0.05		0.6	4	0.5	0.6	9.0	5.4	3	4	3	6	0	0.23	0.31	0.27	0.45

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 60 lb/A of actual nitrogen on June1andJuly19 (Total of 120 lb of N/acre).

Table 8. Dry matter yields, seedling vigor, percent stand, maturity, and plant height of sudangrass varieties sown May 23, 2017, at Princeton, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 12	Percent Stand		Maturity[2]			Plant Height (in)			Yield (DM tons/acre)				
			Jun 12	Oct 25	Jul 11	Aug 14	Sep 21	Jul 11	Aug 14	Sep 21	Jul 11	Aug 14	Sep 21	Oct 25	Total
Commercial Varieties-Available for Farm Use															
AS9302 BMR[3] (Brachytic Dwarf)	Alta Seeds/Ramer Seed	4.5	100	98	32.5	31.8	46.3	54	47	36	3.09	1.64	1.20	1.02	6.95*
HayKing BMR	Cal/West Seeds	4.4	99	97	33.8	39.0	46.3	62	55	45	2.43	1.29	1.08	0.97	5.77*
ProMax BMR	Ampac Seed	3.8	95	93	35.0	45.0	45.0	68	62	47	2.51	1.21	1.04	0.81	5.56*
Piper	Public	4.5	100	95	33.8	35.3	45.0	62	47	38	2.48	0.97	0.83	0.73	5.01
Mean		4.3	98	96	33.8	37.8	45.6	61	53	41	2.63	1.28	1.04	0.88	5.82
CV,%		7.3	2	3	4.2	13.8	4.1	6	5	6	7.89	18.97	18.13	17.93	7.08
LSD,0.05		0.5	3	5	2.3	8.3	3.0	6	4	4	0.33	0.39	0.30	0.25	0.66

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 75 lb/A of actual nitrogen on May 30.

Table 9. Dry matter yields, seedling vigor, percent stand, maturity, and plant height of sorghum-sudangrass varieties sown May 21, 2015, at Lexington, Kentucky.

Variety	Proprietor/Distributor	Seedling Vigor[1] Jun 17	Percent Stand Jun 17	Maturity[2]		Plant Height (in)			Yield (DM tons/acre)			
				Jul 13	Aug 19	Jul 13	Aug 19	Oct 12	Jul 13	Aug 19	Oct 12	Total
Commercial Varieties-Available for Farm Use												
Super Sugar	Gayland Ward Seed	4.9	100	33.8	32.3	60	53	28	2.35	1.52	1.39	5.26*
SS211	Southern States	4.0	98	33.3	32.0	59	53	28	2.02	1.38	1.55	4.95*
FSG 215 BMR[3]	Farm Science Genetics	4.6	99	33.0	31.3	54	41	23	2.05	1.26	1.42	4.73*
FSG 214 BMR	Farm Science Genetics	4.6	100	33.8	31.8	57	46	25	2.05	1.26	1.40	4.71*
Special Effort	Public	3.4	95	33.8	32.3	60	56	30	1.78	1.31	1.58	4.67*
Nutra-King BMR	Gayland Ward Seed	4.9	100	33.0	31.5	53	39	20	2.23	1.19	1.19	4.61*
SweetSix BMR (Dry Stalk)	Gayland Ward Seed	4.9	100	32.8	31.8	54	43	23	1.92	1.14	1.23	4.29*
NutraPlus BMR	Public	3.9	98	32.8	31.5	50	37	22	1.74	1.19	1.11	4.04
GreenGrazer V	Farm Science Genetics	3.0	96	33.5	32.3	57	54	29	1.50	1.14	1.25	3.89
AS6503 BMR	Alta Seeds/Ramer Seed	4.0	100	32.5	31.0	40	30	22	1.75	0.86	1.17	3.78
Super Sugar (Delayed Maturity)	Gayland Ward Seed	3.9	100	33.3	31.3	50	41	23	1.69	0.95	0.81	3.46
Sweet-For-Ever BMR	Gayland Ward Seed	4.4	100	32.3	31.3	50	38	25	1.52	0.82	0.90	3.24
GW 300 BMR	Gayland Ward Seed	3.3	97	31.8	31.0	47	33	18	1.37	0.70	1.00	3.08
Mean		4.1	99	33.0	31.6	53	43	24	1.84	1.13	1.23	4.21
CV,%		15.6	2	1.7	1.4	7	12	9	18.08	22.23	28.49	16.48
LSD,0.05		0.9	2	0.8	0.6	5	7	3	0.48	0.36	0.50	0.99

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on June 3 and July 21 (Total of 100 lb of N/acre).

varieties are truly different when grown under the conditions at a given location. The coefficient of variation (CV), which is a measure of the variability of the data, is included for each column of means. Low variability is desirable, and increased variability within a study results in higher CVs and larger LSDs.

Tables 39, 40, 41, 42, 43 and 44 are summaries of yield data from 2008 to 2018 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 39, 40, 41, 42, 43,, and 44, but these comparisons do help to identify varieties for further consid-

Table 10. Dry matter yields, seedling vigor, stand rating, maturity, and plant height of sorghum-sudangrass varieties sown May 24, 2016, at Lexington, Kentucky.

Variety	Proprietor/ Distibutor	Seedling Vigor[1] Jun 14	Percent Stand Jun 14	Maturity[2]				Plant Height (in)				Yield (DM tons/acre)				
				Jun 30	Jul 18	Aug 10	Sep 28	Jun 30	Jul 18	Aug 10	Sep 28	Jun 30	Jul 18	Aug 10	Sep 28	Total
Commercial Varieties-Available for Farm Use																
SS211	Southern States	4.8	98	30.0	27.8	32.0	38.5	40	32	42	41	1.10	1.20	1.88	1.93	6.12*
HyGain	Turner Seed	4.6	100	30.0	29.5	33.3	61.5	41	34	41	45	1.10	1.08	1.86	2.05	6.08*
Nutra-King BMR[3]	Gayland Ward Seed	5.0	100	30.0	26.0	33.8	51.0	38	29	38	39	1.20	0.98	1.91	1.86	5.95*
Super Sugar BMR	Gayland Ward Seed	4.1	98	29.5	31.5	32.0	35.0	37	33	41	42	0.94	1.23	1.69	2.07	5.93*
Sweet-For-Ever BMR	Gayland Ward Seed	5.0	100	29.5	31.3	31.8	35.0	38	34	41	29	1.15	1.05	1.94	1.63	5.77*
GreenGrazer V	Farm Science Genetics	4.9	100	29.0	25.8	32.0	58.0	40	28	38	41	1.27	1.05	1.68	1.71	5.71*
GW 300 BMR	Gayland Ward Seed	4.8	100	30.5	28.0	32.3	52.5	39	32	41	44	1.17	1.12	1.47	1.85	5.61*
SweetSix BMR	Gayland Ward Seed	3.3	59	29.5	30.3	35.5	59.0	31	38	40	48	0.56	1.37	1.45	1.67	5.05
Super Sugar	Gayland Ward Seed	3.8	97	29.5	29.5	35.8	53.8	32	32	32	41	0.75	1.16	1.18	1.64	4.72
Surpass BMR	Turner Seed	4.8	99	29.5	31.0	36.5	60.0	30	31	29	40	0.85	1.10	1.11	1.33	4.38
Mean		4.5	95	29.7	29.1	33.5	50.4	36	32	38	41	1.01	1.13	1.62	1.77	5.53
CV,%		8.1	8	3.5	10.7	15.1	10.0	11	13	7	21	31.96	15.20	14.83	19.69	10.95
LSD,0.05		0.5	11	1.5	4.5	7.3	7.3	6	6	4	12	0.47	0.25	0.35	0.51	0.88

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on July 1, July 28 and August 31 (Total of 150 lb of N/acre).

Table 11. Dry matter yields, seedling vigor, percent stand, maturity, and stand height of sorghum-sudangrass varieties sown May 17, 2017, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 14	Percent Stand		Maturity[2]			Plant Height (in)			Yield (DM tons/acre)			
			Jun 14	Oct 13	Jul 3	Aug 3	Sep 25	Jul 3	Aug 3	Sep 25	Jul 3	Aug 3	Sep 25	Total
Commercial Varieties-Available for Farm Use														
HyGain	Turner Seed	4.9	100	100	31.8	40.8	46.3	44	47	50	1.74	2.09	1.74	5.56*
SS211	Southern States	4.3	99	98	31.3	34.5	45.0	44	43	41	1.71	2.05	1.55	5.32*
KFSugar-Pro55S	Byron Seed	4.5	99	98	31.0	40.0	50.8	39	40	39	1.77	1.73	1.32	4.83
GreenGrazer V	Farm Science Genetics	5.0	100	100	31.3	40.0	45.0	42	42	41	1.70	1.60	1.51	4.81
Sweet-For-Ever BMR[3]	Gayland Ward Seed	4.6	99	88	30.5	40.5	46.3	41	39	38	1.64	1.71	1.32	4.67
AS6504 BMR6 (Dry Stalk)	Alta Seeds/Ramer Seed	4.6	99	91	30.0	34.0	37.0	35	41	38	1.26	1.82	1.55	4.63
GW 300 BMR	Gayland Ward Seed	3.9	97	96	30.5	35.8	50.3	40	41	47	1.34	1.43	1.63	4.40
NutraKing BMR	Public	4.0	98	93	30.0	34.8	47.3	38	36	35	1.54	1.48	1.19	4.21
SuperSugar (Delayed Maturity)	Gayland Ward Seed	4.0	100	100	29.0	33.8	39.0	32	36	36	1.08	1.49	1.33	3.90
Surpass BMR	Turner Seed	4.8	100	98	29.0	35.0	45.0	32	31	29	1.15	1.24	1.31	3.70
AS6402 BMR (Brachytic Dwarf)	Alta Seeds/Ramer Seed	3.8	97	97	29.0	31.5	37.8	29	33	27	0.94	1.41	1.16	3.50
SweetSix BMR (Dry Stalk)	Gayland Ward Seed	3.6	98	43	29.5	31.8	41.0	31	36	26	1.19	1.33	0.62	3.14
Experimental Varieties														
X50643	Scott Seed	5.0	100	95	30.0	31.3	40.5	36	33	41	1.78	1.55	2.24	5.57*
X54243	Scott Seed	4.9	100	100	30.0	31.5	39.0	38	34	41	1.60	1.49	2.34	5.43*
X5062	Scott Seed	5.0	100	99	31.3	34.8	47.5	41	41	45	1.91	1.82	1.62	5.35*
X50644	Scott Seed	4.5	100	100	29.0	32.3	37.3	29	38	33	1.42	2.04	1.54	5.00*
X51214	Scott Seed	3.5	98	98	31.0	37.8	45.0	41	47	44	1.29	1.83	1.43	4.55
X50651	Scott Seed	4.5	100	97	29.0	33.3	50.8	29	34	37	1.27	1.61	1.65	4.53
X50652	Scott Seed	4.3	100	100	29.0	31.3	37.3	25	32	31	0.91	1.74	1.51	4.16
X5129	Scott Seed	4.4	100	96	29.5	38.0	40.5	34	36	40	1.34	1.38	1.44	4.16
Mean		4.4	99	94	30.1	35.1	43.4	36	38	38	1.43	1.64	1.50	4.57
CV,%		12.6	1	7	2.3	12.9	9.5	10	9	16	19.71	14.96	18.14	11.09
LSD,0.05		0.8	2	9	1.0	6.4	5.9	5	5	9	0.40	0.35	0.39	0.72

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 40 lb/A of actual nitrogen on May 18 and 60 lb/A of actual nitrogen on July 3 (Total of 100 lb of N/acre).

eration. Varieties that have performed better than average over many years and at several locations have very stable performance in comparison to varieties that have only been tested at one location or for one year.

Summary

Warm and cool season annual grasses can be an important supplemental source of pasture, hay, and silage in Kentucky. Varieties should be selected for their seasonal and total yield characteristics and for their suitability for the method of harvest to be employed (pasture, hay, or silage). Make sure seed of the chosen variety is properly labeled and will be available when needed.

The following is a list of University of Kentucky Cooperative Extension publications related to annual grass management. They are available from your county Extension office and are listed in the "Publications" section of the UK Forage website, forages.ca.uky.edu.

- Lime and Fertilizer Recommendations (AGR-1)
- Grain and Forage Crop Guide for Kentucky (AGR-18)
- Establishing Forage Crops (AGR-64)
- Warm Season Annual Grasses in Kentucky. (AGR-88)
- Extending Grazing and Reducing Stored Feed Needs (AGR-199)
- Managing Small Grains for Livestock Forage (AGR-160)

About the Authors

G.L. Olson is a research specialist, S.R. Smith and J.C. Henning are Extension professors and forage specialists, C.D. Teutsch is an Extension associate professor and forage specialist, and B. Bruening is a research specialist in small grain variety testing.

Table 12. Dry matter yields, seedling vigor, stand rating, maturity, and plant height of sorghum-sudangrass varieties sown May 29, 2018, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 13	Percent Stand		Maturity[2]				Plant Height (in)				Yield (tons/acre)				
			Jun 13	Oct 12	Jul 9	Aug 2	Aug 30	Oct 12	Jul 9	Aug 2	Aug 30	Oct 12	Jul 9	Aug 2	Aug 30	Oct 12	Total
Commercial Varieties-Available for Farm Use																	
SS211	Southern States	3.5	86	86	32.8	15.8	32.5	42.0	72	44	44	42	2.13	2.28	1.69	1.44	7.54*
Hygain	Turner Seed	3.6	97	97	33.0	15.8	33.0	41.8	68	44	43	37	2.23	2.23	1.62	1.36	7.45*
NutraKing BMR[3]	Public	4.6	99	99	32.8	15.0	32.0	45.0	63	38	38	31	2.60	2.01	1.58	1.05	7.24*
SweetSix BMR (Dry Stalk)	Gayland Ward Seed	5.0	100	100	33.0	14.5	35.3	47.5	62	34	38	32	2.47	2.00	1.46	0.92	6.85*
SuperSugar (Delayed Maturity)	Gayland Ward Seed	4.4	100	100	32.8	15.0	32.3	33.0	68	38	41	38	2.26	1.71	1.43	1.24	6.64
AS6504 BMR (Dry Stalk)	Alta Seed/ Ramer Seed	4.3	98	95	31.8	15.0	32.0	35.0	58	35	39	29	2.59	1.64	1.58	0.74	6.55
GW300 BMR	Gayland Ward Seed	3.4	96	96	32.8	14.8	32.8	45.0	74	37	43	40	2.36	1.50	1.41	0.96	6.24
SweetForEver BMR	Gayland Ward Seed	4.6	98	60	31.8	14.5	32.0	35.0	63	35	39	29	2.45	1.34	1.02	0.49	5.31
AS6402 BMR (Brachytic Dwarf)	Alta Seed/ Ramer Seed	4.4	96	96	32.0	14.8	32.0	45.0	53	32	36	26	1.93	1.26	1.33	0.70	5.21
Surpass BMR	Turner Seed	4.4	89	89	31.0	14.0	36.5	44.0	53	31	38	26	1.79	1.22	1.15	0.65	4.82
Mean		4.2	96	92	32.4	14.9	33.0	41.3	63	37	40	33	2.28	1.72	1.43	0.96	6.39
CV,%		12.3	8	11	1.7	5.2	10.3	12.7	6	6	7	13	9.80	10.16	14.61	22.12	8.41
LSD,0.05		0.8	11	15	0.8	1.1	4.9	7.6	6	3	4	6	0.32	0.25	0.30	0.31	0.78

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 60 lb/A of actual nitrogen on June1andJuly19 (Total of 120 lb of N/acre).

Table 13. Dry matter yields, seedling vigor, percent stand, maturity, and stand height of sorghum-sudangrass varieties sown May 23, 2017, at Princeton, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 12	Percent Stand		Maturity[2]			Plant Height (in)			Yield (DM tons/acre)				
			Jun 12	Oct 25	Jul 11	Aug 14	Sep 21	Jul 11	Aug 14	Sep 21	Jul 11	Aug 14	Sep 21	Oct 25	Total
Commercial Varieties-Available for Farm Use															
HyGain	Turner Seed	4.8	98	100	34.5	33.0	45.0	69	59	41	2.92	1.83	1.36	1.01	7.11*
AS6504 BMR[3] (Dry Stalk)	Alta Seed/Ramer Seed	4.4	95	89	32.0	31.8	39.0	60	49	36	2.92	1.66	1.14	0.52	6.23
SS211	Southern States	4.6	94	83	34.0	32.3	43.5	71	54	41	2.58	1.52	1.21	0.63	5.94
FSG214 BMR	Farm Science Genetics	5.0	98	95	36.5	35.5	45.0	70	54	39	2.71	1.59	0.93	0.70	5.94
NutraKing BMR	Public	4.9	98	98	33.8	33.8	45.0	65	51	35	2.88	1.71	0.83	0.52	5.93
SweetSix BMR (Dry Stalk)	Gayland Ward	4.8	98	94	36.5	32.0	43.5	65	50	34	2.72	1.36	0.89	0.65	5.62
AS6402 BMR (Brachytic Dwarf)	Alta Seed/Ramer Seed	4.9	95	94	31.5	31.8	39.0	53	44	32	2.47	1.34	0.92	0.64	5.37
SuperSugar (Delayed Maturity)	Gayland Ward	4.6	99	99	32.8	32.0	40.5	67	49	37	2.24	1.21	1.05	0.71	5.21
SuperSugar	Gayland Ward	4.1	96	96	36.0	38.8	45.0	65	56	40	2.10	1.02	1.07	0.80	4.99
Surpass BMR	Turner Seed	4.6	96	96	31.8	30.8	42.0	51	36	32	2.26	0.86	0.87	0.85	4.84
GW300 BMR	Gayland Ward	3.9	96	94	33.3	32.3	45.0	68	53	40	1.96	1.00	0.73	0.60	4.30
Sweet-For-Ever-BMR	Gayland Ward	4.4	96	25	32.8	31.0	35.0	67	41	28	2.70	0.96	0.38	0.16	4.20
Experimental Varieties															
X54243	Scott Seed	4.6	100	100	33.3	31.0	45.0	63	38	45	2.96	1.25	1.81	1.18	7.20*
X51214	Scott Seed	4.3	98	98	33.8	32.8	43.5	68	60	38	2.62	1.74	1.12	1.19	6.67*
X50643	Scott Seed	4.9	99	100	32.8	31.0	39.0	61	39	41	3.11	1.16	1.36	0.98	6.61*
X5062	Scott Seed	4.9	99	99	33.8	32.0	43.5	64	50	38	2.74	1.45	1.06	0.60	5.85
X50652	Scott Seed	4.9	99	99	31.5	30.5	37.3	47	35	32	2.75	0.91	1.27	0.86	5.78
X50651	Scott Seed	4.3	96	98	32.3	31.0	45.0	50	38	29	2.63	1.05	1.07	0.75	5.51
X5129	Scott Seed	4.4	98	96	32.3	31.8	40.5	62	44	34	2.52	1.14	0.97	0.79	5.42
X50644	Scott Seed	4.8	97	97	31.5	30.5	39.0	50	36	35	2.58	0.96	1.21	0.54	5.30
Mean		4.6	97	92	33.3	32.3	42.0	62	47	36	2.62	1.29	1.06	0.73	5.70
CV,%		8.4	2	7	7.2	7.6	5.4	5	10	8	10.94	16.92	24.25	34.29	10.16
LSD,0.05		0.5	3	9	3.4	3.5	3.2	4	7	4	0.41	0.31	0.36	0.36	0.82

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 75 lb/A of actual nitrogen on May 30

Table 14. Dry matter yields and plant height of sorghum-sudangrass and sudangrass varieties sown June 8, 2018, at Princeton, Kentucky.

Variety	Species	Proprietor/ Distributor	Plant Height (in)		Yield (DM tons/acre)		
			Jul 25	Sep 4	Jul 25	Sep 4	Total
Commercial Varieties-Available for Farm Use							
NutraKing BMR[1]	sorghum-sudangrass	Public	54	60	1.81	1.14	2.96*
AS6504 BMR (Dry Stalk)	sorghum-sudangrass	Alta Seed/Ramer Seed	44	59	1.65	1.27	2.91*
FSG214 BMR	sorghum-sudangrass	Farm Science Genetics	54	68	1.60	1.27	2.87*
HyGain	sorghum-sudangrass	Turner Seed	53	65	1.42	1.38	2.80*
Sweet Six BMR (Dry Stalk)	sorghum-sudangrass	Gayland Ward Seed	52	63	1.67	1.13	2.80*
AS6402 BMR (Brachytic Dwarf)	sorghum-sudangrass	Alta Seed/Ramer Seed	44	50	1.44	1.12	2.55*
Surpass BMR	sorghum-sudangrass	Turner Seed	46	53	1.65	0.87	2.52*
AS9302 BMR (Brachytic Dwarf)	sudangrass	Alta Seed/Ramer Seed	45	57	1.22	1.22	2.44
SS211	sorghum-sudangrass	Southern States	56	73	1.22	1.05	2.27
Super Sugar (Delayed Maturity)	sorghum-sudangrass	Gayland Ward Seed	48	67	1.21	0.94	2.15
Sweet Forever BMR	sorghum-sudangrass	Gayland Ward Seed	55	61	1.32	0.81	2.13
Piper	sudangrass	Public	54	80	0.98	1.09	2.06
Promax BMR	sudangrass	Ampac Seed	53	74	0.76	1.00	1.76
Mean			51	64	1.38	1.10	2.48
CV,%			6	5	14.76	23.06	13.54
LSD,0.05			4	4	0.29	0.36	0.48

[1] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 60 lb/A of actual nitrogen on June 8 and July 26.

Table 15. Dry matter yields, seedling vigor, percent stand, maturity, and plant height of pearl millet varieties sown May 21, 2015, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 17	Percent Stand Jun 17	Maturity[2]		Plant Height (in)			Yield (DM tons/acre)			
				Jul 20	Aug 20	Jul 20	Aug 20	Oct 12	Jul 20	Aug 20	Oct 12	Total
Commercial Varieties-Available for Farm Use												
FSG 300	Farm Science Genetics	4.8	99	31.0	51.3	41	35	28	3.09	1.08	1.71	5.88*
Tifleaf III Hybrid	Gayland Ward Seed	4.6	100	31.0	51.5	38	30	27	3.36	0.95	1.48	5.79*
SS635	Southern States	4.3	98	31.0	54.5	38	35	30	2.86	1.14	1.44	5.45*
FSG 315 BMR[3] (Dwarf)	Farm Science Genetics	4.6	99	31.0	56.0	35	41	24	2.66	1.51	1.27	5.43*
SS501	Southern States	4.8	95	45.0	49.8	63	36	35	3.01	1.00	1.11	5.13*
Pennleaf Hybrid	Pennington Seed	4.3	92	31.0	53.3	35	35	27	2.60	1.11	1.35	5.07*
PP102M Hybrid	Cisco	4.3	96	52.0	56.5	62	30	25	3.03	0.87	0.94	4.84
Mean		4.5	97	36.0	53.3	44	35	28	2.95	1.10	1.33	5.37
CV,%		11.0	2	0.0	9.0	8	19	7	8.23	23.81	28.37	11.05
LSD,0.05		0.7	3	0.0	7.1	5	10	3	0.36	0.39	0.56	0.88

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on June 3 and July 27 (Total of 100 lb of N/acre).

Table 16. Dry matter yields, stand rating, seedling vigor, maturity, and plant height of pearl millet varieties sown May 24, 2016, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 14	Percent Stand Jun 14	Maturity[2]			Plant Height (in)			Yield (DM tons/acre)			
				Jul 25	Aug 25	Oct 11	Jul 25	Aug 25	Oct 11	Jul 25	Aug 25	Oct 11	Total
Commercial Varieties-Available for Farm Use													
SS635	Southern States	5.0	99	30.0	60.5	58.0	34	36	26	1.21	1.46	0.89	3.57*
Tifleaf III Hybrid	Gayland Ward Seed	5.0	100	31.3	61.0	59.0	32	37	24	1.22	1.49	0.85	3.55*
Leafy22 Hybrid	Turner Seed	3.9	92	29.5	59.0	58.0	33	40	29	1.03	1.31	0.89	3.23*
FSG 315 BMR[3] (Dwarf)	Farm Science Genetics	4.3	100	27.5	52.3	66.0	26	29	26	0.81	1.27	1.06	3.14*
FSG 300 Hybrid	Farm Science Genetics	3.3	91	31.5	60.5	59.5	32	39	26	0.88	1.47	0.69	3.04*
Pennleaf Hybrid	Pennington Seed	3.6	81	31.3	58.0	60.0	32	38	23	0.95	1.32	0.68	2.95*
SS501	Southern States	4.6	96	47.5	54.3	61.5	47	32	28	1.31	0.78	0.54	2.63
PP102M Hybrid	Cisco	3.5	86	56.0	57.0	62.0	41	33	21	1.15	0.88	0.40	2.43
Experimental Varieties													
Exp10220	Gayland Ward Seed	4.8	99	29.3	51.0	65.5	27	29	27	1.01	1.42	0.94	3.37*
Mean		4.2	94	34.9	57.1	61.1	34	35	25	1.06	1.27	0.77	3.10
CV,%		16.2	8	12.7	7.8	3.5	9	14	10	26.91	18.64	20.54	15.00
LSD,0.05		1.0	11	6.5	6.5	3.1	5	7	4	0.42	0.34	0.23	0.68

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on July 1, July 28 and August 31 (Total of 150 lb of N/acre).

Table 17. Dry matter yields, stand rating, seedling vigor, maturity, and plant height of pearl millet varieties sown May 17, 2017, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 14	Percent Stand		Maturity[2]		Plant Height (in)		Yield (DM tons/acre)		
			Jun 14	Oct 27	Jul 19	Sep 11	Jul 19	Sep 11	Jul 19	Sep 11	Total
Commercial Varieties-Available for Farm Use											
Leafy22 Hybrid	Turner Seed	5.0	100	85	30.3	72.8	32	33	1.35	2.47	3.81*
Tifleaf III Hybrid	Gayland Ward Seed	4.3	99	76	30.8	75.0	34	35	1.28	2.40	3.68*
FSG 300 Hybrid	Farm Science Genetics	3.4	98	78	31.3	70.0	36	41	1.22	2.13	3.35*
SS635	Southern States	4.1	100	76	30.5	72.8	32	35	0.97	1.91	2.89
SS501	Southern States	4.3	100	70	38.8	66.0	45	29	1.15	1.74	2.89
PP102M Hybrid	Cisco Seeds	3.8	99	43	58.5	72.3	51	27	1.37	1.39	2.76
Pennleaf Hybrid	Pennington Seed	3.3	97	51	29.0	75.0	26	29	0.83	1.84	2.67
FSG 315 BMR[3] (Dwarf)	Farm Science Genetics	3.9	98	95	29.0	70.5	27	29	0.87	1.63	2.50
Mean		4.0	99	72	34.8	71.8	35	62	1.13	1.94	3.07
CV,%		12.8	1	22	8.3	5.1	11	11	19.99	16.32	14.79
LSD,0.05		0.8	2	24	4.2	5.4	6	5	0.33	0.46	0.67

[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 3 for complete scale.
[3] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 40 lb/A of actual nitrogen on May 18 and 60 lb/A of actual nitrogen on August 21 (Total of 100 lb of N/acre).

Table 18. Dry matter yields, seedling vigor, stand rating, maturity, and plant height of pearl millet varieties sown May 29, 2018, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 13	Percent Stand Jun 13	Maturity[2]				Plant Height (in)				Yield (tons/acre)				
				Jul 13	Aug 9	Sep 12	Oct 12	Jul 13	Aug 9	Sep 12	Oct 12	Jul 13	Aug 9	Sep 12	Oct 12	Total
Commercial Varieties-Available for Farm Use																
Tifleaf III Hybrid	Gayland Ward Seed	4.9	98	18.3	52.0	50.0	58.0	38	43	30	24	1.93	3.12	1.09	1.27	7.41*
SS635	Southern States	4.5	99	17.5	48.8	48.0	56.0	38	41	29	23	1.88	2.70	1.28	1.33	7.18*
Leafy22 Hybrid	Turner Seed	5.0	100	18.5	46.3	50.5	57.0	38	43	32	25	1.80	2.72	1.26	1.27	7.06*
Pennleaf Hybrid	Pennington Seed	3.8	95	17.3	48.5	50.5	56.0	35	41	32	25	1.73	2.56	1.10	1.00	6.39
SS501	Southern States	4.1	91	35.5	42.0	54.5	56.0	56	41	42	26	2.05	1.88	1.27	0.90	6.11
PP102M Hybrid	Cisco Seeds	3.6	94	38.3	54.5	57.0	57.5	51	35	36	22	1.95	1.90	1.25	0.83	5.91
SweetSummer	Cisco Seeds	3.9	92	17.0	39.0	53.5	55.5	33	31	26	20	1.60	2.24	0.95	0.85	5.64
Mean		4.3	96	23.2	47.2	52.0	56.6	41	39	32	23	1.85	2.44	1.17	1.06	6.53
CV,%		8.4	3	26.0	5.0	9.5	3.4	3	7	10	10	5.96	8.13	15.13	11.69	5.65
LSD,0.05		0.5	5	8.9	3.5	7.4	2.9	2	4	5	4	0.16	0.30	0.26	0.18	0.55

[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 3 for complete scale.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 60 lb/A of actual nitrogen on June1andJuly19 (Total of 120 lb of N/acre).

Table 19. Dry matter yields, stand rating, maturity, and plant height of pearl millet varieties sown May 23, 2017, at Princeton, Kentucky.

Variety	Proprietor/ Distributor	Percent Stand Oct 25	Maturity[1] Aug 1	Plant Height (in) Aug 1	Yield (DM tons/acre)		
					Aug 1	Oct 25	Total
Commercial Varieties-Available for Farm Use							
FSG 300 Hybrid	Farm Science Genetics	95	52.5	54	2.18	1.85	4.02*
Leafy22 Hybrid	Turner Seed	97	44.5	47	2.39	1.56	3.95*
Tifleaf III Hybrid	Gayland Ward Seed	93	45.8	51	2.26	1.68	3.93*
SS635	Southern States	93	38.3	46	2.14	1.55	3.69*
FSG 315 BMR[2] (Dwarf)	Farm Science Genetics	93	31.5	33	1.71	1.62	3.33*
SS501	Southern States	68	54.5	65	2.38	0.70	3.07
Pennleaf Hybrid	Pennington Seed	76	51.8	43	1.76	1.14	2.90
PP102M Hybrid	Cisco Seeds	50	58.0	68	2.10	0.53	2.64
Mean		83	47.1	51	2.12	1.33	3.44
CV,%		15	13.5	13	17.03	26.44	14.42
LSD,0.05		19	9.3	10	0.53	0.52	0.73

[1] 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 3 for complete scale.
[2] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 75 lb/A of actual nitrogen on May 30.

Table 20. Dry matter yields and plant height of pearl millet varieties sown June 8, 2018, at Princeton, Kentucky.

Variety	Proprietor/ Distibutor	Plant Height (in)		Yield (DM tons/acre)		
		Jul 26	Sep 17	Jul 26	Sep 17	Total
Commercial Varieties-Available for Farm Use						
SS635	Southern States	51	42	2.59	0.64	3.23*
Tifleaf III Hybrid	Gayland Ward Seed	48	46	2.48	0.68	3.16*
PP102M Hybrid	Cisco Seeds	65	49	2.28	0.64	2.93*
Leafy22 Hybrid	Turner Seed	53	47	2.27	0.56	2.83*
Wonderleaf	Alta Seed	62	51	2.30	0.52	2.82*
SS501	Southern States	65	60	1.93	0.79	2.72*
PennLeaf Hybrid	Pennington Seed	49	43	2.05	0.58	2.63*
Sweet Summer	Cisco Seeds	42	43	1.66	0.73	2.39*
Mean		55	48	2.19	0.63	2.82
CV,%		7	12	27.83	50.09	22.08
LSD,0.05		5	8	0.90	0.47	0.92

*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 60 lb/A actual nitrogen on June 8 and July 26.

Table 21. Dry matter yields, seedling vigor, percent stand, heading date, plant height, and maturity of forage sorghum varieties sown May 21, 2015, at Lexington, Kentucky.

Variety		Seedling Vigor[1] Jun 17	Percent Stand Jun 17	Heading Date[2]	Plant Height (ft) Sep 25	Maturity[3] Sep 25	Yield (DM tons/ acre) Sep 25
Commercial Varieties-Available for Farm Use							
SS405	Chromatin	4.5	100	Sep 6	9.8	88.0	9.78*
GW-400 BMR[4]	Gayland Ward Seed	4.3	99	Aug 10	7.3	92.5	6.86
FSG114 BMR	Farm Science Genetics	4.5	99	Aug 12	7.6	90.5	6.84
GW-2120	Gayland Ward Seed	3.9	100	Aug 16	6.8	90.0	6.04
GW-600 BMR	Gayland Ward Seed	4.6	100	Aug 9	8.1	90.0	5.92
NK300	Chromatin	4.1	99	Aug 17	6.9	89.5	5.86
Ensilemaster	Caudill Seed	3.6	95	Aug 24	7.8	89.8	5.40
AF7201 BMR	Alta Seeds/Ramer Seed	4.8	100	Aug 10	7.0	87.5	5.38
SD1741 BMR	Chromatin	4.4	99	Aug 12	7.6	81.5	4.90
AF7401 BMR	Alta Seeds/Ramer Seed	4.6	100	Aug 19	5.4	84.8	4.83
1990	Chromatin	3.4	86	–	7.4	29.0	4.74
FSG115 BMR (Brachytic Dwarf)	Farm Science Genetics	3.6	97	Aug 26	4.5	87.0	1.68
SiloPro BMR (Dwarf)	Gayland Ward Seed	3.3	98	Sep 1	4.4	82.0	1.27
Experimental Varieties							
Exp4020	Gayland Ward Seed	3.3	91	Sep 3	4.8	87.7	2.48
Mean		4.1	97	Aug 20	6.9	87.8	5.19
CV,%		11.9	4	6 days	13.4	6.0	24.30
LSD,0.05		0.7	6	7 days	1.3	7.5	1.81

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
[2] Approximately 50% of heads fully emerged. Those without a date are photoperiod sensitive and remain vegetative all season.
[3] Maturity rating scale: 45 = boot swollen, 62 = beginning of pollen shed, 75 = endosperm milky, 93 = endosperm hard and dry. See Table 3 for complete scale.
[4] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on June 3.

Table 22. Dry matter yields, seedling vigor, stand rating, heading date, plant height, lodging, and maturity of forage sorghum varieties sown May 24, 2016, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seeding Rate (seeds/acre)	Seedling Vigor[1] Jun 14	Percent Stand Jun 14	Heading Date[2]	Plant Height (ft) Sep 15	Lodging[3] Sep 15	Maturity[4] Sep 15	Yield (DM tons/ acre) Sep 15
Commercial Varieties-Available for Farm Use									
SS405	Chromatin	80000	5.0	91	Aug 12	10.9	0.0	87.5	14.22*
1990	Chromatin	80000	4.1	86	–	10.3	0.0	29.0	8.24
Ensilemaster	Caudill Seed	80000	4.1	71	Aug 17	9.8	5.0	89.5	7.29
SD1741 BMR[5]	Chromatin	80000	4.3	89	Jul 31	8.5	0.0	85.0	7.11
NK300	Chromatin	80000	4.0	88	Aug 9	7.1	8.0	89.5	6.96
FSG114 BMR	Farm Science Genetics	80000	3.6	78	Aug 7	8.4	1.3	92.5	6.43
GW-600 BMR	Gayland Ward Seed	60000	2.8	40	Aug 7	8.6	6.5	87.5	6.17
AF7201 BMR	Alta Seed/Ramer Seed	80000	4.4	87	Jul 30	8.1	0.0	93.0	6.11
GW-2120	Gayland Ward Seed	80000	2.3	28	Aug 8	8.0	1.5	91.0	5.76
AF7401 BMR	Alta Seed/Ramer Seed	80000	4.0	75	Aug 16	5.9	4.8	87.5	5.74
GW-400 BMR	Gayland Ward Seed	75000	2.3	30	Aug 7	8.1	6.0	89.5	5.37
SiloPro BMR (Dwarf)	Gayland Ward Seed	65000	3.6	66	Aug 13	6.3	0.0	91.0	5.09
FSG115 BMR (Brachytic Dwarf)	Farm Science Genetics	80000	3.5	80	Aug 14	6.3	0.0	89.0	4.97
Experimental Varieties									
Exp10216	Gayland Ward Seed	75000	3.1	73	Aug 6	8.5	1.8	89.0	6.55
Mean			3.6	70	Aug 9	8.2	2.5	89.3	6.86
CV,%			15.6	13	5 days	6.5	46.5	3.7	25.93
LSD,0.05			0.8	13	5 days	0.8	1.7	4.7	2.54

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
[2] Approximately 50% of heads fully emerged. Those without a date are photoperiod sensitive and remain vegetative all season.
[3] Lodging score based on a scale of 0 to 9. 0 indicating no lodging and 9 indicating all plants lodged.
[4] Maturity rating scale: 45 = boot swollen, 62 = beginning of pollen shed, 75 = endosperm milky, 93 = endosperm hard and dry. See Table 3 for complete scale.
[5] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on July 1.

Table 23. Dry matter yields, seedling vigor, stand rating, heading date, aphid damage, plant height, and maturity of forage sorghum varieties sown May 17, 2017, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 14	Percent Stand Jun 14	Heading Date[2]	Sugarcane Aphid Injury[3] Sep 21	Plant Height(ft) Sep 21	Maturity[4] Sep 21	Yield (DM tons/ acre) Sep 21
Commercial Varieties-Available for Farm Use								
SS405	Chromatin	4.3	82	Aug 24	4	10.8	82.5	10.25*
1990	Chromatin	3.8	64	–	2	10.0	29.0	9.29
FSG114BMR[5]	Farm Science Genetics	3.9	82	Aug 3	5	8.9	93.0	9.24
NK300	Chromatin	4.3	89	Aug 13	8	6.5	91.5	8.61
Ensilemaster	Caudill Seed	3.1	70	Aug 23	5	9.2	80.8	8.25
GW2120	Gayland Ward Seed	2.0	43	Aug 6	5	9.0	93.0	7.93
GW400 BMR	Gayland Ward Seed	3.9	82	Aug 1	4	8.9	89.5	6.75
AF7401 BMR (Brachytic Dwarf)	Alta Seed/Ramer Seed	3.5	88	Aug 19	4	5.8	88.0	6.37
FSG115 BMR (Brachytic Dwarf)	Farm Science Genetics	3.9	70	Aug 19	6	6.8	83.0	6.03
SD1741 BMR	Chromatin	4.3	85	Jul 31	3	9.3	91.0	5.97
XF7203 BMR (Brachytic Dwarf)	Alta Seed/Ramer Seed	3.8	86	Aug 1	9	5.9	93.0	5.50
KFFiber-Pro70FS	Byron Seed	3.5	74	Aug 20	4	6.6	75.0	4.80
Experimental Varieties								
X50711	Scott Seed	4.3	89	Aug 18	6	9.6	82.5	11.89*
X50644	Scott Seed	4.3	94	–	3	8.4	29.0	9.20
X5063	Scott Seed	3.0	63	Aug 8	4	8.8	92.5	8.38
X51423	Scott Seed	3.4	76	Aug 13	7	8.6	88.5	7.83
X50652	Scott Seed	3.6	96	–	2	6.8	29.0	6.80
X50610	Scott Seed	4.0	82	Aug 15	5	5.9	75.0	6.54
Mean		3.7	78	Aug 12	5	8.1	73.5	7.76
CV,%		25.4	23	5	33	8.0	9.3	21.35
LSD,0.05		1.3	25	6	2	1.0	5.5	2.35

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
[2] Approximately 50% of heads fully emerged. Those without a date are photoperiod sensitive and remain vegetative all season.
[3] Aphid damage score based on a scale of 1 to 9 with 9 indicating all leaves affected by aphids.
[4] Maturity rating scale: 45 = boot swollen, 62 = beginning of pollen shed, 75 = endosperm milky, 93 = endosperm hard and dry. See Table 3 for complete scale.
[5] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on May 18.

Table 24. Dry matter yields, seedling vigor, stand rating, heading date, plant height, lodging, and maturity of forage sorghum varieties Sown May 29, 2018, at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor[1] Jun 13	Percent Stand Jun 13	Heading Date[2]	Lodging[3] Sep 18	Plant Height(ft) Sep 18	Maturity[4] Sep 18	Yield (DM tons/ acre) Sep 18
Commefcial Varieties-Available for Farm Use								
SS405	Chromatin	3.8	94	Aug 29	0.0	14.0	87.0	14.05*
1990	Chromatin	3.5	92		0.0	13.6	29.0	12.29*
NK300	Chromatin	4.5	96	Aug 19	3.3	7.1	91.0	9.39
Ensilemaster	Caudill Seed	3.5	86	Aug 24	2.3	12.0	91.0	8.98
FSG114 BMR[5]	Farm Science Genetics	3.3	93	Aug 5	4.8	7.9	93.5	6.31
GW600 BMR	Gayland Ward Seed	4.0	95	Aug 4	7.0	9.9	93.0	6.26
GW400 BMR	Gayland Ward Seed	3.1	86	Aug 3	8.5	8.5	93.0	6.14
GW2120	Gayland Ward Seed	2.5	85	Aug 6	0.3	9.4	91.0	6.11
SD1741 BMR	Chromatin	4.5	99	Aug 2	0.8	9.3	85.5	5.82
GW475 BMR	Gayland Ward Seed	3.6	96	Aug 6	8.0	9.5	93.0	5.54
FSG115 BMR (Brachytic Dwarf)	Farm Science Genetics	3.5	86	Aug 27	0.0	7.8	88.5	5.17
XF7203 BMR (Brachytic Dwarf)	Alta Seed/Ramer Seed	2.8	90	Aug 2	8.5	5.8	91.0	5.04
AF7401 BMR (Brachytic Dwarf)	Alta Seed/Ramer Seed	3.0	88	Aug 27	0.3	7.9	93.0	5.02
SiloPro BMR (Dwarf)	Gayland Ward Seed	2.5	70	Aug 24	0.0	7.9	88.0	4.41
KFFiber-Pro70F	Byron Seed	2.9	71	Aug 28	0.3	8.5	89.0	3.69
Mean		3.4	88	Aug 14	2.9	9.3	90.5	6.95
CV,%		15.9	8	3 days	47.6	15.5	3.1	22.75
LSD,0.05		0.8	10	4 days	2.0	2.1	4.0	2.26

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
[2] Approximately 50% of heads fully emerged. Those without a date are photoperiod sensitive and remain vegetative all season.
[3] Lodging score based on a scale of 0 to 9. 0 indicating no lodging and 9 indicating all plants lodged.
[4] Maturity rating scale: 45 = boot swollen, 62 = beginning of pollen shed, 75 = endosperm milky, 93 = endosperm hard and dry. See Table 3 for complete scale.
[5] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 60 lb/A of actual nitrogen on June 1.

Table 25. Dry matter yields, aphid damage, plant height, lodging, and maturity of forage sorghum varieties sown June 1, 2017, at Princeton, Kentucky.

Variety	Proprietor/ Distributor	Sugarcane Aphid Injury[1] Aug 31	Plant Height (ft) Oct 25	Lodging[2] Oct 25	Maturity[3] Oct 25	Yield[4] (DM tons/ acre) Oct 25
Commercial Varieties-Available for Farm Use						
Ensilemaster	Caudill Seed	5	7.9	0.8	93.0	7.43*
SS405	Chromatin	5	9.8	1.5	93.0	6.93*
1990	Chromatin	4	7.5	0.0	51.3	5.68
NK300	Chromatin	6	5.4	0.0	93.0	5.18
AF7401 BMR[5] (Brachytic Dwarf)	Alta Seed/Ramer Seed	5	5.3	0.0	92.0	5.02
SD1741BMR	Chromatin	5	7.9	0.3	93.0	4.07
GW2120	Gayland Ward Seed	8	6.5	1.0	93.0	3.68
FSG115 BMR (Brachytic Dwarf)	Farm Science Genetics	6	4.1	0.3	90.5	3.14
FSG114 BMR	Farm Science Genetics	8	6.4	7.8	92.0	3.07
XF7203 BMR (Brachtic Dwarf)	Alta Seed/Ramer Seed	7	4.4	7.5	93.0	3.03
KFFiber-Pro70FS	Byron Seed	7	4.1	0.5	91.0	3.03
GW400 BMR	Gayland Ward Seed	8	5.1	8.0	88.0	1.82
Experimental Varieties						
X50711	Scott Seed	5	8.2	1.5	93.0	6.77*
X50652	Scott Seed	5	5.9	0.0	53.5	6.23*
X50644	Scott Seed	6	6.1	0.8	45.0	4.10
X51423	Scott Seed	7	5.9	0.3	91.5	3.12
X50610	Scott Seed	6	4.0	0.0	92.5	2.60
X5063	Scott Seed	8	5.6	8.8	92.0	2.28
Mean		5	6.1	2.2	85.0	4.29
CV,%		11	12.0	44.2	2.1	25.18
LSD,0.05		1	1.1	1.4	2.6	1.53

[1] Aphid damage score based on a scale of 1 to 9 with 9 indicating all leaves affected by aphids.
[2] Lodging score based on a scale of 0 to 9. 0 indicating no lodging and 9 indicating all plants lodged.
[3] Maturity rating scale: 45 = boot swollen, 62 = beginning of pollen shed, 75 = endosperm milky, 93 = endosperm hard and dry. See Table 3 for complete scale.
[4] Yields were influenced by late harvest resulting in significant leaf senescence.
[5] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 150 lb/A of actual nitrogen on May 30.

Table 26. Dry matter yields, seedling vigor, percent stand, and maturity of teff varieties sown May 28, 2013, at Lexington, Kentucky.

Variety	Seedling Vigor[1] Jun 20	Percent Stand Jun 20	Maturity[2]		Yield (tons/acre)				
			Jul 17	Aug 7	Jul 17	Aug 7	Sep t9	Oct 21	Total
Commercial Varieties-Available for Farm Use									
Witkope	2.4	93	56.0	49.0	1.98	1.20	1.12	0.61	4.90*
Excaliber	3.4	99	52.5	51.5	1.99	1.17	1.18	0.54	4.87*
Highveld	3.1	98	49.8	32.0	1.94	0.96	1.47	0.48	4.86*
Velvet	2.6	98	53.0	40.8	2.15	1.04	1.11	0.55	4.84*
Rooiberg	2.8	97	56.0	48.8	2.09	1.07	1.24	0.44	4.83*
Pharaoh	3.3	99	45.0	35.3	2.03	1.14	1.09	0.52	4.78*
Corvalis	2.5	98	48.0	38.5	1.95	1.09	1.18	0.51	4.73*
SummerDelight	3.9	99	48.0	35.3	2.14	1.04	1.04	0.51	4.72*
VA-T1Brown	2.9	99	51.3	37.0	2.10	1.03	1.08	0.38	4.60*
Tiffany	2.9	100	49.0	32.0	1.95	1.08	1.02	0.55	4.60*
Dessie	2.6	95	54.0	43.0	1.88	1.04	1.17	0.49	4.59*
HorseCandi	2.0	95	49.8	40.3	2.01	1.09	0.98	0.47	4.56*
Moxie	2.6	97	53.5	33.8	2.04	0.93	1.02	0.45	4.45*
Experimental Varieties									
F11	2.8	100	46.3	37.0	2.08	1.04	1.00	0.56	4.67*
Mean	2.8	98	50.9	39.6	2.02	1.07	1.12	0.50	4.21
CV,%	43.0	4	6.0	16.3	8.12	13.47	19.82	20.51	9.02
LSD,0.05	1.7	6	4.3	9.2	0.23	0.21	0.32	0.15	0.61

[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 3 for complete scale.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 40 lb/A on June 5 and 50 lb/A on July 22 and Aug 8 of actual nitrogen (Total of 140 lb of N/acre).

Table 27. Dry matter yields, stand rating and maturity of teff varieties sown May 21, 2014, at Lexington, Kentucky.

Variety	Percent Stand Jun 17	Maturity[1]		Yield (tons/acre)				
		Jul 8	Aug 4	Jul 8	Aug 4	Aug 29	Oct 13	Total
Commercial Varieties-Available for Farm Use								
Summer Delight	100	55.5	54.0	1.63	1.01	1.78	0.93	5.34*
Corvalis	100	52.3	52.5	1.27	1.05	1.64	0.98	4.95*
Witkope	96	56.0	59.0	1.09	1.09	1.68	0.94	4.81*
VA-T1Brown	100	55.5	52.0	1.15	1.09	1.70	0.76	4.70*
Tiffany	98	54.0	53.0	1.23	1.17	1.55	0.73	4.69*
Highveld	89	50.5	54.5	0.89	1.11	1.74	0.85	4.59*
Dessie	95	54.0	56.0	0.97	1.18	1.39	1.00	4.55*
Moxie	100	52.8	54.0	1.28	1.11	1.40	0.53	4.33*
Velvet	100	56.0	54.0	0.78	0.91	1.60	1.00	4.29*
Pharaoh	97	51.7	51.5	1.09	0.91	1.42	0.75	4.18*
Rooiberg	98	54.5	59.0	0.66	1.05	1.44	0.82	3.97*
HorseCandi	98	54.5	53.0	0.78	0.89	1.30	0.61	3.58
Experimental Varieties								
F11	99	50.5	53.5	0.97	0.89	1.30	0.87	4.04*
Mean	98	53.7	54.3	1.06	1.04	1.54	0.83	4.47
CV,%	6	6.8	4.3	44.66	16.00	23.91	38.16	20.95
LSD,0.05	8	5.5	3.4	0.70	0.24	0.54	0.46	1.38

[1] 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 3 for complete scale.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on May 27 and July 11 (Total of 100 lb of N/acre).

Table 28. Dry matter yields, seedling vigor, percent stand, and maturity of teff varieties sown May 21, 2015, at Lexington, Kentucky.

Variety	Seedling Vigor[1] Jun 17	Percent Stand Jun 17	Maturity[2]		Yield (tons/acre)			
			Jul 20	Aug 14	Jul 20	Aug 14	Sep 17	Total
Commercial Varieties-Available for Farm Use								
Moxie	4.8	100	52.5	47.5	2.33	1.83	0.23	4.39*
HorseCandi	4.3	100	51.5	48.5	2.08	1.78	0.48	4.34*
Dessie	4.5	100	51.5	45.0	2.28	1.67	0.37	4.32*
Summer Delight	4.9	100	52.5	51.0	2.26	1.55	0.41	4.22*
Velvet	4.4	100	52.0	51.0	2.20	1.59	0.35	4.14*
Tiffany	4.9	100	52.0	46.8	2.16	1.52	0.38	4.06*
Pharoah	4.9	100	52.5	48.0	2.32	1.39	0.32	4.04*
VA-T1Brown	4.6	100	51.0	47.5	2.02	1.57	0.44	4.03*
Corvallis	4.6	100	51.0	46.3	2.15	1.58	0.26	3.99*
Experimental Varieties								
F11	4.8	100	53.0	52.5	2.18	1.51	0.25	3.95*
Mean	4.7	100	52.0	48.4	2.20	1.60	0.35	4.15
CV,%	6.7	0	2.6	5.6	12.86	12.39	38.07	9.77
LSD,0.05	0.5	0	1.9	4.0	0.41	0.29	0.19	0.59

[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 3 for complete scale.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on June 3 and July 27 (Total of 100 lb of N/acre).

Table 29. Dry matter yields, seedling vigor, stand rating, and maturity of teff varieties sown May 24, 2016, at Lexington, Kentucky.

Variety	Seedling Vigor[1] Jun 14	Percent Stand Jun 14	Maturity[2]		Yield (tons/acre)			
			Jul 28	Aug 25	Jul 28	Aug 25	Oct 11	Total
Commercial Varieties-Available for Farm Use								
Moxie	4.3	100	50.0	59.5	0.69	1.21	0.74	2.64*
Tiffany	4.8	100	52.5	58.0	0.59	1.15	0.85	2.60*
Dessie	4.5	100	45.0	58.0	0.77	1.09	0.73	2.59*
Summer Delight	4.3	100	53.5	59.5	0.62	1.08	0.86	2.57*
Corvallis	4.4	100	44.0	59.0	0.69	1.13	0.70	2.52*
VA-T1-Brown	4.0	100	38.5	57.0	0.72	1.02	0.75	2.49*
Velvet	4.0	100	45.5	58.5	0.67	1.12	0.68	2.47*
Pharoah	4.3	100	51.0	55.5	0.75	0.91	0.66	2.32*
HorseCandi	4.0	100	44.0	56.5	0.46	0.83	0.75	2.03*
Experimental Varieties								
BARCW0604	4.4	100	52.0	58.5	0.70	1.33	0.73	2.76*
F11	4.5	100	38.5	56.0	0.73	1.16	0.77	2.66*
PST-CRYTE	4.3	100	43.5	56.0	0.58	0.90	0.67	2.15*
Mean	4.3	100	46.5	57.7	0.66	1.08	0.74	2.48
CV,%	19.4	0	23.5	4.4	31.70	28.64	32.51	23.86
LSD,0.05	1.2	0	15.7	3.6	0.31	0.44	0.35	0.85

[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 3 for complete scale.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 50 lb/A of actual nitrogen on July 1, July 28 and August 31 (Total of 150 lb of N/acre).

Table 30. Dry matter yields, seedling vigor and stand persistence of cereal rye varieties sown October 11, 2013 at Lexington, Kentucky. (early first harvest)

Variety	Proprietor/ Distributor	Seedling Vigor[1] Dec 2, 2013	Percent Stand		Yield (tons/acre)			
			2013	2014	2014			
			Dec 2	Mar 13	Apr 9	May 1	May 25	Total
Oklon	Noble Foundation	4.9	100	100	0.82	1.56	0.72	3.10*
Elbon	Noble Foundation	5.0	100	100	0.97	1.40	0.65	3.02*
Maton	Noble Foundation	4.4	98	100	0.66	1.57	0.70	2.92*
Southern Blue	Caudill Seed	5.0	99	100	0.77	0.95	0.58	2.29
Mean		4.8	99	100	0.81	1.37	0.66	2.84
CV,%		5.7	2	0	9.16	14.17	23.51	6.13
LSD,0.05		0.4	2	0	0.12	0.31	0.25	0.28

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Plots were harvested at the first joint stage on April 9 and at early head stage on May 1 and May 25.
Plant height: 15-16 in. on April 9 and 22-24 in. on May 1
Nitrogen application: 60 lb/A of actual nitrogen on March 13.

Table 31. Dry matter yields, seedling vigor, and stand persistence of cereal rye varieties sown October 11, 2013, at Lexington, Kentucky. (delayed first harvest)

Variety	Proprietor/ Distributor	Seedling Vigor[1] Dec 2, 2013	Percent Stand		Yield (tons/acre)			
			2013	2014	2014			
			Dec 2	Mar 13	Apr 22	May 13	May 29	Total
Oklon	Noble Foundation	4.8	100	100	2.63	0.68	0.11	3.41*
Elbon	Noble Foundation	4.6	100	100	2.50	0.69	0.09	3.28*
Maton	Noble Foundation	4.6	99	100	2.51	0.62	0.07	3.20*
Southern Blue	Caudill Seed	4.3	99	100	2.03	0.60	0.12	2.75
Mean		4.6	99	100	2.42	0.65	0.10	3.16
CV,%		13.8	1	1	12.74	16.44	48.44	12.83
LSD,0.05		1.0	1	1	0.49	0.17	0.08	0.65

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Plots were harvested at the early head stage on April 22, May 13 and May 29.
Plant height: 30-32 in. on Apr 22 and 16-18 in. on May 13.
Nitrogen application: 60 lb/A of actual nitrogen on March 13.

Table 32. Dry matter yields, seedling vigor, and stand persistence of triticale varieties sown October 11, 2013, at Lexington, Kentucky (early first harvest).

Variety	Proprietor/ Distributor	Seedling Vigor[1] Dec 2, 2013	Percent Stand 2013 Dec 2	Percent Stand 2014 Mar 13	Yield (tons/acre) 2014 Apr 9	Yield (tons/acre) 2014 May 7	Yield (tons/acre) 2014 May 29	Yield (tons/acre) 2014 Total
Trical336	Syngenta	3.3	98	99	0.30	2.51	0.21	3.02*
CCTCLE1	Caldbeck Consulting	2.8	96	90	0.16	2.15	0.07	2.39
CCTCLL22	Caldbeck Consulting	5.0	98	1	0.07	0.28	0.00	0.34
Mean		3.7	97	63	0.18	1.65	0.09	1.92
CV,%		10.2	4	6	32.41	9.71	27.68	10.84
LSD,0.05		0.6	6	6	0.10	0.28	0.05	0.36

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Plots were harvested in the vegetative stage on April 9 and at the early head stage on May 7 and May 29.
Plant height: 6-8 in. on Apr 9 and 26-28 in. on May 7.
Nitrogen application: 60 lb/A of actual nitrogen on March 13.

Table 33. Dry matter yields, seedling vigor, and stand persistence of triticale varieties sown October 11, 2013, at Lexington, Kentucky (delayed first harvest).

Variety	Proprietor/ Distributor	Seedling Vigor[1] Dec 2, 2013	Percent Stand 2013 Dec 2	Percent Stand 2014 Mar 13	Yield (tons/acre) 2014 May 7	Yield (tons/acre) 2014 May 29	Yield (tons/acre) 2014 Total
Trical336	Syngenta	3.4	94	94	3.04	0.15	3.19*
CCTCLE1	Caldbeck Consulting	3.3	93	83	2.36	0.02	2.38
CCTCLL22	Caldbeck Consulting	5.0	98	1	0.22	0.02	0.25
Mean		3.9	95	59	1.88	0.06	1.94
CV,%		16.2	5	15	16.89	71.32	17.48
LSD,0.05		1.1	8	16	0.55	0.08	0.59

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Plots were harvested at the early head stage on May 7 and May 29.
Plant height: 28-30 in. on May 7.
Nitrogen application: 60 lb/A of actual nitrogen on March 13.

Table 34. Dry matter yields, stand rating, and maturity of cereal crops and annual ryegrass sown March 18, 2015, at Lexington, Kentucky.

Variety	Species	Proprietor/Distributor	Percent Stand 2015 Apr 22	Maturity[1] 2015 May 27	Yield (tons/acre) 2015 May 27	Yield (tons/acre) 2015 Jun 18	Yield (tons/acre) 2015 Total
Excel	Spring Oats	Ag. Alumni Seed, IN	88	55.5	1.50	0.40	1.90*
Jerry	Spring Oats	Caudill Seed	84	55.5	1.20	0.49	1.69*
Saber	Spring Oats	Ag. Alumni Seed, IN	66	56.0	1.09	0.55	1.65*
Robust	Spring Oats	Ag. Alumni Seed, IN	86	47.5	1.14	0.49	1.64*
Marshall	Annual Ryegrass	The Wax Company	100	55.5	0.75	0.87	1.61*
PST5O200	Spring Oats	Caldbeck Consulting	69	46.8	0.90	0.71	1.61*
021A17815	Spring Oats	Ag. Alumni Seed, IN	83	56.0	1.12	0.41	1.53
Reins	Spring Oats	Ag. Alumni Seed, IN	78	56.0	1.00	0.49	1.49
PST-241	Spring Oats	Caldbeck Consulting	63	46.3	0.76	0.68	1.44
PST5O-288C	Spring Oats	Caldbeck Consulting	81	45.0	0.86	0.57	1.43
Common	Spring Oats	Central Farm Supply	54	46.3	0.75	0.66	1.41
Southern Blue	Cereal Rye	Caudill Seed	100	62.0	0.90	0.48	1.38
AgriMAXX 447	Winter Wheat	AgriMAXX Wheat Co.	97	29.0	0.07	0.46	0.54
Mean			80	50.6	0.93	0.56	1.48
CV,%			12	3.4	18.64	26.37	16.80
LSD,0.05			14	2.5	0.25	0.21	0.36

[1] 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 3 for complete scale.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 60 lb/A of actual nitrogen on March 18.

Table 35. Dry matter yields, seedling vigor, stand rating, and maturity of cereal crops and annual ryegrass sown March 17, 2016, at Lexington, Kentucky.

Variety	Species	Proprietor/Distributor	Seedling Vigor[1] Apr 15	Percent Stand Apr 15	Maturity[2]		Yield (tons/acre)		
					May 31	Jul 5	May 31	Jul 5	Total
Persik	Black Hulled Oat	Caldbeck Consulting	4.5	99	45.0	66.0	1.67	0.52	2.20*
Robust	Spring Oats	Ag. Alumni Seed, IN	4.9	98	52.0	66.0	1.68	0.49	2.17*
021A17815	Spring Oats	Ag. Alumni Seed, IN	5.0	99	56.5	66.0	1.74	0.38	2.12*
PST50288C	Spring Oats	Caldbeck Consulting	5.0	99	45.0	66.0	1.46	0.53	2.00*
Excell	Spring Oats	Ag. Alumni Seed, IN	4.9	99	56.0	66.0	1.64	0.32	1.97*
VNK	Spring Oats	Public	5.0	97	56.0	66.0	1.64	0.25	1.89*
Marshall	Annual Ryegrass	The Wax Company	3.5	100	56.0	66.0	0.91	0.97	1.88*
Jerry	Spring Oats	Caudill Seed	5.0	100	55.5	66.0	1.58	0.24	1.82*
PST50200	Spring Oats	Caldbeck Consulting	4.4	96	46.8	66.0	1.22	0.54	1.76
PST241	Spring Oats	Caldbeck Consulting	4.1	94	45.0	66.0	1.20	0.48	1.68
Byron	Spring Triticale	Byron Seed	5.0	99	56.0	66.0	1.18	0.17	1.35
Southern Blue	Cereal Rye	Caudill Seed	5.0	100	64.0	66.0	0.74	0.50	1.24
PST101	Spring Wheat	Caldbeck Consulting	4.8	97	45.0	66.0	0.63	0.48	1.11
AgriMAXX4	Winter Wheat	AgriMAXX Wheat Co.	4.5	99	29.0	29.0	0.13	0.38	0.51
Mean			4.7	98	50.6	63.4	1.25	0.45	1.69
CV,%			6.7	2	2.5	0.0	22.80	39.66	17.62
LSD,0.05			0.4	2	1.8	0.0	0.41	0.25	0.43

[1] Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth
[2] Maturity rating scale: 37 = flag leaf emergence, 45 = boot swollen, 50 = beginning of inflorescence emergence, 58 = complete emergence of inflorescence, 62 = beginning of pollen shed. See Table 3 for complete scale.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 60 lb/A of actual nitrogen on April 19.

Table 36. Dry matter yields, seedling vigor, stand rating, and maturity of cereal crops and annual ryegrass sown March 13, 2017, at Lexington, Kentucky.

Variety	Species	Proprietor/Distributor	Seedling Vigor[1] Apr 20	Percent Stand Apr 20	Maturity[2]		Yield (tons/acre)		
					May 19	Jun 20	May 19	Jun 20	Total
Robust	Spring Oat	Ag. Alumni Seed, IN	4.0	100	45.0	56.0	2.96	1.03	4.00*
Persik	Black Hulled Oat	Caldbeck Consulting	3.4	100	45.0	56.0	2.74	1.17	3.91*
Excell	Spring Oat	Ag. Alumni Seed, IN	4.5	93	45.0	58.5	2.98	0.82	3.80*
VNK	Spring Oat	Public	3.9	97	48.8	60.0	2.59	1.07	3.66*
Jerry	Spring Oat	Caudill Seed	5.0	100	46.3	59.0	2.65	0.88	3.54*
PST50288C	Spring Oat	Caldbeck Consulting	3.6	97	45.0	57.0	2.01	1.01	3.02
PST50200	Spring Oat	Caldbeck Consulting	3.9	99	45.0	56.5	2.05	0.92	2.98
021A17815	Spring Oat	Ag. Alumni Seed, IN	4.3	98	45.0	58.5	2.15	0.81	2.97
PST241	Spring Oat	Caldbeck Consulting	3.1	98	45.0	51.3	1.73	1.21	2.93
Byron	Spring Triticale	Byron Seed	3.9	99	46.3	58.5	1.68	0.40	2.09
PST101	Spring Wheat	Caldbeck Consulting	4.5	99	48.3	59.0	1.49	0.53	2.02
Southern Blue	Cereal Rye	Caudill Seed	4.5	99	53.3	62.0	1.53	0.47	2.00
Marshall	Annual Ryegrass	The Wax Company	1.3	69	48.0	62.0	0.81	1.18	1.99
AgriMAXX4	Winter Wheat	AgriMAXX Wheat Co.	3.0	99	29.0	29.0	0.76	0.91	1.67
Mean			3.7	96	45.3	55.9	2.61	0.89	2.90
CV,%			27.1	6	5.8	4.2	21.18	28.72	23.42
LSD,0.05			1.2	9	3.8	3.4	0.78	0.36	0.97

[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 3 for complete scale.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 60 lb/A of actual nitrogen on April 20.

Table 37. Dry matter yields, seedling vigor, stand rating, and maturity of cereal crops and annual ryegrass sown April 12, 2018, at Lexington, Kentucky.

Variety	Species	Proprietor/Distributor	Seedling Vigor[1] May 22	Percent Stand May 22	Maturity[2] June 14	Yield (tons/acre) Jun 14
Persik	black hulled oat	Caldbeck Consulting	4.6	99	52.8	1.95*
Excel	spring oat	Ag. Alumni Seed, IN	4.3	92	60.0	1.65*
CCSO-120	black hulled oat	Caldbeck Consulting	4.4	94	54.0	1.63*
Reins	spring oat	Ag. Alumni Seed, IN	5.0	100	59.5	1.57
Robust	spring oat	Ag. Alumni Seed, IN	4.6	97	58.0	1.57
VNK	spring oat	public	4.4	92	58.5	1.56
Saber	spring oat	Ag. Alumni Seed, IN	4.6	95	60.0	1.54
Jerry	spring oat	Caudill Seed	4.3	97	55.5	1.52
PST50288C	spring oat	Caldbeck Consulting	3.8	83	47.3	1.49
CCSO-102	spring oat	Caldbeck Consulting	3.1	74	51.8	1.47
PST241	spring oat	Caldbeck Consulting	3.3	63	45.0	1.32
PST50200	spring oat	Caldbeck Consulting	3.4	66	53.5	1.22
Marshall	annual ryegrass	The Wax Company	2.9	82	62.0	0.87
Byron	spring triticale	Byron Seed	3.0	70	43.5	0.37
TetraPrime	Italian ryegrass	Mountain View Seed	2.8	87	29.0	0.36
AgriMAXX447	winter wheat	AgriMAXX Wheat Co.	2.3	65	29.0	0.08
Mean			3.8	85	51.2	1.26
CV,%			13.0	13	5.0	19.26
LSD,0.05			0.8	18	3.7	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 3 for complete scale.
*Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
Nitrogen application: 60 lb/A of actual nitrogen on April 13.

Table 38. Dry matter yields of wheat varieties sown October 17, 2017, at Lexington, Kentucky (originally appeared in PR-742, Table 4).

Variety	DM Yield* at Soft Dough Stage Tons/acre			Head Type
	2018	2017-18	2016-18	
SYNGENTA SY VIPER	4.20	4.20	3.82	Smooth
KAS 18X6	3.91			Bearded
Pioneer variety 26R59	3.80	4.05	3.73	Smooth
ARMOR ARW1766	3.79			Bearded
VA12W-68	3.76	4.04		Bearded
LCS Ammo	3.75			Bearded
AGS 2055	3.74	3.96		Bearded
PA 258 SR	3.74			Smooth
AgriMAXX 438	3.72	3.95	3.83	Smooth
AgriMAXX 446	3.70	3.78	3.61	Bearded
CROPLAN SRW 9415	3.70	3.94	3.84	Bearded
Pioneer variety 26R41	3.68	3.90	3.80	Bearded
SC 13S37TM	3.61	3.90		Smooth
PEMBROKE 2008	3.60	3.63	3.51	Bearded
LCS L11719	3.59			Bearded
PROGENY PGX 17-16	3.59			Bearded
ARMOR RAGE	3.59	4.01		Bearded
PROGENY PGX 16-7	3.57			Bearded
Pioneer variety 26R10	3.57	3.99	3.94	Bearded
Beck 726	3.57			Bearded
ARMOR ARW1718	3.56			Bearded
PA 218 SR	3.56			Bearded
AgriMAXX 454	3.55	3.79	3.79	Bearded
AgriMAXX 486	3.55	4.16		Bearded
X08C-1074-48-7-5	3.54			Smooth
PROGENY #BULLET	3.53	3.94	3.67	Bearded
KY06C-1178-16-10-3	3.53	3.87	3.65	Bearded
Dyna-Gro 9811	3.52			Bearded
USG 3316	3.51	3.94		Bearded
SC 13S26TM	3.48	3.92	4.04	Bearded
EXPZ152	3.45			Smooth
AgriMAXX Exp 1892	3.44			Bearded
Dyna-Gro 9522	3.44	3.93	3.71	Bearded
USG 3404	3.44	3.74	3.73	Bearded
ARMOR ARW1716	3.44			Bearded
PROGENY PGX 17-20	3.42			Bearded
SC EX308	3.42			Bearded
Dyna-Gro WX18724	3.42			Bearded
PEMBROKE 2014	3.42	3.81	3.65	Bearded
AgriMAXX Exp 1884	3.41			Bearded
LCS L11551	3.41			Bearded
CROPLAN SRW 9606	3.40	3.87		Bearded
SYNGENTA SY 547	3.40	3.82	3.66	Smooth
EXPZ192	3.40			Bearded
Go Wheat 2058	3.39	3.50		Bearded
Beck 721	3.38			Bearded
AgriMAXX 473	3.37	3.74		Bearded
KY09C-1245-99-12-3	3.37			Smooth
Dyna-Gro 9862	3.36	3.76		Smoooth
ARMOR ARW1729	3.36			Bearded
AgriMAXX 485	3.35	3.68		Smooth
PROGENY #BLAZE	3.35	3.85		Bearded
KAS Lincoln	3.35			Smooth
USG 3329	3.34			Bearded
ARMOR MAYHEM	3.34	4.09		Bearded
SC EX328	3.33			Bearded
KY06C-1178-16-17-3F	3.33			Bearded
KY06C-1178-16-17-3C	3.33			Bearded
CROPLAN SRW 8550	3.32	3.98		Bearded
SYNGENTA SY 100	3.32	3.62		Smooth
KY07C-1145-94-12-5	3.30	3.93		Smooth
Dyna-Gro 9701	3.29	3.83		Bearded
ARMOR ARW1726	3.29			Bearded
Truman	3.26	3.65	3.33	Smooth
VA12W-31	3.21	3.77		Bearded
KY09C-1245-99-8-5	3.21			Bearded
KAS Roosevelt	3.16			Bearded
PEMBROKE 2016	3.15	3.57	3.62	Bearded
AgriMAXX 463	3.13	3.68	3.59	Smooth
Go Wheat 2059	3.12	3.38		Smooth
PROGENY #WARRIOR	3.07	3.34	3.41	Smooth
USG 3429	3.06			Smooth
Dyna-Gro WX17775	3.04			Bearded
KY09C-1245-99-15-1	3.03			Tip-Awned
USG 3118	3.03			Tip-Awned
PROGENY #BOSS	3.02	3.52		Bearded
X08C-1077-11-18-3	2.99	3.48		Smooth
KY05C-1105-43-6-1D	2.98			Tip-Awned
SYNGENTA SY MISKIN	2.89			Bearded
Pioneer variety 26R36	2.88	3.34	3.29	Bearded
Pioneer variety 26R45	2.87	3.41		Smooth
KAS 18X7	2.86			Bearded
ARMOR ARW1727	2.83			Bearded
AgriMAXX 480	2.78			Bearded
Bess	2.77			Smooth
Clark	2.67	3.30		Smooth
ARMOR ARW1719	2.66			Bearded
AVERAGE	3.36	3.78	3.68	
C.V.	14.68	14.49	14.07	
LSD (0.10)	0.81	0.61	0.48	

Location: Bluegrass Region - Fayette Co.; Conventional tillage
Planted: 10-17-17
Harvested: 6-4-18
*DM = Dry Matter Yield

Table 39. Summary of Kentucky sudangrass yield trials 2008-2018 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietor/KY Distributor	Lexington											Princeton		Mean[3] (#trials)
		2008[1,2]	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2017	2018	
		All trials are 1 year yields													
AS9301 BMR[4]	Alta Seeds/Ramer Seed					118									–
AS9302 BMR (Brachytic Dwarf)	Alta Seeds/Ramer Seed										124	104	119	117	116(4)
Enorma BMR	Cal/West Seeds			99	94	92	91	83	91	98					93(7)
FSG 1000 BMR	Farm Science Genetics								101	124	110				112(3)
Hayking BMR	Central Farm Supply	111	112	91	97	97	96	92	94	90	80	109	99		97(12)
Monarch V	Public	104	96	102	97	93	98	110	99	82					98(9)
Piper	Public	90	91	97	94	104	105	89	94	85	81	86	86	99	92(13)
ProMax BMR	Ampac Seed	95	101	110	115	96	103	100	111	111	106	102	96	84	102(13)
SS130 BMR	Cal/West Seeds			101	103		107	106	110	109	99				105(7)
Trudan Headless	Chromatin							118							–

[1] Establishment year.
[2] Use this summary table as a guide in making variety decisions, but refer to specific tables in this report to determine statistical differences in forage yield between varieties.
[3] Mean only presented when respective variety was included in two or more trials.
[4] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.

Table 40. Summary of Kentucky sorghum-sudangrass yield trials 2008-2018 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietor/KY Distributor	Lexington											Princeton		Mean[3] (#trials)
		2008[1,2]	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2017	2018	
		All trials are 1 year yields													
AS6402 BMR[4] (Brachytic Dwarf)	Alta Seeds/Ramer Seed					91					78	82	98	98	89(4)
AS6503 BMR	Alta Seeds/Ramer Seed						96	103	90						96(3)
AS6504 BMR (Dry Stalk)	Alta Seeds/Ramer Seed										105	103	114	112	109(4)
FSG 208 BMR	Farm Science Genetics			75											–
FSG 214 BMR	Farm Science Genetics						99	108	112				109	111	108(5)
FSG 215 BMR	Farm Science Genetics								112						–
Greengrazer V	Farm Science Genetics			166			122	107	92	103	110				117(6)
GW300 BMR	Gayland Ward Seed				88	78	88	81	73	101	100	98	79		87(9)
HyGain	Turner Seed	104	105	118						110	127	117	130	108	115(8)
KFSugar-Pro55S	Byron Seed										110				–
MS 202 BMR	Farm Science Genetics			106											–
Nutra-King BMR	Gayland Ward Seed								110	108	96	113	108	114	108(6)
NutraPlus BMR	Public	106	97	94	103	106	109	106	96						102(8)
Sordan Headless	Chromatin							105							–
Special Effort	Public	109	110	93	94	115	120	91	111						105(8)
SS211	Southern States				104	93	114	103	118	111	121	118	109	87	108(10)
SS220 BMR	Southern States		107	84		112									101(3)
Surpass BMR	Turner Seed	81	80	64						79	84	75	88	97	81(8)
Super Sugar	Gayland Ward Seed				102	117	107		125	85			91		105(6)
Super Sugar BMR	Gayland Ward Seed									107					–
Super Sugar (Delayed Maturity)	Gayland Ward Seed							101	82		89	104	95	83	92(6)
Super Sugar Sterile	Gayland Ward Seed							94							–
Sweet-For-Ever	Gayland Ward Seed				110	107	81								99(3)
Sweet-For-Ever BMR	Gayland Ward Seed					78	70		77	104	106	83	77	82	85(8)
SweetSix BMR	Gayland Ward Seed						93	101		91					95(3)
SweetSix BMR (Dry Stalk)	Gayland Ward Seed								102		72	107	103	108	98(5)
Vita-Cane	Gayland Ward Seed					121									–

[1] Establishment year.
[2] Use this summary table as a guide in making variety decisions, but refer to specific tables in this report to determine statistical differences in forage yield between varieties.
[3] Mean only presented when respective variety was included in two or more trials.
[4] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.

Table 41. Summary of Kentucky pearl millet yield trials 2013-2018 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietor/KY Distributor	Lexington						Princeton		Mean[3] (#trials)
		2013[1,2]	2014	2015	2016	2017	2018	2017	2018	
		All trials are 1 year yields								
FSG 300 Hybrid	Farm Science Genetics			109	99	109		117		109(4)
FSG 315 BMR[4] (Dwarf)	Farm Science Genetics			101	102	81		97		95(4)
Leafy22 Hybrid	Turner Seed				105	124	108	115	100	110(4)
Pennleaf Hybrid	Pennington Seed	93	91	94	96	87	98	84	93	92(8)
PP102M Hybrid	Cisco Seeds	93	93	90	79	90	91	77	104	90(8)
SS501	Southern States	90	99	96	86	94	94	89	96	93(8)
SS635	Southern States	108	112	101	116	94	110	107	115	108(8)
Sweet Summer	Cisco Seeds						86		85	86(2)
Tifleaf III Hybrid	Gayland Ward Seed	116	106	108	116	120	113	114	112	113(8)
Wonderleaf	Alta Seed								100	–

[1] Establishment year.
[2] Use this summary table as a guide in making variety decisions, but refer to specific tables in this report to determine statistical differences in forage yield between varieties.
[3] Mean only presented when respective variety was included in two or more trials.
[4] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.

Table 42. Summary of Kentucky teff yield trials 2008-2016 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Princeton		Lexington									Mean[3] (#trials)
	2008[1,2]	2009	2008	2009	2010	2011	2012	2013	2014	2015	2016	
	All trials are 1 year yields											
Corvallis	94	112	81	101	91	101	96	100	110	96	102	99(11)
Dessie	102	87	99	92	96	94	95	97	101	104	105	97(11)
Excaliber	109	111	109	104	125	108	106	103				109(8)
Highveld	111	115	100	121	106	101	109	103	102			108(9)
HorseCandi	91	84	99	105	89	108	94	97	80	104	82	94(11)
Moxie								94	96	105	107	101(4)
Pharaoh	95	101	105	85	106	106	97	101	93	97	94	98(11)
Rooiberg	102	107	112	109	113	108	115	102	88			106(9)
Summer Delight		90		91	96	88	93	100	119	101	104	98(9)
Tiffany	102	106	102	93	82	93	102	98	104	97	105	99(11)
VA T1 Brown		89		99	87	91	94	98	104	97	101	96(9)
Velvet		94		100	97	98	95	103	95	99	100	98(9)
Witkope	94	100	93	101	115	103	101	104	107			102(9)

[1] Establishment year.
[2] Use this summary table as a guide in making variety decisions, but refer to specific tables in this report to determine statistical differences in forage yield between varieties.
[3] Mean only presented when respective variety was included in two or more trials.

Table 43. Summary of Kentucky forage sorghum yield trials 2013-2018 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietor/KY Distributor	Lexington						Mean[3] (#trials)
		2013[1,2]	2014	2015	2016	2017	2018	
AF7201 BMR[4]	Alta Seed/Ramer Seed	89	81	101	89			90(4)
AF7401 BMR (Brachytic Dwarf)	Alta Seed/Ramer Seed	76	94	90	83	86	72	84(6)
Ensilemaster	Caudill Seed	125	90	101	106	111	129	110(6)
FSG114 BMR	Farm Science Genetics		94	128	93	125	91	106(5)
FSG115 BMR (Brachytic Dwarf)	Farm Science Genetics		51	31	72	81	74	62(5)
GW2120	Gayland Ward Seed	117	89	113	84	107	88	100(6)
GW400 BMR	Gayland Ward Seed	93	79	128	78	91	88	93(6)
GW475 BMR	Gayland Ward Seed						80	–
GW600 BMR	Gayland Ward Seed		107	111	90		90	100(4)
KFFiber-Pro70FS	Byron Seed					65	53	59(2)
NK300	Chromatin		126	110	101	116	135	118(5)
SD1741 BMR	Chromatin		133	92	103	81	84	99(5)
SilageKing BMR (Dwarf)	Gayland Ward Seed		48					–
SiloPro BMR (Dwarf)	Gayland Ward Seed			24	74		63	54(3)
SS405	Chromatin		188	183	207	138	202	184(5)
XF7203 BMR (Brachytic Dwarf)	Alta Seed/Ramer Seed					74	73	74(2)
1990	Chromatin		121	89	118	125	177	126(5)

[1] Establishment year.
[2] Use this summary table as a guide in making variety decisions, but refer to specific tables in this report to determine statistical differences in forage yield between varieties.
[3] Mean only presented when respective variety was included in two or more trials.
[4] BMR (Brown Mid-rib) means that a variety has been developed to produce lower amounts of lignin which usually translates into higher quality.

Table 44. Summary of Kentucky spring oats yield trials 2015-2018 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietor/Distributor	2015[1,2]	2016	2017	2018	Mean[3] (#trials)
		All trials are 1 year yields				
CCSO-102	Caldbeck Consulting				95	–
CCSO-120 (black hulled)	Caldbeck Consulting				106	–
Common	Central Farm Supply	89				–
Excel	Ag. Alumni Seed, IN	120	101	111	107	110(4)
Jerry	Caudill Seed	107	93	103	99	101(4)
Persik (black hulled)	Caldbeck Consulting		112	114	127	118(3)
PST-241	Caldbeck Consulting	91	86	86	86	87(4)
PST5O200	Caldbeck Consulting	102	90	87	79	90(4)
PST5O-288C	Caldbeck Consulting	91	102	88	97	95(4)
Reins	Ag. Alumni Seed, IN	94			102	98(2)
Robust	Ag. Alumni Seed, IN	104	111	117	102	109(4)
Saber	Ag. Alumni Seed, IN	104			100	102(2)
VNK	Public		97	107	101	102(2)
021A17815	Ag. Alumni Seed, IN	97	108	87		97(3)

[1] Establishment year.
[2] Use this summary table as a guide in making variety decisions, but refer to specific tables in this report to determine statistical differences in forage yield between varieties.
[3] Mean only presented when respective variety was included in two or more trials.

12-2018