

2011 Summer Annual Grass Report

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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 2007-2011 forage yield trials with sudangrass, sorghum/sudangrass, millets, and teff.

Sudangrass (*Sorghum bicolor* ssp. *drummondii*) 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.

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.

Foxtail (German) millet (*Setaria italica*) is shorter growing and finer stemmed than pearl millet, which makes it easier to harvest as hay. However, it is the lowest yielding of the summer annual grasses and will not regrow to produce another harvest. It is a good smother crop to be used before late summer no-till seeding of another forage crop such as fescue or alfalfa. It is also used in wildlife plant-

ings to produce food and cover for doves, quail, and other birds.

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.

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). Sudangrass and sorghum-sudangrass hybrids 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 foxtail millet is harvested only once. For more detailed management recommendations refer to *Producing Summer Annual Grasses for Emergency or Supplemental Forage* (AGR-88), and *Teff*, which can be found at www.uky.edu/Ag/Forage under "Publications" in the "Grass" species.

Description of the Tests

This report summarizes studies at Lexington (one in 2007, two in 2008, three in 2009, three in 2010, and three in 2011) and Princeton (one in 2008 and one in 2009). 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 x 20 feet in a randomized complete block design with four replications with a harvested area of 5 feet x 20 feet. All trials were sown into a prepared seedbed using a disk drill at the following rates (lb/acre): sudangrass (25), sorghum-sudangrass (30), pearl millet (20), foxtail millet (20), and teff (5 for uncoated, 8 for coated). Plots were harvested with a sickle-type forage plot harvester. Cutting height was 4 inches for the millets and teff and 6 inches for sudangrass and sorghum-sudangrass. 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. Pests were controlled so that they would not limit yield. See individual yield tables for nitrogen application.

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 17. 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

Table 1. Temperature and rainfall at Lexington, Kentucky in 2007, 2008, 2009, 2010 and 2011.

	2007				2008				2009				2010				2011 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	37	+6	2.93	+0.07	32	+2	3.91	+1.05	28	-3	2.45	-0.41	29	-2	2.40	-0.46	29	-2	2.10	-0.76
FEB	27	-8	1.83	-1.38	36	+1	6.11	+2.90	38	+3	2.86	-0.35	29	-6	1.38	-1.83	39	+4	6.34	+3.13
MAR	52	+8	1.97	-2.43	44	+1	6.51	+1.91	48	+4	2.19	-2.21	47	+3	1.05	-3.35	47	+3	4.76	+0.36
APR	53	-2	3.87	-0.01	55	0	5.89	+2.01	55	0	4.48	+0.60	59	+4	2.74	-1.14	58	+3	12.36	+8.48
MAY	68	+4	1.45	-3.02	62	-2	4.33	+0.14	64	0	5.05	+0.58	67	+3	7.84	+3.37	64	0	6.72	+2.25
JUN	74	+2	1.77	-1.89	74	+2	3.59	-0.07	74	+2	5.41	-1.75	76	+4	4.61	+0.95	74	+2	2.61	-1.05
JUL	74	-2	6.90	+1.90	76	0	3.41	-1.59	71	-5	5.89	+0.89	78	+2	5.49	+0.49	80	+4	6.29	1.29
AUG	80	+5	2.56	-1.37	75	0	2.18	-1.75	73	-2	5.38	+1.45	78	+3	1.54	-2.39	75	0	2.89	-1.04
SEP	72	+4	1.15	-2.05	72	+4	1.42	-1.78	68	0	5.37	+2.17	71	+3	1.14	-2.06	66	-2	5.52	+2.32
OCT	63	+6	5.28	+2.71	57	0	1.53	-1.04	54	-3	4.83	+2.26	59	+2	1.22	-1.35	55	-2	4.10	+1.53
NOV	46	+1	2.86	-0.53	43	-2	2.53	-0.86	49	+4	0.94	-2.45	47	+2	4.58	+1.19				
DEC	40	+4	5.29	+1.31	35	-1	6.03	+2.05	36	0	3.86	-0.12	28	-8	2.15	-1.93				
Total			37.86	-6.69			47.24	+2.69			48.71	+4.16			36.14	-8.41			53.69	+16.51

¹ DEP is departure from the long-term average.

² 2011 data is for ten months through October.

Table 2. Temperature and rainfall at Princeton, Kentucky in 2008 and 2009.

	2008				2009			
	Temp.		Rainfall		Temp.		Rainfall	
	°F	DEP ¹	IN	DEP	°F	DEP	IN	DEP
JAN	37	+3	2.40	-1.40	33	-1	0.94	-2.86
FEB	39	+1	6.76	+2.33	42	+4	3.28	-1.15
MAR	48	+1	7.55	+2.61	53	+6	2.89	-2.05
APR	58	-1	6.56	+1.76	58	-1	5.35	+0.55
MAY	65	-2	6.19	+1.23	67	0	6.14	+1.18
JUN	78	+3	1.24	-2.61	77	+2	7.97	+4.12
JUL	79	+1	5.12	+0.83	74	-4	7.45	+3.16
AUG	77	0	0.69	-3.32	75	-2	2.44	-1.60
SEP	74	+3	0.61	-2.72	71	0	4.61	+1.28
OCT	60	+1	2.25	-0.80	55	-4	9.08	+6.03
NOV	46	-1	2.59	-2.04	52	+5	1.50	-3.13
DEC	39	0	6.99	+1.95	36	-3	2.73	-2.31
Total			48.95	-2.18			54.31	+3.22

¹ DEP is departure from the long-term average.

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 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 18, 19, and 20 are summaries of yield data from 2008 to 2011 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 18, 19, and 20, but these comparisons do help to identify varieties for further consideration. Varieties that have performed better than average over many years and at several locations have very stable performance; others may have performed very well in wet years or on particular soil types.

Summary

Summer 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 ryegrass management. They are available from your county

Extension office and are listed in the “Publications” section of the UK Forage web site, www.uky.edu/Ag/Forage.

- *Lime and Fertilizer Recommendations* (AGR-1)
- *Grain and Forage Crop Guide for Kentucky* (AGR-18)
- *Establishing Forage Crops* (AGR-64)
- *Producing Summer Annual Grasses for Emergency or Supplemental Forage* (AGR-88)
- *Forage Identification and Use Guide* (AGR-175)
- *Extending Grazing and Reducing Stored Feed Needs* (AGR-199)

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

Table 4. Dry matter yields, plant height and maturity of summer annuals sown May 1, 2007 at Lexington, Kentucky.

Variety	Type	Proprietor/ Distributor	Plant height (in)			Maturity ¹	2007 Yield (tons/acre)			
			Jul 11	Aug 17	Oct 2		Jul 11	Aug 17	Oct 2	Total
			Monarch V	Sudangrass	Public	60	57	31	62.0	1.51
Special Effort	Sorghum-Sudan	Cisco	65	53	35	59.0	1.42	1.48	1.19	4.09*
ProMax BMR	Sudangrass	Ampac Seed	68	62	32	63.0	1.54	1.44	0.79	3.76*
NutraPlus BMR	Sorghum-Sudan	Cisco	57	41	32	53.3	1.25	0.97	0.87	3.09
Dessie	Teff	Turner Seed	19	19	16	59.0	0.89	1.54	0.64	3.07
Tiffany	Teff	Target Seed	16	20	15	52.5	0.90	1.41	0.51	2.82
Common Pearl	Pearl millet	--	20	35	19	31.8	0.47	0.95	0.59	2.01
Common Foxtail	Foxtail (German) millet	Public	24	---	---	75.5	1.29	---	---	1.29
Mean			42.1	41.1	26.1	57.6	1.06	1.09	0.66	2.81
CV,%			14.7	11.3	11.5	4.9	18.82	25.95	22.33	14.79
LSD,0.05			9.0	6.8	4.4	4.1	0.29	0.41	0.21	0.60

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.

• Rainfall deficit: May-September rainfall was 13.83 inches; rainfall deficit during this period in 2007 was -6.43 inches.

• Pearl millet had a poor stand

• Foxtail millet is a one cut crop

Nitrogen application: 45# on May 2 and 30# on Aug 22

Table 5. Dry matter yields, height and maturity of sudangrass and sorghum-sudangrass varieties sown May 29, 2008 at Lexington, Kentucky.

Variety	Type	Proprietor/ Distributor	Height (inches)		Maturity ¹		2008 Yield (tons/acre)			
			Jul 10	Aug 13	Jul 10	Aug 13	Jul 10	Aug 13	Sep 26	Total
			Special Effort	Sorghum-Sudan	Cisco	39	51	31.3	49.8	1.39
NutraPlus BMR	Sorghum-Sudan	Cisco	33	48	31.5	49.0	1.47	0.60	0.52	2.59*
HyGain	Sorghum-Sudan	Turner Seed	39	51	32.3	46.3	1.30	0.65	0.59	2.54*
Hayking BMR	Sudangrass	Central Farm	40	56	32.8	50.3	1.37	0.54	0.48	2.40
Monarch V	Sudangrass	Public	39	47	33.0	45.0	1.28	0.58	0.38	2.24
ProMax BMR	Sudangrass	Ampac Seed	40	54	33.0	47.5	1.18	0.46	0.39	2.04
SurpassBMR-6	Sorghum-Sudan	Turner Seed	24	40	30.3	51.8	1.25	0.39	0.36	1.99
Piper	Sudangrass	Public	40	54	33.3	47.5	1.13	0.51	0.29	1.93
Mean			36.5	50.1	32.2	48.4	1.30	0.54	0.46	2.30
CV,%			7.1	5.4	1.7	7.3	9.81	13.32	21.27	7.79
LSD,0.05			3.8	4.0	0.8	5.2	0.19	0.11	0.14	0.26

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.

• Rainfall deficit: June-September rainfall was 8.13 inches; rainfall deficit during this period in 2008 was -7.66 inches.

• Nitrogen application; 60# on June 13 and 30# on July 17.

Table 6. Dry matter yields, seedling vigor, percent stand, maturity and stand height of sudangrass varieties sown May 29, 2009 at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor ¹ Jun 14	Percent Stand Jun 14	Maturity ² Jul 15	Height (inches)			Yield (tons/acre)			
					Jul 15	Aug 14	Sep 16	Jul 15	Aug 14	Sep 16	Total
					Hayking BMR	Central Farm	4.1	95	35	71	59
ProMax BMR	Ampac Seed	4.5	98	35	69	56	36	1.73	1.14	0.57	3.44*
Monarch V	Public	5.0	99	35	68	47	27	1.98	1.00	0.29	3.27
Piper	Public	4.8	100	35	66	48	30	1.70	0.91	0.49	3.10
Mean		4.6	97.8	35.0	68.3	52.1	33.0	1.82	1.08	0.51	3.41
CV,%		9.6	2.4	0.0	3.9	4.8	12.9	9.81	11.62	18.13	8.22
LSD,0.05		0.7	3.7	0.0	4.2	4.0	6.8	0.29	0.20	0.15	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.

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

• Nitrogen application; 60# on June 9 and 25# on July 17.

Table 7. Dry matter yields, seedling vigor, percent stand, maturity and stand height of sudangrass varieties sown May 27, 2010 at Lexington, Kentucky.

Variety	Proprietor/Distributor	Seedling Vigor ¹ Jun 10	Percent Stand	Maturity ²	Height (in)			Yield (tons/acre)			
			Jun 10	Jul 7	Jul 7	Jul 29	Sep 1	Jul 7	Jul 29	Sep 1	Total
Commercial Varieties-Available for Farm Use											
ProMax BMR	Ampac Seed	3.3	81	33.5	47	43	38	0.87	1.00	0.59	2.45*
Monarch V	Public	3.5	94	33.5	47	42	30	0.84	0.96	0.47	2.27*
SS130 BMR	Cal/West Seeds	2.5	66	33.5	47	45	29	0.76	0.99	0.49	2.24*
Enorma BMR	Cal/West Seeds	2.1	73	33.5	44	43	32	0.80	0.97	0.42	2.19*
Piper	Public	3.0	94	33.0	45	41	35	0.85	0.82	0.49	2.16*
Hayking BMR	Cal/West Seeds	2.0	63	33.3	39	39	36	0.63	0.84	0.55	2.02*
Experimental Varieties											
CW5-43-29 BMR	Cal/West Seeds	2.8	75	33.3	47	46	27	0.79	1.15	0.47	2.41*
CW5-43-43 BMR	Cal/West Seeds	2.5	61	33.3	45	46	29	0.82	1.12	0.44	2.38*
CW5-43-68 BMR	Cal/West Seeds	2.8	65	33.3	42	43	29	0.81	1.07	0.49	2.37*
CW5-43-33 BMR	Cal/West Seeds	2.5	76	33.3	47	46	30	0.86	1.11	0.39	2.36*
CW5-43-34 BMR	Cal/West Seeds	2.1	68	33.0	42	45	27	0.78	1.03	0.44	2.26*
CW5-43-50 BMR	Cal/West Seeds	2.3	65	33.3	42	43	24	0.74	0.94	0.39	2.07*
CW5-43-69 BMR	Cal/West Seeds	1.4	46	33.0	39	41	24	0.67	0.87	0.31	1.85
Mean		2.5	71.3	33.3	43.8	43.1	29.8	0.79	0.99	0.46	2.23
CV,%		22.8	14.5	1.4	9.7	8.6	15.4	16.81	21.64	20.65	15.52
LSD,0.05		0.8	14.8	0.7	6.1	5.3	6.6	0.19	0.31	0.14	0.80

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# on June 3 and 50# on July 7.

Table 8. Dry matter yields, percent stand, seedling vigor ,maturity and stand height of sudangrass varieties sown May 25, 2011 at Lexington, Kentucky.

Variety	Proprietor/Distributor	Seedling Vigor ¹ Jun 16	Percent Stand	Maturity ²		Plant Height (inches)				Yield (tons/acre)				
			Jun 16	Jun 27	Jul 18	Jun 27	Jul 18	Aug 8	Sep 20	Jun 28	Jul 18	Aug 8	Sep 20	Total
ProMax BMR	Ampac Seed	4.5	99	2.3	2.5	34	41	44	42	0.53	1.05	1.17	0.80	3.54*
SS130 BMR	Cal/West Seeds	3.8	99	1.5	2.0	27	33	38	29	0.49	1.00	1.02	0.67	3.18*
Monarch V	Public	5.0	100	2.0	1.3	33	32	33	29	0.64	0.94	0.81	0.62	3.01*
Hayking BMR	Cal/West Seeds	3.5	97	1.8	3.0	26	41	40	32	0.38	0.92	1.03	0.67	3.00*
Enorma BMR	Cal/West Seeds	3.3	97	1.3	2.3	25	37	41	32	0.37	0.92	0.96	0.66	2.91
Piper	Public	4.8	100	2.0	1.8	33	34	36	30	0.52	0.96	0.88	0.55	2.90
Mean		4.1	98.5	1.8	2.1	29.7	36.1	38.5	32.2	0.49	0.96	0.98	0.66	3.09
CV,%		11.6	1.3	25.5	37.4	12.1	10.1	10.2	20.5	20.12	10.17	14.16	22.80	13.19
LSD,0.05		0.7	1.9	0.7	1.2	5.4	5.5	5.9	10.0	0.15	0.15	0.21	0.23	0.61

¹ Vigor score based on scale of 1 to 5 with 5 being the most vigorous seedling growth.
² Maturity rating scale: 37=flag leaf emergence, 45=boot swollen, 50=beginning of inflorescence emergence, 58=complete emergence of inflorescence, 62=beginning of pollen shed. See Table 3 for complete scale.
* Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
• Nitrogen application: 30# on June 2, 60# on June 28 and 40# on July 18.

Table 9. Dry matter yields, seedling vigor, percent stand, maturity and stand height of sorghum-sudangrass varieties sown May 29, 2009 at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor ¹ Jun 14	Percent Stand Jun 14	Maturity ² Jul 15	Height (inches)			Yield (tons/acre)				
					Jul 15	Aug 14	Sep 16	Jul 15	Aug 14	Sep 16	Oct 19	Total
Commercial Varieties-Available for Farm Use												
Special Effort	Cisco	3.4	98	34.3	68	45	36	1.84	1.11	0.71	0.16	3.82*
SS220 BMR	Southern States	2.5	93	34.0	69	47	35	1.79	1.07	0.65	0.22	3.73*
HyGain	Turner Seed	3.3	95	34.0	68	50	38	1.76	1.18	0.62	0.11	3.66*
NutraPlus BMR	Cisco	2.3	84	33.0	60	41	35	1.48	1.02	0.68	0.20	3.39
Surpass BMR-6	Turner Seed	3.0	93	32.3	50	32	30	1.46	0.59	0.59	0.16	2.80
Experimental Varieties												
AMP-SGII BMR	Ampac Seed	3.9	95	33.5	68	50	38	1.99	1.18	0.72	0.15	4.05*
AMP-R52537 BMR	Ampac Seed	4.3	96	34.0	74	45	32	2.05	1.09	0.57	0.11	3.82*
AMP-SPS	Ampac Seed	4.8	99	32.0	59	32	38	1.97	0.70	0.76	0.22	3.65*
AMP-R40352	Ampac Seed	3.5	90	34.0	69	45	36	1.74	1.01	0.62	0.20	3.57
AMP-R82400 BMR	Ampac Seed	2.8	95	32.8	62	38	33	1.82	0.77	0.62	0.14	3.36
AMP-R38327 BMR	Ampac Seed	4.8	100	32.3	53	30	24	1.78	0.63	0.52	0.21	3.13
Mean		3.5	94.2	33.3	63.3	41.0	33.8	1.79	0.94	0.64	0.17	3.54
CV,%		17.5	4.2	1.8	4.0	6.3	11.7	9.25	13.41	18.68	37.76	7.96
LSD,0.05		0.9	5.7	0.8	3.7	3.8	5.7	0.24	0.18	0.17	0.09	0.41

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# on June 9 and 25# on July 17.

Table 10. Dry matter yields, seedling vigor, percent stand, maturity and stand height of sorghum-sudangrass varieties sown May 27, 2010 at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor ¹ Jun 11	Percent Stand Jun 11	Maturity ² Jun 28	Jul 27	Height (in)			Yield (tons/acre)			
						Jun 28	Jul 27	Sep 1	Jun 28	Jul 27	Sep 1	Total
Commercial Varieties-Available for Farm Use												
Greengrazer V	Farm Science Genetics	4.8	91	32.0	33.8	59	68	57	1.58	1.67	1.50	4.75*
HyGain	Turner Seed	3.3	91	31.5	33.3	44	64	53	0.92	1.41	1.03	3.36
MS 202 BMR	Farm Science Genetics	3.0	79	31.5	32.8	42	63	50	0.94	1.19	0.90	3.03
NutraPlus BMR	Cisco	3.6	76	31.0	33.3	39	57	39	0.89	1.08	0.72	2.69
Special Effort	Cisco	2.4	78	31.5	32.8	38	57	45	0.88	0.95	0.80	2.65
SS220 BMR	Southern States	2.4	56	31.5	32.8	40	62	42	0.72	1.05	0.64	2.41
FSG 208 BMR	Farm Science Genetics	2.8	86	31.3	32.3	37	50	36	0.72	0.86	0.55	2.13
Surpass BMR-6	Turner Seed	2.9	76	30.0	31.8	31	39	27	0.67	0.82	0.35	1.84
Experimental Varieties												
AS2	Allied Seed, L.L.C.	4.4	88	32.0	33.8	57	66	54	1.44	1.49	1.03	3.95*
ASPS	Allied Seed, L.L.C.	3.3	89	31.0	31.0	39	54	42	1.03	1.17	0.72	2.92
AS1 BMR	Allied Seed, L.L.C.	4.3	91	31.3	31.8	40	38	23	1.08	0.65	0.27	2.00
Mean		3.4	81.9	31.3	32.6	42.1	56.0	42.4	0.99	1.12	0.78	2.89
CV,%		17.5	10.4	1.7	2.2	9.8	9.2	13.4	22.65	21.83	36.00	23.74
LSD,0.05		0.8	12.3	0.8	1.1	6.0	7.4	6.2	0.33	0.35	0.40	1.01

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# on June 3 and 50# on June 29

Table 11. Dry matter yields, percent stand, seedling vigor, maturity and stand height of sorghum-sudangrass varieties sown May 25, 2011 at Lexington, Kentucky.

Variety	Proprietor/ Distributor	Seedling Vigor ¹ Jun 16	Percent Stand	Maturity ²		Plant Height (inches)				Yield (tons/acre)				
			Jun 16	Jun 30	Jul 22	Jun 30	Jul 22	Aug 15	Sep 20	Jun 30	Jul 22	Aug 15	Sep 20	Total
Sweet-For-Ever	Gayland Ward Seed	3.5	100	30.0	32.3	30	44	33	29	0.59	1.80	1.12	0.88	4.38*
SS211	Southern States	3.8	96	31.0	32.8	40	49	44	29	0.68	1.58	1.22	0.67	4.15*
NutraPlus BMR	Cisco	5.0	100	30.3	31.8	36	35	33	24	0.84	1.44	1.17	0.64	4.10*
Super Sugar	Gayland Ward Seed	4.3	97	31.0	32.8	40	48	45	29	0.70	1.51	1.17	0.72	4.09*
Special Effort	Cisco	3.8	77	30.8	32.8	36	44	38	28	0.67	1.42	1.10	0.58	3.77*
GW300BMR	Gayland Ward Seed	3.3	93	30.3	32.5	34	44	37	25	0.55	1.44	1.01	0.54	3.53
Mean		3.9	93.6	30.5	32.5	35.9	43.9	39.3	274.3	0.67	1.53	1.13	0.67	4.00
CV,%		10.4	19.4	1.1	1.9	4.7	8.8	5.8	7.1	9.56	12.09	14.14	13.81	10.36
LSD,0.05		0.6	27.3	0.5	0.9	2.6	5.9	3.4	2.9	0.10	0.28	0.24	0.14	0.63

¹ Vigor score based on scale of 1 to 5 with 5 being the most vigorous seedling growth
² Maturity rating scale: 37=flag leaf emergence, 45=boot swollen, 50=beginning of inflorescence emergence, 58=complete emergence of inflorescence, 62=beginning of pollen shed. See Table 3 for complete scale.
 * Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
 • Nitrogen application: 30# on June2, 60# on July1, 40# on July 27 and 40# on Aug 19.

Table 12. Dry matter yields and maturity of teff varieties sown May 29, 2008 at Lexington, Kentucky.

Variety ²	Maturity ¹	Yield (tons/acre)				
	Jul 15	Jul 15	Aug 13	Sept 26	Oct 28	Total
Rooiberg	87	0.34	0.56	0.77	0.17	1.83*
Excaliber	73	0.39	0.54	0.70	0.15	1.78*
Pharaoh	56	0.44	0.37	0.79	0.12	1.73*
Tiffany	62	0.24	0.40	0.88	0.15	1.68*
Highveld	67	0.25	0.50	0.70	0.19	1.64*
HorseCandi	70	0.28	0.41	0.80	0.14	1.63*
Dessie	72	0.31	0.48	0.73	0.11	1.63*
Witkope	81	0.34	0.44	0.66	0.09	1.53*
Corvallis	68	0.17	0.36	0.63	0.17	1.33
Mean	70.6	0.31	0.45	0.74	0.14	1.64
CV,%	10.5	41.81	17.53	18.85	47.98	17.45
LSD,0.05	10.8	0.19	0.12	0.20	0.10	0.42

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 Check with local dealer for available varieties.
 * Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
 • Nitrogen application: 60# on June 13 and 30# on July 17.
 • Rainfall deficit: June-October rainfall was 9.48 inches; rainfall deficit during this period in 2008 was -8.88 inches.

Table 13. Dry matter yields and maturity of teff varieties sown June 4, 2008 at Princeton, Kentucky.

Variety ²	Maturity ¹		Yield (tons/acre)				
	Jul 29	Aug 28	Jul 29	Aug 28	Oct 3	Oct 30	Total
Highveld	56	55	1.58	1.05	0.67	0.14	3.44*
Excaliber	56	56	1.75	1.01	0.53	0.10	3.38*
Tiffany	49	49	1.62	0.90	0.47	0.17	3.17*
Rooiberg	57	58	1.44	0.96	0.58	0.17	3.15*
Dessie	56	51	1.67	0.93	0.44	0.10	3.15*
Pharaoh	55	52	1.40	0.93	0.53	0.08	2.94*
Witkope	57	57	1.51	0.86	0.39	0.15	2.90*
Corvallis	56	52	1.57	0.85	0.39	0.09	2.90*
HorseCandi	54	52	1.40	0.87	0.41	0.14	2.83
Mean	54.8	53.5	1.55	0.93	0.49	0.13	3.10
CV,%	5.9	3.8	17.34	13.43	27.01	53.37	12.20
LSD,0.05	4.7	3.0	0.39	0.18	0.16	0.10	0.55

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 Check with local dealer for available varieties.
 * Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
 • Nitrogen application: 60# on June 4 and 30# on July 30.
 • Rainfall deficit: June-October rainfall was 9.87 inches; rainfall deficit during this period in 2008 was -8.66 inches.

Table 14. Dry matter yields, seedling vigor, maturity and percent stand of teff varieties sown May 29, 2009 at Lexington, Kentucky.

Variety ³	Seedling Vigor ¹ Jun 14	Percent Stand Jun 14	Maturity ² Jul 15	Yield (tons/acre)				
				Jul 15	Aug 17	Sep 16	Oct 19	Total
Highveld	3.3	99	50.3	1.65	1.00	0.27	0.34	3.26*
Rooiberg	4.1	100	56.0	1.39	1.01	0.27	0.27	2.95*
HorseCandi	2.9	99	51.8	1.72	0.82	0.11	0.18	2.84*
Excaliber	3.5	100	55.0	1.51	0.94	0.15	0.20	2.80
Corvallis	4.3	100	51.3	1.70	0.76	0.08	0.20	2.74
Witkope	3.8	100	56.0	1.71	0.84	0.08	0.09	2.73
Velvet	4.6	100	52.8	1.57	0.90	0.14	0.08	2.69
VA-T1 Brown	4.0	100	51.5	1.57	0.87	0.10	0.11	2.66
Tiffany	3.1	99	52.0	1.37	0.89	0.09	0.14	2.50
Dessie	4.0	100	48.5	1.42	0.74	0.20	0.13	2.49
Summer Delight	3.3	99	54.5	1.51	0.77	0.07	0.11	2.47
Pharaoh	3.4	100	47.5	1.40	0.79	0.03	0.09	2.30
Mean	3.7	99.5	52.3	1.54	0.86	0.13	0.16	2.70
CV,%	23.2	1.5	5.5	13.46	15.74	43.86	44.74	11.02
LSD,0.05	1.2	2.2	4.1	0.30	0.20	0.09	0.10	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.
³ Check with local dealer for available varieties.
 * Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
 • Nitrogen application: 60# on June 9 and 25 # on July 17.

Table 15. Dry matter yields and maturity of teff varieties sown June 2, 2009 at Princeton, Kentucky.

Variety ²	Maturity ¹ Jul 14	Yield (tons/acre)			Total
		Jul 14	Aug 22	Sep 29	
Highveld	53.5	1.42	0.99	0.13	2.54*
Corvallis	51.3	1.31	1.03	0.15	2.48*
Excaliber	53.3	1.40	0.96	0.09	2.45*
Rooiberg	57.0	1.42	0.83	0.12	2.37*
Tiffany	45.0	1.33	0.87	0.14	2.34*
Pharaoh	42.3	1.24	0.92	0.08	2.24*
Witkope	56.5	1.17	0.93	0.11	2.21*
Velvet	57.0	1.17	0.81	0.10	2.08*
SummerDelight	49.8	1.17	0.72	0.11	2.00
VA-T1 Brown	42.5	1.10	0.77	0.11	1.97
Dessie	46.0	1.17	0.67	0.08	1.93
HorseCandi	39.8	1.14	0.61	0.11	1.86
Mean	49.5	1.25	0.84	0.11	2.21
CV,%	16.0	15.11	28.80	49.26	16.99
LSD,0.05	11.4	0.27	0.35	0.08	0.54

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 Check with local dealer for available varieties.
 * Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
 • Nitrogen application: 60# on June 2 and 30# on July 22.

Table 16. Dry matter yields, seedling vigor and percent stand of teff varieties sown May 27, 2010 at Lexington, Kentucky.

Variety ²	Seedling Vigor ¹ Jun 11	Percent Stand Jun 11	Yield (tons/acre)			
			Jul 7	Jul 30	Sep 28	Total ³
Excaliber	3.1	95	0.71	1.00	0.42	2.14*
Witkope	3.1	92	0.60	0.90	0.46	1.96*
Rooiberg	2.4	91	0.67	0.85	0.42	1.94*
Pharaoh	3.5	98	0.69	0.87	0.26	1.81*
Highveld	2.5	94	0.60	0.82	0.38	1.81*
Velvet	4.0	98	0.62	0.81	0.24	1.66*
Dessie	2.8	79	0.63	0.87	0.15	1.65*
Summer Delight	4.1	96	0.62	0.82	0.21	1.65
Corvallis	3.3	93	0.61	0.70	0.25	1.56*
HorseCandi	2.8	94	0.50	0.69	0.33	1.52*
VA-T1 Brown	3.4	96	0.47	0.78	0.24	1.49*
Tiffany	3.1	92	0.59	0.68	0.14	1.41
Mean	3.2	92.9	0.61	0.82	0.29	1.71
CV,%	32.9	13.1	26.65	33.38	43.97	27.18
LSD,0.05	1.5	16.2	0.23	0.39	0.18	0.67

¹ Vigor score based on a scale of 1 to 5 with 5 being the most vigorous seedling growth.
² Check with local dealer for available varieties.
³ There was heavy weed pressure from annual grasses and the weather was very dry, therefore the result was reduced yields.
 * Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
 • Nitrogen application: 30# on June 3 and 50# on July 7.

Table 17. Dry matter yields, seedling vigor, percent stand, maturity and stand height of teff varieties sown May 25, 2011 at Lexington, Kentucky.

Variety ³	Seedling Vigor ¹ Jun 16	Percent Stand Jun 16	Maturity ²		Height (inches)		Yield (tons/acre)					
			Jul 7	Jul 22	Jul 7	Jul 22	Jul 7	Jul 22	Aug 15	Sep 27	Total	
			Rooiberg	4.5	100	57.0	57.0	23	0.71	1.09	1.18	0.71
Excaliber	4.0	100	55.0	56.0	25	0.62	1.02	1.12	0.89	1.12	0.88	3.64*
HorseCandi	4.0	99	47.5	51.3	21	0.71	0.99	1.06	0.78	1.03	0.78	3.56*
Pharaoh	4.9	100	44.5	53.5	23	0.78	0.97	1.03	0.78	1.03	0.78	3.56*
Witkope	4.0	100	55.5	56.0	24	0.69	1.11	0.97	0.70	1.11	0.70	3.47*
Corvallis	4.8	100	51.3	53.0	22	0.63	0.95	1.09	0.75	1.09	0.75	3.42*
Highveld	3.8	100	42.8	53.5	20	0.47	1.02	1.01	0.89	1.01	0.89	3.39*
Velvet	4.4	100	50.8	53.0	22	0.56	0.99	0.96	0.79	0.96	0.79	3.31*
Dessie	3.3	99	42.3	54.0	21	0.46	1.02	0.94	0.73	1.02	0.73	3.16*
Tiffany	4.0	100	46.5	54.5	19	0.41	1.00	0.96	0.78	1.00	0.78	3.14*
VA-T1 Brown	4.8	100	48.0	52.0	20	0.45	0.95	1.00	0.68	0.95	0.68	3.07
Summer Delight	3.3	99	48.8	54.0	17	0.44	0.93	0.91	0.70	0.91	0.70	2.98
Mean	4.1	99.7	49.1	54.0	21.3	0.58	1.00	1.02	0.77	1.02	0.77	3.37
CV,%	18.4	0.9	9.9	3.4	13.4	46.81	8.95	11.59	16.40	12.33	16.40	12.33
LSD,0.05	1.1	1.3	7.0	2.6	4.1	0.39	0.13	0.17	0.18	0.18	0.18	0.60

¹ Vigor score based on scale of 1 to 5 with 5 being the most vigorous seedling growth
² Maturity rating scale: 37=flag leaf emergence, 45=boot swollen, 50=beginning of inflorescence emergence, 58=complete emergence of inflorescence, 62=beginning of pollen shed.
³ Check with local dealer for available varieties.
 * Not significantly different from the highest numerical value in the column, based on the 0.05 LSD.
 • Nitrogen application: 30# on June 2, 40# on July 7, 40# on July 27 and 30# on Aug 19.

Table 18. Summary of Kentucky Sudangrass Yield Trials 2008-2011 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietor/KY Distributor	Lexington				Mean ³ (#trials)
		2008 ^{1,2}	2009	2010	2011	
		All trials are 1 year yields				
Enorma BMR	Cal/West Seeds			99	94	97(2)
Hayking BMR	Central Farm Supply	111	112	91	97	103(4)
Monarch V	Public	104	96	102	97	100(4)
Piper	Public	90	91	97	94	93(4)
ProMax BMR	Ampac Seed	95	101	110	115	105(4)
SS130 BMR	Cal/West Seeds			101	103	102(2)

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 19. Summary of Sorghum-Sudangrass Yield Trials 2008-2011 (yield shown as a percentage of the mean of the commercial varieties in the trial).

Variety	Proprietor/KY Distributor	Lexington				Mean ³ (#trials)
		2008 ^{1,2}	2009	2010	2011	
		All trials are 1 year yields				
FSG 208 BMR	Farm Science Genetics			75		–
Greengrazer V	Farm Science Genetics			166		–
GW300 BMR	Gayland Ward Seed				88	–
HyGain	Turner Seed	104	105	118		109(3)
MS 202 BMR	Farm Science Genetics			106		–
NutraPlus BMR	Cisco	106	97	94	103	100(4)
Special Effort	Cisco	109	110	93	94	102(4)
SS211	Southern States				104	–
SS220 BMR	Southern States		107	84		96(2)
Surpass BMR-6	Turner Seed	81	80	64		75(3)
Super Sugar	Gayland Ward Seed				102	–
Sweet-For-Ever	Gayland Ward Seed				110	–

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 20. Summary of Kentucky Teff Yield Trials 2008-2011 (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	
	All trials are 1 year yields						
Corvallis	94	112	81	101	91	101	97(6)
Dessie	102	87	99	92	96	94	95(6)
Excaliber	109	111	109	104	125	108	111(6)
Highveld	111	115	100	121	106	101	109(6)
HorseCandi	91	84	99	105	89	108	96(6)
Pharaoh	95	101	105	85	106	106	100(6)
Rooiberg	102	107	112	109	113	108	109(6)
Summer Delight		90		91	96	88	91(4)
Tiffany	102	106	102	93	82	93	96(6)
VA T1 Brown		89		99	87	91	92(4)
Velvet		94		100	97	98	97(4)
Witkope	94	100	93	101	115	103	101(6)

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.



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