PR-619

UNIVERSITY OF KENTUCKY College of Agriculture

2010 Summer Annual Grass Report

(Includes trials planted in 2007, 2008, and 2009)

G.L. Olson, S.R. Smith, and G.D. Lacefield, UK Department of 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 2007-2010 forage yield trials with sudangrass, sorghum/sudangrass, millets, and teff.

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.

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 italic*) 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 plantings 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

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

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

[1] DEP is departure from the long-term average.
[2] 2009 data is for 10 months through October.

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, and three in 2010) 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 ft x 20 ft in a randomized complete block design with four replications with a harvested area of 5 ft x 20 ft. All trials were sown into a prepared seedbed using a disk drill at the following rates (pounds/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. Nitrogen was applied at 60 pounds per acre two weeks after planting and 30 pounds/acre immediately after the first harvest.

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

	2008				2009[2]			
	Temperature		Rainfall		Temperature		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				
Total			48.95	-2.18			51.62	+5.33

[1] DEP is departure from the long-term average.
[2] 2009 data is for 11 months through November.

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 14. 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 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.

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.

Authors

G.L. Olson, Research Specialist, Forages
S.R. Smith, Extension Professor, Forages
G.D. Lacefield, Extension Professor, Forages

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)*	Applicable to primary growth of seedlings or to single-tiller transplants.
21	Main shoot only	
22	Main shoot and 1 tiller	
23	Main shoot and 2 tillers	
24	Main shoot and 3 tillers	
•	• • • •	
29	Main shoot and 9 or more tillers	
	Stem elongation	
31	First node palpable	More precisely an accumulation of nodes. Fertile and sterile tillers distinguishable.
32	Second node palpable	
33	Third node palpable	
34	Fourth node palpable	
35	Fifth node palpable	
37	Flag leaf just visible	
39	Flag leaf ligule/collar just visible	
	Booting	
45	Boot swollen	
	Inflorescence emergence	
50	Upper 1 to 2 cm of inflorescence visible	
52	¼ of inflorescence emerged	
54	½ of inflorescence emerged	
56	¾ of inflorescence emerged	
58	Base of inflorescence just visible	
	Anthesis	Inflorescence-bearing internode is visible. No anthers are visible.
60	Preanthesis	
62	Beginning of anthesis	First anthers appear.
64	Maximum anthesis	Maximum pollen shedding.
66	End of anthesis	No more pollen shedding.
	Seed ripening	
75	Endosperm milky	Inflorescence green.
85	Endosperm soft doughy	No seeds loosening when inflorescence is hit on palm.
87	Endosperm hard doughy	Inflorescence losing chlorophyll; a few seeds loosening when inflorescence hit on palm.
91	Endosperm hard	Inflorescence-bearing internode losing chlorophyll; seeds loosening in quantity when inflorescence hit on palm.
93	Endosperm hard and dry	Final stage of seed development; most seeds shed.
Smith, J. Allan, and Virgil W. Hayes. 1981. pp. 416-418. 14th International Grasslands Conference Proc. 1981. June 14-24, 1981, Lexington, Kentucky.		

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 (inches)			Maturity[1]	2007 Yield (tons/acre)			
			Jul 11	Aug 17	Oct 2	Jul 11	Jul 11	Aug 17	Oct 2	Total
Monarch V	Sudangrass	Public	60	57	31	62.0	1.51	1.58	1.08	4.17*
Special Effort	Sorghun-Sudan	Cisco	65	53	35	59.0	1.42	1.48	1.19	4.09*
ProMax	Sudangrass	Ampac Seed	68	62	32	63.0	1.54	1.44	0.79	3.76*
NutraPlus	Sorghun-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.

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	0.61	0.65	2.66*
NutraPlus	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	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	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.

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	Central Farm	4.1	95	35	71	59	39	1.87	1.26	0.69	3.83*
ProMax	Ampac Seed	4.5	98	35	69	56	36	1.73	1.14	0.57	3.44*
MonarchV	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.

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 Jun 10	Maturity[2] Jul 7	Height (inches)			Yield (tons/acre)			
					Jul 7	Jul 29	Sep 1	Jul 7	Jul 29	Sep 1	Total
Commercial Varieties-Available for Farm Use											
ProMax	Ampac Seed	3.3	81	33.5	47	43	38	0.87	1.00	0.59	2.45*
MonarchV	Public	3.5	94	33.5	47	42	30	0.84	0.96	0.47	2.27*
SS130	Cal/West Seeds	2.5	66	33.5	47	45	29	0.76	0.99	0.49	2.24*
Enorma	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	Cal/West Seeds	2.0	63	33.3	39	39	36	0.63	0.84	0.55	2.02*
Experimental Varieties											
CW5-43-29	Cal/West Seeds	2.8	75	33.3	47	46	27	0.79	1.15	0.47	2.41*
CW5-43-43	Cal/West Seeds	2.5	61	33.3	45	46	29	0.82	1.12	0.44	2.38*
CW5-43-68	Cal/West Seeds	2.8	65	33.3	42	43	29	0.81	1.07	0.49	2.37*
CW5-43-33	Cal/West Seeds	2.5	76	33.3	47	46	30	0.86	1.11	0.39	2.36*
CW5-43-34	Cal/West Seeds	2.1	68	33.0	42	45	27	0.78	1.03	0.44	2.26*
CW5-43-50	Cal/West Seeds	2.3	65	33.3	42	43	24	0.74	0.94	0.39	2.07*
CW5-43-69	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.

Table 8. 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*
SS220BMR	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	Cisco	2.3	84	33.0	60	41	35	1.48	1.02	0.68	0.20	3.39
SurpassBMR-6	Turner Seed	3.0	93	32.3	50	32	30	1.46	0.59	0.59	0.16	2.80
Experimental Varieties												
AMP-SGIIBMR	Ampac Seed	3.9	95	33.5	68	50	38	1.99	1.18	0.72	0.15	4.05*
AMP-R52537BMR	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-R82400BMR	Ampac Seed	2.8	95	32.8	62	38	33	1.82	0.77	0.62	0.14	3.36
AMP-R38327BMR	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.

Table 9. Dry matter yields, seedling vigor, percent stand, maturity, and stand height of sorghum-sudangrass varieties sown May 27, 2010 at Lexington, Kentucky.

Variety	Propietor/ Distributor	Seedling Vigor[1] Jun 11	Percent Stand Jun 11	Maturity[2]		Height (inches)			Yield (tons/acre)			
				Jun 28	Jul 27	Jun 28	Jul 27	Sep 1	Jun 28	Jul 27	Sep 1	Total
Commercial Varieties-Available for Farm Use												
Greengrazer II	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	Cisco	3.6	76	31.0	33.3	39	57	39	0.89	1.08	0.72	2.69
SpecialEffort	Cisco	2.4	78	31.5	32.8	38	57	45	0.88	0.95	0.80	2.65
SS220BMR	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
SurpassBMR-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, LLC	4.4	88	32.0	33.8	57	66	54	1.44	1.49	1.03	3.95*
ASPS	Allied Seed, LLC	3.3	89	31.0	31.0	39	54	42	1.03	1.17	0.72	2.92
AS1	Allied Seed, LLC	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.

Table 10. Dry matter yields and maturity of teff varieties sown May 29, 2008 at Lexington, Kentucky.

Variety[2]	Maturity[1] Jul 15	Yield (tons/acre)				
		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.
Fertilizer application: Application of 60# of N on June 13 and 30# of N on July 17.
Rainfall deficit: June-October rainfall was 9.48 inches; rainfall deficit during this period in 2008 was -8.88 inches.

Table 11. Dry matter yields and maturity of teff varieties sown June 4, 2008 at Princeton, Kentucky.

	Maturity[1]		Yield (tons/acre)				
Variety[2]	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.
Fertilizer application: Application of 60# of N on June 4 and 30# of N on July 30.
Rainfall deficit: June-October rainfall was 9.87 inches; rainfall deficit during this period in 2008 was -8.66 inches.

Table 13. Dry matter yields and maturity of teff varieties sown June 2, 2009 at Princeton, Kentucky.

	Maturity[1]	Yield (tons/acre)			
Variety[2]	Jul 14	Jul 14	Aug 22	Sep 29	Total
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.
Fertilizer application: Application of 60# of N on June 2 and 30# of N on July 22.

Table 12. 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.
Fertilizer application: Application of 60# of N on June 9 and 25 # of N on July 17.

Table 14. 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*
SummerDelight	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*
VAT1Brown	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.
Fertilizer application: Application of 30# of N on June3 and 50# of N on July 7.

UK UNIVERSITY OF KENTUCKY College of Agriculture

The College of Agriculture is an Equal Opportunity Organization
1-2011