Sorghum and Sudan Forage
Variety Trials

THE SAMUEL ROBERTS NOBLE FOUNDATION

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Introduction

In an effort to assist producers with summer annual forage selection, the Agricultural Division has conducted forage yield trials to determine hay yields of commercially available varieties of forage sorghum (FS), sorghum sudan (SS) crosses and sudan (SU) grass. This report summarizes results from the 2010 rain-fed and irrigated trials. Results from previous years can be found in "Forage Yields from Five Years of Summer Annual Variety Trials" NF-SO-10-01 or at http://www.noble.org/Ag/Forage/summerannuals-variety-trial/index.html.

Trial Procedures

The 2010 trials were conducted at the Noble Foundation Dupy Farm near Gene Autry, Okla. The soil series is Dale silt loam. Entries were provided by seed companies that market varieties in the region (Table 1). Rain-fed and irrigated trials contain the same entries, but are individual trials with unique randomized complete block designs with four replications each. Supplemental irrigation was provided to the irrigated trial to make up the difference between rainfall and evapotranspiration.

The entries were seeded into a clean-tilled seedbed as in years past. Planting date was May 7 for rain-fed and May 10, 2010, for irrigated. Soil temperatures were consistently above 65 degrees Fahrenheit at 9:00 a.m. 2 inches under bare soil prior to planting. Seeds were planted in 7-inch rows at 1.5-inch depth using a Hege 500 drill. Plot size was 3.3 by 20 feet. Seeding rate was 25 lbs/ac for SU, 20 lbs/ac for SS and 6 lbs/ac for FS, except for 23402 BMR FS which was planted at 20 lbs/ac at the request of the supplier. Soil testing was performed prior to planting, and nitrogen fertilizer was broadcast so that applied and soil residual nitrogen (N) totaled 70 lbs N/ac at emergence. In addition, 50 lbs N/ac was top-dressed after the first harvest. Soil pH, phosphorus (P) and potassium (K) were at such levels that no lime, P or K fertilizer were needed. Weeds were controlled with a hormone-type herbicide, and surviving weeds were removed by hand. Plots were harvested with a Carter flail forage harvester at a 2-inch stubble height. Harvest was done soon after the majority of entries reached flowering stage. The plots produced two harvests, one in July and the second after frost.

Wet plot weight, and wet and dry subsample weights were collected to adjust all yields to 0% moisture (100% dry matter). Forage analyses for crude protein (CP), acid detergent fiber (ADF), total digestible nutrients (TDN) and in vitro dry matter digestibility (IVDMD) were performed on the dry subsamples. Data were analyzed with general linear analysis of variance for the mean in Statistix 9.0, and means were separated by the least significant difference (LSD) method (alpha = 0.05).

Results and Discussion

Rainfall of 17.6 inches from May through September was considered near normal when compared to the 30-year average of 18.5 inches at Ardmore for 1971-2000 (Table 2). The longest rain-free period was 38 days, from July 11 to August 18. However, soil moisture was good prior to this event.

As one would expect, CP appears to be inversely related to yield. In general, higher yields tend to give lower CP and vice versa. This seems logical, since higher yield spreads a set amount of nitrogen and other ▸

nutrients across more plant tissue. It is interesting to note that IVDMD values, with few exceptions, are higher for irrigated than rain-fed. We speculate this is because there is less cell wall (lignin) relative to cell contents (energy) in the irrigated forage versus the rain-fed forage. Test result averages for CP, ADF, TDN and IVDMD for each variety for the July and October harvests in 2010 are shown in Tables 4 and 5. However, the minimum, average and maximum values in Table 3 show a range of quality that could be expected from hay of these forages.

Yields in 2010 were, on average, very good. The lowest and highest yields were 7,433 lbs/ac for rain-fed 2 Way BMR FS and 43,422 lbs/ac for irrigated Gro-N-Graze Dream SS. Across all entries, the average rain-fed yield was 20,595 lbs/ac and the average irrigated yield was 29,703 lbs/ac. The average rain-fed yields for FS, SS and SU were 12,964 lbs/ac, 23,489 lbs/ac and 24,683 lbs/ac, respectively. The average irrigated yields for FS, SS and SU were 23,255 lbs/ac, 32,467 lbs/ac and 31,084 lbs/ac, respectively. There were three varieties, BMR 201 SS, GW-300 SS and Hegari FS, that yielded numerically less with irrigation than without. As in years past, FS entries did not tend to yield as well as SS and SU entries. This was true in both the rain-fed and irrigated plots.

Mega Green and Sweet Grazin performed well as both irrigated and rain-fed in 2010 and have performed well in one or more previous years of our testing. Gro-N-Graze 8493 and Sucrose 2-S performed well in the rain-fed trial in 2010, and in the rain-fed and irrigated trials in 2008, while Gotcha Plus performed well in the irrigated trial in 2010, and in the rain-fed and irrigated trials in 2008. Pacesetter PS performed well in the irrigated trial in 2010, and the rain-fed trial in 2008, while Sordan Headless performed well in the irrigated trials in 2010 and 2008. All of these are SS varieties.

Gro-N-Graze Dream and Sucrose 9R-PS performed well in both tests in 2010, but we have not tested them in the past. Other varieties we have not tested in the past, but that performed well in 2010 under rain-fed conditions, are BMR 201, BMR 301, GW 9417 and SS2 BMR. Likewise, varieties we have not tested in the past, but that performed well in 2010 under irrigated conditions, are 22053 PS BMR and Trudan Headless. These varieties should be evaluated at more locations and for more years since single year, single location data are not always indicative of adaptation and performance. This information should be a valuable tool when used with similar information from other sources. ■

Table 1. Contributors to the sorghum and sudan forage variety trials

Garrison & Townsend, Hereford, Texas
Gayland Ward Seed, Hereford, Texas
Johnston Seed Company, Enid, Okla.
MBS Seed, Denton, Texas
Pennington Seed, Madison, Ga.
Production Plus, Plainview, Texas
Sorghum Partners, New Deal, Texas
Walter Moss Seed Company, Waco, Texas
Warner Seeds, Hereford, Texas

Table 2. Monthly precipitation (inches) from May thru September 2010 and 30-year (1971-2000) average precipitation for the Ardmore mesonet

Year	May	Jun	Jul	Aug	Sep	Growing Season Total
30-year	5.08	4.26	2.48	2.51	4.17	18.50
2010 rain-fed	3.45	2.34	4.52	1.16	6.13	17.60
2010 irrigated	3.45	4.68	5.52	4.16	6.13	23.94

Table 3. Minimum, Average and Maximum values for crude protein (CP), acid detergent fiber (ADF), total digestible nutrients (TDN) and in vitro dry matter digestibility (IVDMD) for all varieties under rain-fed and irrigated conditions at Gene Autry, Okla. in 2010

	Min	Avg	Max
Rain-fed CP	8.0	10.3	14.5
Rain-fed ADF	34.1	38.7	42.5
Rain-fed TDN	55.8	58.8	62.3
Rain-fed IVDMD	63.0	68.9	74.9
Irrigated CP	3.9	6.4	10.1
Irrigated ADF	33.7	41.0	47.4
Irrigated TDN	52.0	57.0	62.6
Irrigated IVDMD	63.1	74.8	80.6

Table 4. Season long rain-fed forage yields (lbs/ac dry matter) and average crude protein (CP), acid detergent fiber (ADF), total digestible nutrients (TDN) and in vitro dry matter digestibility (IVDMD) of forage sorghum (FS), sorghum sudan (SS) and sudan (SU) at Ardmore, Okla. in 2010 including means and least significant differences (LSD) at alpha=0.05

Source	Variety	Type	DM lb/ac	CP%	ADF	TDN	IVDMD
Sorghum Partners	1990	FS	15384	11.6	38.2	59.2	69.3
Warner	2 Way BMR	FS	7433	**14.5**	**34.1**	**62.3**	**74.9**
Warner	2 Way F104	FS	11406	12.2	**36.3**	**60.6**	**72.0**
Warner	2 Way Husky	FS	13273	12.0	**36.4**	**60.6**	71.1
Warner	2 Way SRS	FS	13275	11.4	37.4	59.7	68.6
Garrison & Townsend	22050 BMR	SS	25247	9.1	39.4	58.2	70.6
Garrison & Townsend	22053 PS BMR	SS	22197	9.3	40.3	57.5	69.6
Garrison & Townsend	23402 BMR	FS	13886	11.2	38.4	59.0	71.0
Garrison & Townsend	23431 BMR	SS	22612	10.3	40.2	57.6	69.5
Warner	6R-BMR	SS	16450	10.4	38.0	59.3	**71.6**
Johnston's	BMR 201	SS	**30269**	8.7	38.0	59.3	**72.1**
Johnston's	BMR 201D	SS	21515	11.8	38.7	58.8	70.2
Johnston's	BMR 301	SS	**25426**	9.4	41.4	56.7	68.8
Moss Seed	Century	SS	22797	9.5	38.0	59.3	71.0
	EXP	FS	20787	10.2	39.7	58.0	68.5
MBS	Fastgrass 5	SS	23815	8.5	40.5	57.4	64.7
MBS	Gotcha Plus	SS	24215	10.7	**36.9**	**60.2**	70.8
MBS	Gotcha Plus BMR	SS	12810	**13.0**	**36.5**	**60.5**	**72.7**
Warner	Gro-N-Graze 8493	SS	**25570**	9.5	40.1	57.6	64.9
Warner	Gro-N-Graze Dream	SS	**28110**	9.4	38.1	59.3	69.4
Garrison & Townsend	GW 9417	SS	**26453**	8.9	39.0	58.5	67.3
Gayland Ward	GW-300	SS	23281	10.6	38.4	59.0	68.2
MBS	Haymaster BMR	SS	13027	11.7	37.4	59.8	**72.1**
MBS	Hegari	FS	9306	**12.7**	**35.4**	**61.3**	**71.9**
Moss Seed	Mega Green	SS	**25857**	9.7	39.3	58.3	68.3
MBS	Pacesetter PS	SS	22683	8.3	41.8	56.4	66.7
MBS	Piper	SU	22118	11.7	39.7	58.0	65.1
Warner	Red Top Kandy	FS	12658	11.0	37.3	59.9	69.9
Sorghum Partners	Sordan 79	SS	24108	8.3	41.6	56.5	63.1
Sorghum Partners	Sordan Headless	SS	22981	9.6	39.5	58.2	67.7
Garrison & Townsend	SS2 BMR	SU	**27783**	10.1	38.1	59.2	69.8
Warner	Sucrosse 2-S	SS	**26040**	9.7	39.1	58.4	67.0
Warner	Sucrosse 9R-PS	SS	**28663**	8.1	41.0	57.0	66.8
MBS	Sumac	FS	11759	11.9	**37.0**	**60.1**	69.2
Pennington	Summergrazer III	SS	24811	8.0	40.7	57.2	64.4
Warner	Sweet Bee Fertile	FS	15564	11.5	**36.9**	**60.1**	70.1
Warner	Sweet Bee Sterile II	FS	10834	12.0	**37.0**	**60.1**	70.2
Johnston's	Sweet Grazin	SS	**28126**	8.5	40.8	57.1	64.8
Production Plus	Sweet Sunnysue	SS	21410	11.1	37.5	59.7	68.5
Gayland Ward	Sweet-For-Ever	SS	22228	11.3	39.1	58.5	68.2
Sorghum Partners	Trudan 8	SU	24167	8.4	42.5	55.8	63.0
Sorghum Partners	Trudan Headless	SU	24663	8.6	39.4	58.2	69.3
	LSD		4907	2.1	3.0	2.4	3.7
	Mean		20595	10.3	38.7	58.8	68.9

Numbers in bold are statistically the best for each column.

Table 5. Season long irrigated forage yields (lbs/ac dry matter) and average crude protein (CP), acid detergent fiber (ADF), total digestible nutrients (TDN) and in vitro dry matter digestibility (IVDMD) of forage sorghum (FS), sorghum sudan (SS) and sudan (SU) at Ardmore, Okla. in 2010 including means and least significant differences (LSD) at alpha=0.05

Source	Variety Irrigated	Type	DM lb/ac	CP%	ADF	TDN	IVDMD
Sorghum Partners	1990	FS	32565	6.9	38.7	58.8	73.4
Warner	2 Way BMR	FS	19516	7.2	**36.7**	**60.4**	**80.1**
Warner	2 Way F104	FS	18889	6.3	42.5	55.8	71.4
Warner	2 Way Husky	FS	35833	5.8	41.4	56.6	71.1
Warner	2 Way SRS	FS	30044	5.0	38.8	58.7	**76.8**
Garrison & Townsend	22050 BMR	SS	31076	6.9	41.7	56.4	**77.1**
Garrison & Townsend	22053 PS BMR	SS	**38684**	5.8	42.3	56.0	**78.6**
Garrison & Townsend	23402 BMR	FS	26644	7.0	38.8	58.7	**80.6**
Garrison & Townsend	23431 BMR	SS	29812	7.8	41.7	56.4	**77.3**
Warner	6R-BMR	SS	19278	7.3	42.1	56.1	76.0
Johnston's	BMR 201	SS	29941	7.0	39.9	57.8	**80.1**
Johnston's	BMR 201D	SS	24375	7.2	41.9	56.3	**79.5**
Johnston's	BMR 301	SS	35735	5.5	42.2	56.0	**77.9**
Moss Seed	Century	SS	27641	5.3	41.2	56.8	**78.0**
	EXP	FS	24867	7.5	41.0	57.0	72.9
MBS	Fastgrass 5	SS	33361	5.3	42.1	56.1	73.4
MBS	Gotcha Plus	SS	**38542**	6.5	41.0	57.0	72.2
MBS	Gotcha Plus BMR	SS	26881	5.9	40.9	57.0	**77.2**
Warner	Gro-N-Graze 8493	SS	32845	5.2	42.4	55.8	72.0
Warner	Gro-N-Graze Dream	SS	**43422**	5.4	40.4	57.5	76.3
Garrison & Townsend	GW 9417	SS	35716	6.6	40.7	57.2	73.0
Gayland Ward	GW-300	SS	21458	6.2	40.9	57.1	73.3
MBS	Haymaster BMR	SS	18142	7.7	41.8	56.3	**77.5**
MBS	Hegari	FS	7477	**10.1**	**33.7**	**62.6**	**78.8**
Moss Seed	Mega Green	SS	**37728**	6.4	42.3	55.9	71.9
MBS	Pacesetter PS	SS	**40919**	6.0	43.2	55.3	71.3
MBS	Piper	SU	28124	7.1	47.4	52.0	63.1
Warner	Red Top Kandy	FS	18275	6.0	38.2	59.2	75.6
Sorghum Partners	Sordan 79	SS	**37596**	5.3	44.9	54.0	68.7
Sorghum Partners	Sordan Headless	SS	**41002**	5.2	43.5	55.1	71.2
Garrison & Townsend	SS2 BMR	SU	30365	7.3	38.1	59.2	**80.2**
Warner	Sucrosse 2-S	SS	32154	5.9	41.0	57.0	73.9
Warner	Sucrosse 9R-PS	SS	**42195**	5.1	43.8	54.8	71.8
MBS	Sumac	FS	17065	7.3	**36.3**	**60.6**	**78.4**
Pennington	Summergrazer III	SS	28141	5.2	41.7	56.5	72.2
Warner	Sweet Bee Fertile	FS	23926	6.7	**36.2**	**60.7**	**80.4**
Warner	Sweet Bee Sterile II	FS	23957	7.1	**36.0**	**60.8**	**79.7**
Johnston's	Sweet Grazin	SS	**36873**	3.9	43.3	55.2	69.6
Production Plus	Sweet Sunnysue	SS	26101	6.3	40.5	57.3	75.1
Gayland Ward	Sweet-For-Ever	SS	34532	6.3	41.7	56.4	73.3
Sorghum Partners	Trudan 8	SU	24709	8.0	44.3	54.4	68.3
Sorghum Partners	Trudan Headless	SU	**41138**	5.2	43.8	54.8	72.2
	LSD		7074	1.8	3.0	2.3	4.1
	Mean		29703	6.4	41.0	57.0	74.8

Numbers in bold are statistically the best for each column.