The Agriculture Program
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2000 Texas Panhandle Forage Sorghum Trial

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Introduction and Objective

Forage sorghum is used throughout Texas for grazing, hay, or as silage. In addition, many dual purpose sorghums are grown that can be utilized for forage or for grain. The purpose of this study was to compare various types of sorghums for there ability to produce silage and to compare their nutritional constituents.. In addition, grain yield of each entry was examined. The study included male sterile, photoperiod sensitive, brown mid-rib, and a few sudan type entries. Grain yield was compared to several standard grain sorghum hybrids. Sorghum silage yields were compared to NC+ 7117 corn hybrid grown in the same field.

Materials and Methods

Trial Location:	Bush Farm. Located one mile north of Bushland, TX.
Cooperator:	Texas Agricultural Experiment Station
Previous Crop:	Fallow
Previous Herbicide:	None
Soil Type:	Pullman Clay Loam, pH = 7.4
Plot Size:	4 - 30 inch rows by 25 feet long
Replications:	3
Study Design:	Randomized Complete Block
Planting Date:	May 24, 2000
Planting Rate:	120,000 plants/acre
Planting Depth:	1.5 inches
Seed Method:	Bedded
Soil Moisture:	Good; study was pre-irrigated Field
Maintenance:	Study site was bedded and fertilized with 180 lbs actual N / acre on March 9, 2000. Pre-irrigation took place on May 15, 2000.
Herbicides:	Bicep II Magnum was applied preemergence immediately following planting.

Rainfall:	May:	0.51 inches
	June:	4.21 inches
	July:	1.04 inches
	Aug:	0.0 inches
	Sept:	0.01 inches
	Oct:	2.34 inches
Irrigation:	Pre-water:	4.5 inches
	June 21:	3.11 inches

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July 12:	2.47 inches
July 26:	3.29 inches
Aug 10:	2.79 inches
Aug 21:	3.40 inches

Data Collected:

-Height at the time entries were harvested for silage in feet.

-Lodging as a percentage of fallen plants per plot on September 11.

-Forage Yield was collected from 1 meter of row in each plot. These yields were converted to yield in tons/ac at 65% moisture. Yields were collected on August 30, September 6, or September 27 when each entry was at the soft-dough stage. Photoperiod sensitive entries were harvested on September 27.

-Grain Yield was collected at maturity from 10 feet of row in each plot. Samples were thrashed and converted to a yield of lbs/ac at 14% moisture.

Results and Discussion

The 2000 growing season was hotter and drier than normal. Considerably more irrigation water was applied to the trial than a similar trial conducted in 1999. Lodging was somewhat high in many of the plots (Table 1). This was likely due to high wind speeds that accompanied the hot, dry weather experienced in August and early September. There was a considerable amount of variation in the lodging of the brown mid-rib entries. Several of the brown mid-rib entries received lodging ratings of less than 15%. The tall photoperiod sensitive entries all had good standibility with the exception of BMR 301. This entry did appear to be earlier in maturity than the other photoperiod sensitive entries and did produce some grain.

Grain yield was collected from all entries that produced grain. This included the sorghum-sudangrass entries as well as those forage sorghums that were male-sterile but produced grain after being pollinated from neighboring entries. Grain yield of the traditional grain sorghum hybrids, F-647E, A571, P8505, P84G62, NC+ Y363 averaged 6,556 lbs/ac. The yield range on the other entries excluding the photoperiod sensitive, sorghum-sudan, and male sterile entries was 864 to 6,393 lbs/ac. The NC+ 7117 corn grain yield was 9,352 lbs/ac.

Silage yield ranged from 18.02 to 33.70 tons/ac excluding the traditional sorghum hybrids. The NC+ 7117 corn silage yield was 23.66 tons/ac.

Nutrient Analysis

Forage Analysis: Forage was chopped at harvest and subsampled. Subsamples were immediately frozen. Samples were analyzed by the Dairy One Laboratory, Ithaca, New York. A,, nutritional constituents were adjusted to a 100% moisture free basis.

Definitions:

Maturity:	PS, photoperiod sensitive; E, early; M, mid; L, late.
Brown Midrib:	N, no; Y, yes; refers to phenotype associated with genotype with potential for lower lignin content and higher digestibility.
Male Sterile:	N, no; Y, yes.
Rank:	Relative ranking of variety based on nutritional constituents; 1= highest.
Crude Protein=	6.25* % total nitrogen.
NDF:	% neutral detergent fiber; cell wall fraction of the forage.
ADF:	% acid detergent fiber; constituent of the cell wall includes cellulose and lignin; inversely related to energy availability.

Lignin: constituent of ADF; considered indigestible and is negatively related to energy content of forage.

IVTD: % in vitro digestibility; positively related to energy availability.

IVTD/ac= % IVTD * forage yield (lbs. DM/ac).

P= % phosphorus.

P/ac= % P * forage yield (lbs. DM/ac); reported because of interest in crops that will remove P from soils fertilizes with livestock manure.

See Table 2 for nutrient analysis results.

Table 1. Comparison of Sorghums for Standibility, Silage Production and Grain Yield

Variety	Company	Maturity	Brown Midrib	Male Sterile	Mature Height (Ft.)	% Lodged 9/11/00	% Plant Moisture[1)]	Silage (Ton/Ac)[2)]	Grain Yield (lbs/Ac)[3)]
Maxi Gain	Coffey Forage Seeds	PS	N	N/A	9.5	0	67	28.99 a-f	-
GW 9110 F	Crosbyton Seed	ML	N	N	7.1	50	63	22.99 e-l	2980 l-q
Silo N Feed	Crosbyton Seed	ML	N	N	6.8	83	62	32.38 ab	2539 n-s
GW 8228 BMR	Crosbyton Seed	M	Y	N	7.3	20	61	25.39 b-l	3297 j-p
GW 9430 F	Crosbyton Seed	ME	N	Y	6.5	0	68	21.11 f-m	4123 f-l
BMR 100	Garrison & Townsend	ML	Y	N	7.3	82	72	20.52 g-m	2666 n-s
BMR 101	Garrison & Townsend	ML	Y	N	8.3	80	68	27.27 a-i	2943 l-q
Sile-All W	Garrison & Townsend	ML	N	N	7	93	52	25.13 b-l	4105 g-l
Bale-All III	Garrison & Townsend	M	N	Y	7.5	43	67	23.64 d-l	2224 o-t
Silo-Milo	Garrison & Townsend	M	N	N	5.6	3	60	23.76 c-l	5259 c-g
BMR 301	Garrison & Townsend	PS	Y	N/A	9.3	45	69	25.15 b-l	586 uv
RO325-X	Garst Seed	ML	N	N	5.8	0	57	28.86 a-f	5491 b-f
Hi-Energy II	Garst Seed	L	N	N	7.3	78	59	21.10 f-m	2973 l-q
NO348 BMR-X	Garst Seed	L	Y	N	8.3	13	68	23.29 d-l	1314 s-v
333	Garst Seed	ML	N	N	6.5	92	57	33.70 a	3067 l-q
Si-Gro H-45	Golden Harvest	M	N	N	5.8	48	49	26.23 a-j	4786 d-h
Si-Gro EX47(X)	Golden Harvest	M	Y	N	6.7	15	66	20.74 g-m	2812 l-r
Silamax BMR	Kelley Green Seeds	M	Y	N	8	10	68	20.63 g-m	1047 tuv
Silamaster	Kelley Green Seeds	M	N	N	8	90	63	21.65 e-l	2989 l-q
2-Way F-190 BMR	Kelly Green Seeds	M	Y	N	6.8	12	62	22.60 e-l	2631 n-s
FS5	Monsanto	M	N	N	7.6	3	69	23.42 d-l	3319 i-p
FS25E	Monsanto	ML	N	N	7.8	18	66	31.70 abc	3031 l-q
4 Ever Green	Walter Moss Seed	PS	N	N/A	9.5	0	75	23.08 e-l	-
Millennium BMR	Walter Moss Seed	M	Y	N	8	10	70	24.23 c-l	572 uv
Nutri-Choice	NC+ Hybrids	E	N	N	6.3	0	58	25.85 a-k	6393 bc
Nutri-Choice II	NC+ Hybrids	ML	N	N	5.5	93	58	26.72 a-i	4077 g-m
Nutri-Cane II	NC+ Hybrids	ME	N	Y	6.5	7	65	25.21 b-l	4469 e-k
NC+ 305F	NC+ Hybrids	ME	N	Y	7.5	0	66	20.85 g-m	4057 g-m
Nutri-Ton	NC+ Hybrids	ML	N	Y	7.5	60	56	27.94 a-h	4574 e-j
NC+ 8R18	NC+ Hybrids	ML	N	N	4.7	0	64	20.89 g-m	5756 b-e
Hikane II	Novartis Seeds	M	N	N	7.5	25	68	26.74 a-i	3390 i-o
KF429	Novartis Seeds	ML	N	N	8.3	68	60	26.02 a-j	4617 d-j
NK300	Novartis Seeds	M	N	N	5.7	90	64	23.61 d-l	4678 d-i
SS405	Novartis Seeds	ML	N	N	10	17	66	28.16 a-g	1475 r-v
			Brown Midrib	Male Sterile	Mature Height (Ft.)	% Lodged 9/11/00	% Plant Moisture[1)]	Silage (Ton/Ac)[2)]	Grain Yield (lbs/Ac)[3)]

Variety	Company	Maturity	Midrib	Sterile	Height (Ft.)	9/11/00	Moisture [1]	(Ton/Ac) [2]	(lbs/Ac) [3]
SS506	Novartis Seeds	ML	N	N	10.7	8	66	22.64 e-l	864 tuv
1990	Novartis Seeds	ML/PS	N	N/A	9.7	0	74	22.91 e-l	-
811F	Pioneer Hi-Bred	PS	N	N	8.5	3	75	22.72 e-l	-
979	Pioneer Hi-Bred	ML	N	Y	7.2	3	63	23.09 e-l	127 v
Silo Buster	Production Plus	ML	N	N	8.3	77	62	22.03 e-l	2525 n-s
Silo +	Production Plus	ML	Y	N	6.8	13	57	22.36 e-l	2535 n-s
Red Top +	Production Plus	ML	Y	Y	6.5	0	71	21.39 e-m	3124 k-q
Dairy Master BMR	Richardson Seeds	ML	Y	N	7.8	13	70	18.36 j-m	1118 tuv
Pacesetter	Richardson Seeds	PS	N	N	10	0	75	19.35 i-m	-
Silo Master D	Richardson Seeds	ML	N	N	7.5	80	59	31.24 a-d	3357 i-o
Silo 600D	Richardson Seeds	ML	N	N	5.5	0	60	23.23 e-l	5479 b-f
X 32736	Richardson Seeds	ML	Y	N	6.9	15	66	28.16 a-g	1773 q-u
X 32735	Richardson Seeds	ML	Y	N	6.8	23	68	20.39 g-m	2050 o-t
Canex	Sharp Brothers Seed	ME	N	Y	7	0	65	22.04 e-l	3707 h-n
Canex II	Sharp Brothers Seed	ME	N	Y	7	0	66	24.07 c-l	2731 m-r
Canex BMR 208	Sharp Brothers Seed	ME	Y	N	6.7	7	62	23.31 d-l	4046 g-m
Buffalo Brand	Sharp Brothers Seed	M	N	N	7.7	10	57	18.02 klm	174 v
Grazex II	Sharp Brothers Seed	E	N	N	7.5	0	60	24.65 b-l	307 v
Grazex II W	Sharp Brothers Seed	ME	N	N	7.6	5	56	18.30 j-m	168 v
Grazex BMR 737	Sharp Brothers Seed	ME	Y	N	7.6	10	62	20.04 h-m	414 uv
Grazex BMR 727X	Sharp Brothers Seed	ME	Y	N	7.2	23	63	22.48 e-l	566 uv
Grazex BMR 116X	Sharp Brothers Seed	ME	Y	Y	7.7	0	63	23.02 e-l	896 tuv
101F	Seed Inc.	ML	N	N	8.5	90	60	23.96 c-l	1977 p-t
101FS	Seed Inc.	ML	N	Y	7	7	67	21.19 e-m	3611 h-n
2-Way SRS	Warner Seed	M	N	N	7.7	85	58	21.62 e-l	2562 n-s
2-Way F-145	Warner Seed	ML	N	N	7.2	85	57	29.11 a-e	2926 l-q
F-647E (Grain)	Frontier	ML	N	N	4.3	0	36	20.58 g-m	5822 b-e
A571 (Grain)	Monsanto	M	N	N	4.5	0	58	20.43 g-m	7813 a
P8505 (Grain)	Pioneer HiBred	M	N	N	3.8	0	57	13.52 m	6740 ab
P84G62 (Grain)	Pioneer HiBred	ML	N	N	4.3	0	61	18.00 klm	5984 bcd
NC+ Y 363 (Grain)	NC+ Hybrids	ME	N	N	4	0	49	17.84 lm	6424 bc

[1] Percent whole plant moisture when plots were harvested for silage yield.

[2] Silage yield were corrected to 65% moisture. Means followed by the same letter do not significantly differ at P=0.05, LSD.

[3] Grain yield were corrected to 14% moisture.