THE UNIVERSITY OF ARIZONA
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Research Report
Sorghum Silage Hybrid Evaluation at Maricopa, 2019

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Summary

Sorghum hybrids for silage were evaluated in small plots at the University of Maricopa Agricultural Center. The maturity range of the hybrids was early to full season. The trial was irrigated up on July 26, 2019 and harvested at soft dough which occurred from October 16 to December 19. Various parameters were measured including yield, moisture, plant height, lodging, bloom date, and forage quality. Differences in yield, forage quality, and other parameters were detected among hybrids.

Introduction

Sorghum for silage is an important crop in Arizona due to the needs of the dairy industry for high quality feed. The University of Arizona has tested sorghum hybrids in the past, but there is no formalized program at this time for doing so. This trial was initiated at the request of the dairy industry.

Procedure

Sorghum hybrids were evaluated at Maricopa Agricultural Center on a sandy loam soil in Field 4, Border 18. The seed was planted with a cone planter in plots 25 ft long in 4 rows spaced 30 inches apart. The seeds were spaced 1.57 inches apart for a seeding rate of 133,000 seeds/acre. The experimental design was a randomized complete block with 4 replications and 18 sorghum hybrids. Growing conditions are listed in Table 1.

The following data was collected: 50% bloom date, plant height and lodging at harvest, forage yield at soft dough adjusted to 72% moisture, forage moisture, and forage quality measured by NIRS (by Chandler Analytical Labs, Chandler, AZ). Forage yields were determined by hand-harvesting 10 ft from one of the middle two rows. A sample of four plants was shredded and subsampled for moisture. Forage quality was determined from a composite of four reps from the moisture sample.

Discussion

Yield and plant characteristics of the hybrids are presented in Table 2 and quality is presented in Table 3. Abbreviations used for the quality parameters in Table 3 are presented in Table 4.

The cultural practices used in this study were optimal for most of the hybrids except the planting date was a bit late for some of the full season hybrids. Nevertheless, all the hybrids reached soft dough and were harvested at that stage. Some of the leaves were damaged by frost later in the season, but the effect was minimal. Bird damage was not a factor in this study.

Several locations and years are needed to accurately assess sorghum hybrid performance. The results of this trial are most useful when combined with data from previous years. Nevertheless, the results show that there were some differences in the performance of sorghum hybrids in this particular trial.

Acknowledgments

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Table 1. Cultural practices for a sorghum hybrid evaluation trial at the University of Arizona Maricopa Agricultural Center in 2019.

Cultural practice	**Information**
Previous crop	Fallow
Soil texture	Sandy loam
Germination irrigation date	7/25/19
Seasonal rainfall	3.64 inches (7/25 to 12/19)
Irrigation dates and amount	Date — Amount (inches) 07/25 — 3.67 07/30 — 3.03 08/12 — 3.25 08/21 — 2.69 08/30 — 2.67 09/06 — 4.21 09/13 — 2.84 09/20 — 3.34 09/27 — 2.68 10/04 — 2.45 10/11 — 2.89 10/18 — 1.49 10/25 — 3.40 11/01 — 2.64 11/15 — 3.77 Sum — 45.02
Nitrogen fertilizer amount	7/15: 40 lbs N/A as 16-20-0 8/30: 50 lbs N/A as 32-0-0 9//27: 50 lbs N/A as 32-0-0 10/11: 50 lbs N/A as 32-0-0
Phosphorus fertilizer amount	7/15: 50 lbs P_2O_5/A
Herbicides	7/24: Metalachlor @1.01 pt/A 8/29: Atrazine @ 2.4 pt/A
Insecticide	9/6: Coragen @ 2 oz/A
Harvest stage	Soft dough

Table 2. Forage yield (at 72% moisture), forage moisture, plant height, lodging, 50% bloom date, and harvest date near soft dough for a sorghum hybrid evaluation trial at the University of Arizona Maricopa Agricultural Center in 2019.

Hybrid	Seed company	Forage yield	Moisture	Plant height	Lodging	Bloom	Harvest
		T/A	%	ft	%	date	date
NK300	S&W Seed Sorghum Partners	34.3	74.2	7.7	0	10/21	11/30
SP3904 BD BMR	S&W Seed Sorghum Partners	28.3	75.4	7.1	0	10/21	12/06
SP3808 SB BMR	S&W Seed Sorghum Partners	22.1	78.6	6.1	64	10/23	12/06
SP2774 BMR	S&W Seed Sorghum Partners	27.8	73.8	8.6	15	09/26	10/24
SS405	S&W Seed Sorghum Partners	41.9	70.0	12.4	0	10/23	11/30
Silo 700D	Desert Sun Marketing	34.1	74.2	9.1	0	10/18	11/30
Silo 700D BMR	Desert Sun Marketing	32.7	74.3	8.2	50	10/22	12/06
X125 BMR	Desert Sun Marketing	36.1	74.7	9.8	6	10/26	12/06
Little Giant BMR	Desert Sun Marketing	24.5	69.9	7.4	0	10/17	12/19
OPAL	MOJO Seed Enterprises	31.1	73.7	7.7	0	10/18	11/30
X714	MOJO Seed Enterprises	33.6	73.4	8.6	0	10/09	11/14
X761	MOJO Seed Enterprises	33.1	71.6	7.7	0	10/09	11/14
NF0501	NRG Farm Consulting	31.4	75.0	8.0	0	09/30	11/14
NF8501	NRG Farm Consulting	29.0	70.4	7.8	0	09/14	10/16
NF8502	NRG Farm Consulting	28.3	71.6	7.4	0	09/14	10/16
NF9001	NRG Farm Consulting	25.3	76.7	7.3	0	09/26	10/24
NF9002	NRG Farm Consulting	26.7	73.1	7.9	0	09/14	10/16
NF9501	NRG Farm Consulting	31.7	73.9	7.0	0	09/25	10/31
AVG		30.7	73.6	8.1	8	10/08	11/16
LSD (5%)		3.7	1.5	1.2	26	-	-
CV (%)		8.4	1.4	10.4	248	-	-

Table 3. Forage quality for a sorghum hybrid evaluation trial at the University of Arizona Maricopa Agricultural Center in 2019. No statistical difference were found among hybrids for any quality parameter. See Table 4 for quality parameter abbreviations.

Hybrid	Seed company	DM	Moist	Ash	NDF	ADF	CP	RFV	TDN	RFQ	NEL	Fat
		%	%	%	%	%	%					%
NK300	S&W Seed Sorghum Partners	93.4	6.65	13.4	59.1	44.0	4.29	86	49.3	81	0.49	3.21
SP3904 BD BMR	S&W Seed Sorghum Partners	94.7	5.28	15.7	51.4	37.3	4.64	108	54.4	103	0.55	2.41
SP3808 SB BMR	S&W Seed Sorghum Partners	97.5	2.53	22.6	59.4	45.0	2.24	84	48.6	80	0.49	0.36
SP2774 BMR	S&W Seed Sorghum Partners	92.9	7.09	9.1	50.6	33.0	7.52	116	57.6	111	0.59	3.42
SS405	S&W Seed Sorghum Partners	92.8	7.22	10.0	59.1	40.8	5.80	90	51.7	85	0.52	2.84
Silo 700D	Desert Sun Marketing	93.7	6.33	12.7	58.9	43.3	4.73	87	49.9	83	0.50	3.03
Silo 700D BMR	Desert Sun Marketing	94.3	5.68	14.0	55.4	41.1	3.28	96	51.5	91	0.52	2.61
X125 BMR	Desert Sun Marketing	93.7	6.27	13.3	60.7	43.0	4.97	85	50.1	80	0.50	2.99
Little Giant BMR	Desert Sun Marketing	99.2	0.83	25.9	53.0	42.0	0.67	99	50.8	94	0.51	---
OPAL	MOJO Seed Enterprises	93.6	6.43	11.1	54.4	36.4	6.98	104	55.0	99	0.56	3.38
X714	MOJO Seed Enterprises	93.3	6.74	10.9	55.1	37.6	6.89	101	54.1	96	0.55	3.46
X761	MOJO Seed Enterprises	93.1	6.94	12.2	49.7	33.8	7.06	117	57.0	112	0.58	3.82
NF0501	NRG Farm Consulting	93.5	6.52	12.4	53.8	36.0	7.97	105	55.3	100	0.56	3.56
NF8501	NRG Farm Consulting	92.7	7.32	8.7	44.8	26.1	9.86	142	62.8	137	0.64	3.09
NF8502	NRG Farm Consulting	92.8	7.23	9.2	46.4	26.2	10.11	137	62.7	132	0.64	3.49
NF9001	NRG Farm Consulting	93.3	6.71	10.1	52.6	33.1	9.31	112	57.5	107	0.58	3.89
NF9002	NRG Farm Consulting	92.5	7.51	7.2	47.3	27.4	9.57	133	61.8	127	0.63	3.17
NF9501	NRG Farm Consulting	93.4	6.57	10.2	47.3	30.0	8.80	129	59.9	123	0.61	3.49
AVG		93.9	6.10	12.7	53.3	36.4	6.37	107	55.0	102	0.56	2.86

Table 3. (con'd). Forage quality for a sorghum hybrid evaluation trial at the University of Arizona Maricopa Agricultural Center in 2019. No statistical difference were found among hybrids for any quality parameter. See Table 4 for quality parameter abbreviations.

Hybrid	Seed company	Ca	K	Mg	S	K	Na	Cl	Fe	Mn	Cu	Zn
		%	%	%	%	%	%	%	ppm	ppm	ppm	ppm
NK300	S&W Seed Sorghum Partners	0.28	0.17	0.06	0.05	1.37	0.01	0.66	259	104	6.67	37.8
SP3904 BD BMR	S&W Seed Sorghum Partners	0.37	0.17	0.01	0.06	1.64	0.03	0.93	852	105	6.18	39.3
SP3808 SB BMR	S&W Seed Sorghum Partners	0.44	0.11	0.07	0.09	2.30	0.04	1.05	2434	140	8.88	42.7
SP2774 BMR	S&W Seed Sorghum Partners	0.24	0.24	0.05	0.07	1.66	0.00	1.31	205	60	7.39	36.1
SS405	S&W Seed Sorghum Partners	0.23	0.19	0.01	0.06	1.42	0.00	0.75	93	91	8.02	37.7
Silo 700D	Desert Sun Marketing	0.25	0.17	0.08	0.05	1.32	0.01	0.58	248	103	6.87	37.7
Silo 700D BMR	Desert Sun Marketing	0.33	0.14	0.04	0.05	1.43	0.03	0.70	635	98	5.67	39.3
X125 BMR	Desert Sun Marketing	0.35	0.19	0.04	0.06	1.36	0.02	1.09	537	86	7.31	39.0
Little Giant BMR	Desert Sun Marketing	0.41	0.01	0.11	0.07	2.02	0.05	1.07	3712	160	11.79	45.8
OPAL	MOJO Seed Enterprises	0.31	0.21	0.07	0.06	1.38	0.00	1.44	166	66	7.48	37.0
X714	MOJO Seed Enterprises	0.22	0.22	0.12	0.06	1.39	0.00	1.07	115	71	8.10	36.6
X761	MOJO Seed Enterprises	0.24	0.23	0.10	0.06	1.34	0.00	1.27	58	71	7.75	36.7
NF0501	NRG Farm Consulting	0.30	0.23	0.06	0.06	1.27	0.00	1.43	37	71	8.30	37.3
NF8501	NRG Farm Consulting	0.25	0.26	0.00	0.07	1.38	0.00	1.58	74	66	9.25	36.8
NF8502	NRG Farm Consulting	0.30	0.30	0.02	0.08	1.65	0.00	1.96	113	44	8.29	36.1
NF9001	NRG Farm Consulting	0.30	0.29	0.06	0.07	1.33	0.00	1.62	142	58	9.04	36.1
NF9002	NRG Farm Consulting	0.20	0.27	0.06	0.06	1.40	0.00	1.50	175	58	9.39	36.4
NF9501	NRG Farm Consulting	0.25	0.26	0.08	0.07	1.42	0.00	1.51	84	63	8.73	36.4
AVG		0.29	0.20	0.06	0.06	1.50	0.01	1.20	552	84	8.06	38.0

Table 3 (con'd). Forage quality for a sorghum hybrid evaluation trial at the University of Arizona Maricopa Agricultural Center in 2019. No statistical difference were found among hybrids for any quality parameter. See Table 4 for quality parameter abbreviations.

Hybrid	Seed company	SP	ADF-CP	NDF-CP	UIP	Lignin	Starch	NFC	Carbo	Sugar
		%	%	%	%	%	%	%	%	%
NK300	S&W Seed Sorghum Partners	41.6	0.83	2.42	29.7	9.83	16.8	28.0	0.34	3.42
SP3904 BD BMR	S&W Seed Sorghum Partners	38.5	0.66	2.96	27.6	11.52	22.6	17.8	1.46	4.14
SP3808 SB BMR	S&W Seed Sorghum Partners	37.9	0.91	4.05	23.7	14.82	11.4	23.6	2.25	2.33
SP2774 BMR	S&W Seed Sorghum Partners	40.9	0.52	1.63	30.8	7.59	21.8	29.0	0.25	2.62
SS405	S&W Seed Sorghum Partners	46.3	0.81	2.26	28.7	8.80	15.5	18.5	0.23	2.84
Silo 700D	Desert Sun Marketing	41.3	0.80	2.44	27.0	9.65	17.0	28.9	0.12	2.32
Silo 700D BMR	Desert Sun Marketing	38.4	0.69	2.39	26.5	11.33	20.9	26.1	0.68	2.98
X125 BMR	Desert Sun Marketing	46.3	0.62	2.50	29.2	10.24	11.0	19.3	3.19	3.31
Little Giant BMR	Desert Sun Marketing	42.7	1.31	3.13	21.3	17.08	10.9	19.9	3.05	2.15
OPAL	MOJO Seed Enterprises	43.8	0.61	1.87	28.8	8.34	18.0	26.6	1.47	3.35
X714	MOJO Seed Enterprises	39.7	0.58	1.95	29.7	8.00	18.8	22.2	0.33	1.71
X761	MOJO Seed Enterprises	39.6	0.57	2.15	30.1	8.05	25.2	29.5	0.22	2.08
NF0501	NRG Farm Consulting	42.0	0.56	1.88	29.4	8.77	18.6	27.5	1.07	3.04
NF8501	NRG Farm Consulting	49.5	0.46	1.55	29.3	7.46	20.4	27.4	3.02	4.32
NF8502	NRG Farm Consulting	46.5	0.37	1.52	29.7	7.18	20.3	34.1	3.18	5.63
NF9001	NRG Farm Consulting	48.3	0.45	1.67	29.7	7.56	14.1	28.6	2.11	4.29
NF9002	NRG Farm Consulting	49.0	0.43	1.59	29.9	6.99	18.5	23.4	2.48	3.75
NF9501	NRG Farm Consulting	44.4	0.50	1.57	30.4	7.51	21.2	30.1	1.51	3.65
AVG		43.1	0.65	2.20	28.4	9.48	17.9	25.6	1.50	3.22

Table 3 (con'd). Forage quality for a sorghum hybrid evaluation trial at the University of Arizona Maricopa Agricultural Center in 2019. No statistical difference were found among hybrids for any quality parameter. See Table 4 for quality parameter abbreviations.

Hybrid	Seed company	IVTD-MD24	IVTD-MD30	IVTD-MD48	NDF-D24	NDF-D30	NDF-D48	Lys	Met	AA	LA
		%	%	%	%	%	%	%	%	%	%
NK300	S&W Seed Sorghum Partners	56.3	61.9	65.4	40.5	47.6	55.1	0.24	0.13	0.57	0.91
SP3904 BD BMR	S&W Seed Sorghum Partners	56.3	61.8	65.2	36.0	43.1	50.7	0.19	0.10	0.39	1.12
SP3808 SB BMR	S&W Seed Sorghum Partners	47.5	53.1	56.5	27.7	34.9	42.4	0.32	0.15	2.13	0.42
SP2774 BMR	S&W Seed Sorghum Partners	65.2	70.7	74.2	46.3	53.4	60.9	0.21	0.12	0.65	1.14
SS405	S&W Seed Sorghum Partners	59.7	65.3	68.8	45.4	52.5	60.0	0.22	0.12	0.88	0.79
Silo 700D	Desert Sun Marketing	58.0	63.6	67.1	41.3	48.3	55.9	0.23	0.12	0.58	0.70
Silo 700D BMR	Desert Sun Marketing	56.8	62.3	65.8	38.1	45.2	52.8	0.23	0.11	0.87	0.40
X125 BMR	Desert Sun Marketing	57.6	63.2	66.7	42.4	49.5	57.1	0.24	0.13	0.17	0.18
Little Giant BMR	Desert Sun Marketing	46.4	51.9	55.4	23.5	30.7	38.3	0.14	0.08	3.17	0.20
OPAL	MOJO Seed Enterprises	62.3	67.8	71.3	44.2	51.3	58.8	0.23	0.12	0.87	1.14
X714	MOJO Seed Enterprises	62.6	68.2	71.7	45.7	52.8	60.3	0.24	0.13	0.43	0.87
X761	MOJO Seed Enterprises	64.3	69.8	73.3	45.4	52.5	60.0	0.24	0.13	0.58	1.47
NF0501	NRG Farm Consulting	63.3	68.9	72.4	44.6	51.7	59.2	0.22	0.12	0.80	1.29
NF8501	NRG Farm Consulting	68.8	74.2	77.7	48.9	56.0	63.5	0.21	0.13	0.88	1.55
NF8502	NRG Farm Consulting	67.1	72.5	76.0	48.6	55.6	63.1	0.21	0.13	1.33	2.20
NF9001	NRG Farm Consulting	64.1	69.6	73.1	45.7	52.8	60.3	0.20	0.12	0.43	1.49
NF9002	NRG Farm Consulting	68.0	73.5	76.9	49.9	57.0	64.5	0.21	0.13	0.91	1.41
NF9501	NRG Farm Consulting	67.2	72.7	76.2	46.8	53.9	61.4	0.20	0.12	0.40	1.50
AVG		60.6	66.2	69.6	42.3	49.4	56.9	0.22	0.12	0.89	1.04

Table 4. Abbreviations used for forage quality parameters.

Abbreviation	Parameter	Abbreviation	Parameter
DM	DM	SP	Soluble Protein
Moist	Moisture	ADF-CP	ADF CP
Ash	Ash	NDF-CP	NDF CP
NDF	NDF	UIP	UIP
ADF	ADF	Lignin	Lignin
CP	Crude Protein	Starch	Starch
RFV	RFV	NFC	NFC
TDN	TDN	Carbo	Soluble Carbohydrate
RFQ	RFQ	Sugar	Simple Sugar
NEL	NEL	IVTDMD24	IVTDMD24
Fat	Fat	IVTDMD30	IVTDMD30
Ca	Calcium	IVTDMD48	IVTDMD48
K	Phosphorus	NDFD24	NDFD 24
Mg	Magnesium	NDFD30	NDFD 30
S	Sulfur	NDFD48	NDFD 48
K	Potassium	Lys	Lysine
Na	Sodium	Met	Methionine
Cl	Chloride	AA	Acetic Acid
Fe	Iron (ppm)	LA	Lactic Acid
Mn	Manganese (ppm)		
Cu	Copper (ppm)		
Zn	Zinc (ppm)		

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