

Forage Sorghums

Summary of
Nutritive Value and
Agronomic Performance



Report of Progress 629

Agricultural Experiment Station, Kansas State University, Manhattan, Walter R. Woods, Director

TABLE OF CONTENTS

	Page
Effects of Maturity at Harvest and Cultivar on Agronomic Performance of Forage Sorghum and the Nutritive Value of Selected Sorghum Silages -- Department of Animal Sciences and Industry	1
Table 1. Agronomic Characteristics of 20 Forage Sorghum Cultivars, 1990	3
Table 2. Dry Matter Content and Silage and Grain Yield of 20 Forage Sorghum Cultivars Harvested at Three Stages of Maturity, 1990	4
Table 3. Effect of Harvest Stage on Dry Matter Content and Silage and Grain Yields of 20 Forage Sorghum Cultivars, 1990	4
Table 4. Agronomic Characteristics, Dry Matter Content, Voluntary Intake, and Digestibility of 12 Sorghum Silages, 1989	5
Table 5. Minimum, Maximum, and Mean for the Agronomic Characteristics of 10 Forage Sorghum Cultivars Compared in Both 1989 and 1990	5
Results from Kansas Forage Sorghum Performance Tests; 1986-1989 -- Department of Agronomy and Branch Stations	6
Table 6. Brown County Forage Sorghum Performance Test Results, 1987-1989	7
Table 7. Riley County Forage Sorghum Performance Test Results, 1986-1989	8
Table 8. Labette County Forage Sorghum Performance Test Results, 1986-1989	9
Table 9. Ellis County Forage Sorghum Performance Test Results, 1986-1989	10
Table 10. Reno County Forage Sorghum Performance Test Results, 1986-1989	11
Table 11. Finney County Forage Sorghum Performance Test Results, 1986-1989	12
Contributors	13

EFFECTS OF MATURITY AT HARVEST AND CULTIVAR ON AGRONOMIC PERFORMANCE OF FORAGE SORGHUM AND THE NUTRITIVE VALUE OF SELECTED SORGHUM SILAGES

*R. N. Sonon, R. Suazo, L. Pfaff,
J. T. Dickerson, and K. K. Bolsen*

Summary

These studies examined the agronomic performance of 20 forage sorghum cultivars, each harvested at three stages of maturity in 1990. Whole-plant dry matter (DM) yields were highest at the late-dough stage of kernel maturity, whereas DM content and grain yields steadily increased as maturity advanced. A voluntary intake and digestion trial was conducted with 12 grain and forage sorghum silages harvested at the late-dough stage in 1989. The highest silage DM intakes and digestibilities were obtained with the high-grain yielding hybrids.

(Key Words: Forage Sorghum, Cultivar, Maturity, Intake, Digestibility.)

Introduction

Several earlier studies on the effects of stage of maturity showed that harvesting forage sorghums at the late-dough stage optimized silage yields and nutritive values. The objectives of this study were: 1) to document the effect of stage of maturity on agronomic performance over a wider range of forage sorghum phenotypes than was used in previous studies and 2) to continue to compare voluntary intake and DM digestibility of selected forage sorghum silages harvested in the late-dough stage.

Experimental Procedures

1990. Twenty forage sorghum cultivars were selected to represent a broad range of phenotypic characteristics and season lengths. All were grown under dryland conditions near the Kansas State University campus,

Manhattan. The 12-row plots were planted on June 4, and each cultivar was randomly assigned to three replications. Rows were 25 ft long with a 30-inch spacing, and plots were thinned to uniform stands of 34,800 plants per acre. Cultivars were harvested at milk, late-dough, and hard-grain stages of kernel maturity. Agronomic data collected included days to half-bloom, plant height, lodging score, and whole-plant DM and grain yields. The first row in each plot was a border, and whole-plant DM yield for the first maturity stage was measured by harvesting the 2nd and 3rd rows with a precision chopper. All heads in the 4th row were clipped for grain yield determination. The plants in the 4th row were left standing to act as a border for the next harvest.

1989. A voluntary intake and digestion trial was conducted with 12 grain and forage sorghum silages produced in 1989. The cultivars were grown under dryland conditions and harvested in the late-dough stage. Three mature wethers were assigned to each silage in the two-period trial.

The farm-scale plots were similar to those described last year (Rep. of Prog. 592; pp. 110-113). However, dry soil conditions at planting on May 31 and subsequent very low rainfall until the second week in August (only 4.5 inches) produced thin and uneven stands, and one of the three replications for each cultivar was abandoned. Therefore, statistical analysis of the agronomic data shown in Table 4 is not reported, and the numerical values are presented for reference purposes only.

Results and Discussion

1990. Agronomic characteristics of the 20 forage sorghums are shown in Table 1. Blooming was delayed in all cultivars probably because of prolonged cool weather in the early part of the growing season. Time to half-bloom ranged from 64 to 83 days. Plant height varied greatly between cultivars and, as expected, the late-season hybrids were the tallest.

In the milk stage harvest, the only significant lodging occurred in three of the late-season hybrids (i.e., DeKalb FS2SE, Garst 333, and SeedTec Hi-Energy II). However, several other cultivars lodged with advancing maturity (i.e., Funk's 102F, Golden Acres T-E Silomaker, Oro Kandy Kane, NC + 940, Pioneer 843 and 947, and Rox Orange). A very high wind on August 30th caused the initial lodging, which appeared to be more severe for the higher grain-yielding hybrids. Plant height did not show a direct relationship to lodging; some of the shorter cultivars had high lodging scores (i.e., Funk's 102F, Silomaker, and Rox Orange), whereas several of the taller sorghums had very low lodging scores (i.e., Atlas, DeKalb FS5 and FS25E, NC+ NB305, and Pioneer 931).

The effects of cultivar and harvest stage on DM content and silage and grain yields of the 20 forage sorghums are presented in Tables 2 and 3. Very high rainfall (13.1 inches) from mid-July through August favored extended vegetative growth in the mid- and late-season hybrids, which resulted in higher whole-plant DM yields, particularly at the first two harvest stages, compared to the early-season sorghums. Limited rainfall

during June and early-July resulted in relatively low whole-plant DM and grain yields for the early-season cultivars at the milk stage harvest (i.e., Buffalo Canex, Cargill 200F, Oro Kandy Kane, and Rox Orange). Whole-plant DM yields peaked at the late-dough stage; however, grain yields continued to increase and were highest at the hard-grain harvest. Eighteen of the 20 cultivars had their highest whole-plant DM yield at the late-dough stage and 14 of the 18 grain-producing sorghums had their highest grain yield at the hard-grain stage. The average harvest intervals were 12 days between the milk and late-dough and 13 days between the late-dough and hard-grain stages.

1989. Agronomic characteristics and results of the voluntary intake and digestion trial are shown in Table 4. Dry matter intake was positively associated with DM digestibility, and the highest digestibilities were obtained for the high grain-yielding cultivars. Six of the 10 grain-producing forage sorghums had not reached the late-dough stage at the first frost on September 24. The non-heading forage sorghum (Funk's G 1990) showed the lowest DM intake and digestibility, which is consistent with previous results for this cultivar.

1989 vs. 1990. Presented in Table 5 are minimum, maximum, and mean values for the agronomic characteristics of the 10 forage sorghum cultivars that were included in both the 1989 and 1990 late-dough stage harvests. Agronomic measurements were dramatically reduced in the 1989 growing season compared to 1990 (i.e., plant height and silage and grain yields).

Table 1. Agronomic Characteristics of 20 Forage Sorghum Cultivars, 1990

Cultivar ¹	Days to half-bloom ²	Plant height, ² inches	Date of the milk stage harvest	Lodging scores, %		
				Milk stage	Late-dough stage	Hard-grain stage
AgriPro 1020F	79	75	Sept 6	-	1	12
Atlas	75	122	Sept 4	-	-	1
Buffalo Canex	64	109	Aug 26	-	-	-
Cargill 200F	67	108	Aug 26	-	-	1
Cargill 466	82	102	Sept 11	5	3	57
Cargill Morcane	-	104	Aug 29	-	-	-
DeKalb FS5	72	122	Sept 3	-	5	8
DeKalb FS25E	83	127	Sept 11	12	18	10
Funk's 102F	80	95	Sept 8	4	30	49
Garst 333	81	110	Sept 7	27	58	79
GA T-E Silomaker	80	95	Sept 7	4	13	74
NC+ NB305	69	118	Aug 28	-	4	2
NC+ 940	69	124	Aug 31	-	14	18
NK 300	79	78	Sept 6	-	3	11
Oro Kandy Kane	65	104	Aug 28	-	18	22
Pioneer 843	74	126	Sept 3	2	13	21
Pioneer 931	-	172	Sept 11	1	-	3
Pioneer 947	73	117	Sept 3	-	54	76
Rox Orange	65	95	Aug 26	-	45	53
ST Hi-Energy II	80	122	Sept 7	60	28	66
Average	74.3	111.3	Sept 3	6	15	28
LSD (P<.05) ³	--	4.2	--	--	--	--

¹GA = Golden Acres; NK = Northrup King; ST = Seed Tec.

²Average of measurements taken at the first two stages of maturity.

³Least significant difference.

Table 2. Dry Matter Content and Silage and Grain Yields of 20 Forage Sorghum Cultivars Harvested at Three Stages of Maturity, 1990

Cultivar	Harvest stage								
	Milk			Late-dough			Hard-grain		
	Whole-plant DM and DM yield, %		Grain yield, Bu/A ²	Whole-plant DM and DM yield, %		Grain yield, Bu/A	Whole-plant DM and DM yield, %		Grain yield, Bu/A
	T/A ¹		%	T/A	Bu/A	%	T/A	Bu/A	
AgriPro 1020F	25.3	5.5	66	31.0	6.8	114	38.7	5.9	119
Atlas	25.3	6.0	41	27.8	7.3	58	28.5	5.7	65
Buffalo Canex	25.1	5.3	17	28.5	6.1	47	31.1	5.7	72
Cargill 200F	28.3	4.7	16	37.6	5.8	72	42.9	6.1	89
Cargill 466	22.6	6.8	61	26.2	7.8	124	32.7	6.6	121
Cargill Morcane	23.7	4.3	-	26.4	5.8	-	27.8	6.1	-
DeKalb FS5	24.8	5.4	58	30.2	7.9	87	34.0	7.2	82
DeKalb FS25E	25.1	7.5	49	27.1	8.2	82	29.9	6.2	107
Funk's 102F	22.4	6.0	54	28.2	7.8	106	33.8	5.9	126
Garst 333	27.3	5.8	39	32.8	8.4	110	37.4	6.3	114
GA T-E Silomaker	24.4	6.4	46	29.0	7.8	96	41.1	6.5	151
NC + NB305	23.1	5.4	23	29.3	7.1	55	30.8	6.3	65
NC + 940	24.7	5.8	40	29.5	7.2	85	31.7	6.3	97
NK 300	24.4	5.8	60	33.9	7.4	105	35.9	6.0	117
Oro Kandy Kane	24.1	4.9	24	30.4	6.9	93	32.7	5.4	92
Pioneer 843	31.4	5.1	45	40.0	8.0	74	38.8	5.6	72
Pioneer 931	32.7	8.3	-	34.3	6.3	-	38.3	6.1	-
Pioneer 947	30.8	4.6	48	43.0	8.3	119	45.7	6.3	133
Rox Orange	22.0	4.5	18	27.2	5.7	83	33.0	5.4	93
ST Hi-Energy II	25.1	7.5	51	24.5	7.2	96	29.5	6.1	112
LSD ³ (P<.05)	--	1.0	13.4	--	1.1	27.0	--	.8	23.8

¹Tons per acre.

²Bushels per acre; adjusted to 14.5 % moisture.

³Least significant difference.

Table 3. Effect of Harvest Stage on Dry Matter Content and Silage and Grain Yields of 20 Forage Sorghum Cultivars, 1990

Item	Harvest stage		
	Milk	Late-dough	Hard-grain
Whole-plant DM, %	25.6 ^c	30.8 ^b	34.7 ^a
Whole-plant DM yield, tons/acre	5.8 ^b	7.2 ^a	6.1 ^b
Grain yield, bushels/acre ^{1,2}	42 ^c	90 ^b	102 ^a

^{abc}Means in the same row with different superscripts differ significantly (P<.05).

¹Average of the 18 grain-producing cultivars.

²Adjusted to 14.5 % moisture.

Table 4. Agronomic Characteristics, Dry Matter Content, Voluntary Intake, and Digestibility of 12 Sorghum Silages, 1989

Cultivar	Days to Plant half- bloom	Plant height, inches	Silage DM, %	Whole-plant DM yield, T/A ¹	Grain yield, Bu/A ²	Ration ³	
						DM intake, g/MBW ⁴	DM digestibility, %
<u>Grain sorghum</u>							
DeKalb 42Y	66	37	37.6	3.9	92*	71.0	61.2
<u>Forage sorghum</u>							
DeKalb FS5	73	73	30.4	6.0	98*	69.9	56.8
DeKalb FS25E	103	91	27.8	6.2	34***	67.0	55.7
Funk's 102F	92	76	30.2	5.7	60**	72.8	58.2
Funk's G 1990	--	114	25.6	5.8	--	57.6	55.2
Garst 333	96	77	28.6	5.5	34***	63.7	57.0
GA T-E Silomaker	92	70	29.6	5.8	46**	62.5	52.7
NK 300	89	58	30.9	5.5	77**	67.2	58.9
Oro Kandy Kane	67	61	33.3	4.5	77*	77.5	59.2
Pioneer 947	75	73	33.3	5.6	91*	67.2	58.2
Rox Orange	67	57	31.6	3.7	74*	66.2	55.8
ST Hi-Energy II	92	89	28.6	6.2	43**	63.6	55.6
LSD (P<.05)	--	--	--	--	--	11.4	5.0

¹Tons per acre.

²Bushels per acre; adjusted to 14.5% moisture.

³Ration = 90% silage and 10% supplement on a DM basis.

⁴MBW = metabolic body wt (kg^{0.75}).

*Cultivars that were between the late-dough and hard-grain stages at the first frost on Sept 24.

**Hybrids that were in the mid-to-late milk stage at the first frost.

***Hybrids that were in the early-milk stage at the first frost.

Table 5. Minimum, Maximum, and Mean for the Agronomic Characteristics of 10 Forage Sorghum Cultivars Compared in Both 1989 and 1990

Item	Minimum		Maximum		Mean	
	1989	1990	1989	1990	1989	1990
Days to half-bloom	67	65	103	83	85	76
Plant height, inches	57	78	91	127	84	107
Lodging score, %	0	3	9	58	3	27
Silage yield, tons of DM/acre	3.7	5.7	6.2	8.4	5.47	7.56
Grain yield, bu/acre ¹	34	82	98	119	63	98
Whole-plant DM, %	27.8	24.5	33.3	43.0	30.4	30.6

¹Adjusted to 14.5% moisture.

RESULTS FROM KANSAS FORAGE SORGHUM PERFORMANCE TESTS; 1986-1989

Test Objectives and Procedures

The intent of the annual Kansas Forage Sorghum Performance program is to furnish Kansas stockmen, Extension workers, and private research and sales personnel with unbiased agronomic information on forage sorghum varieties and hybrids suitable for silage production. Cooperating seed firms nominate test entries, select test sites, and pay entry fees to cover part of the test costs.

Rainfall records from recent years and 1989 entrants and entries are given below. The 1989 and period-of-years results from individual locations are in Tables 6 through 11. Results shown for each test are averages from three or four plots per entry, planted in a randomized complete block design with six-row plots about 30 feet long. About 20 feet of two of the center rows were harvested for silage yield. Neighboring bordered rows were harvested for grain production where possible. Rows were 30 inches apart.

Growing season rainfall for Forage Sorghum Performance Test sites, 1982-1989:

County	1989						6-month totals							
	April	May	June	July	Aug.	Sept.	1989	1988	1987	1986	1985	1984	1983	1982
Brown	0.81	2.42	5.64	1.76	4.29	3.93	18.85	16.53	28.27	29.80	—	31.05	14.98	31.29
Finney	0.44	3.58	6.70	1.52	2.71	2.24	17.19	10.00	14.45	11.38	16.22	9.58	12.12	15.97
Ellis	0.24	2.17	3.90	2.68	1.18	3.27	13.43	11.82	16.66	17.67	18.82	15.37	8.00	13.62
Reno	0.17	5.86	9.18	2.85	6.13	2.77	26.96	17.49	26.16	31.88	26.73	12.14	18.35	19.91
Labette	0.34	5.02	6.94	5.29	4.24	3.35	25.18	24.85	26.81	38.67	36.74	30.18	22.10	24.13
Riley	0.31	1.57	2.91	1.18	5.55	6.89	18.41	16.93	20.30	34.44	27.20	24.87	16.99	21.26

Entrants and entries in 1989 Forage Sorghum Performance Tests:

Entrant and (Brand)	Hybrid	Entrant and (Brand)	Hybrid
Sharp Brothers Seed Co. P.O. Box 140 (Buffalo) Healy, KS 67850	Canex	Germain's Seed (Germain's) P.O. Box 12447 Fresno, CA 93776	FS-555
Cargill Hybrid Seeds P.O. Box 5645 Minneapolis, MN 55440	FS-455, FS-466 Sweet Sioux V MorCane, X15645	Taylor-Evans Seed Co. Box 68 (Golden Acres T-E) Tulia, TX 79088	Silomaker, Yieldmaker, Milk-A-Lot Horsepower
DeKalb-Pfizer Genetics Route 2, Box 56 (DeKalb) Lubbock, TX 79415	FS-5 FS-25E	Northrup King Co. Box 959 (NK) Minneapolis, MN 55440	Sucro Sorgo 405 NK 300 Millex 24
Garst Seed Co. Eminence Route Garden City, KS 67846	333	Triumph Seed Co., Inc. P.O. Box 1050 (Triumph) Ralls, TX 79357	Super Sile 20

Note: Three varieties - Early Sumac, Rox Orange, and Sugar Drip -- were entered at all 1989 test locations by the Kansas Agricultural Experiment Station. Certified Atlas seed was not available in 1989.

NORTHEASTERN KANSAS

COOPERATOR: Jim Long, agronomist-in-charge, Cornbelt Experiment Field, Powhattan, BROWN COUNTY.

SITE: Grundy silty clay loam, planted to forage sorghum in 1987 and 1988.

PLANTED: June 7. BLOOMED: August 19 (73 days from planting) to September 16 (101 days). HARVESTED: October 18.

FERTILIZATION: 80 lbs N/a before planting. PEST CONTROL: 1 gal/a Ramrod-atrazine herbicide combination used. Furadan insecticide applied in furrow at planting; Lorsban (2 pt./a) insecticide applied for chinch bug control when the forage was about 10 inches in height.

PLANT POPULATION: Desired about 35,000 plants/a in 30-inch rows (6 inches between plants in the row). Actual stands averaged only 71% of desired or about 25,000 plants/a.

ENVIRONMENTAL FACTORS AFFECTING 1989 PERFORMANCE: Severe chinch bug infestations attacked plants from the seedling stage until they were about 1 foot tall. Stands were reduced, and growth was slowed. Rainfall was below normal (only about 19 inches were recorded for the 6-month growing season). A light freeze on September 23 stopped growth to some extent; the first real killing freeze took place on October 20.

TABLE 6. BROWN COUNTY FORAGE SORGHUM PERFORMANCE TEST RESULTS, 1987-1989.

BRAND	VARIETY OR HYBRID	SILAGE YIELD TONS PER ACRE 1/									DAYS TO 1/2 BLOOM		1989 PLANT LODG-			
		2YR			3YR			GRAIN YIELD 2			2YR		HT. (IN)	ING %	DM %	STAND %
		89	88	87	AVG.	AVG.	89	88	87	AVG.	89	89				
GOLDEN ACRES	T-E SILOMAKER	24*	23	23*	24	23	H	H	M	78	79	124	0	36	78	
GOLDEN ACRES	T-E MILK-A-LOT	20*	22	20*	21	21	H	H	H	76	78	108	0	38	70	
NORTHRUP KING	SUCRO SORGO 405	22*	29*	---	26	---	M	M	---	93	94	163	0	31	66	
NORTHRUP KING	NK 300	21*	22	---	21	---	H	H	---	76	78	112	6	38	73	
TRIUMPH	SUPER SILE 20	22*	27*	22*	25	24	H	M	M	93	94	135	0	28	73	
_____	EARLY SUMAC	12	15	22*	13	16	M	M	M	68	74	119	24	35	67	
_____	ROX ORANGE	14	19	20*	16	18	M	M	M	71	73	121	0	35	75	
_____	SUGAR DRIP	19	25*	22*	22	22	L	M	M	96	101	151	1	25	67	
TEST AVERAGES, ALL ENTRIES		18	22	22	20	21	---	---	---	79	83	128	5	34	71	
L.S.D. (.05) 3/		5	5	5	---	---	---	---	---	1	6	9	3	NS		

* Upper LSD group; differences among those marked with an asterisk (for any one year) are not statistically significant.

1/ Silage yields adjusted to 70% moisture.

2/ Visual grain yield ratings of zero (0), low (L), medium (M), or high (H) at harvest.

3/ Unless two varieties differ by more than the L.S.D. (Least Significant Difference), little confidence can be placed in one being superior to the other.

PLEASE NOTE: This test was grown for the first time in 1987, so only 3 years of data are available.

NORTHEASTERN KANSAS

COOPERATORS: T. L. Walter, agronomist, and Clarence Swallow, superintendent, Agronomy Farm, Manhattan, RILEY COUNTY.

TEST SITE: Silt loam soil, planted to soybeans in 1988 and sorghum in 1987. PLANTED: June 9. HARVESTED: November 8.

PLANT POPULATION DESIRED: About 6 inches between plants in 30-inch rows or approximately 35,000 plants per acre. Final stands averaged 70% or about 25,000 plants per acre.

PEST CONTROL: Furadan insecticide applied in furrow at planting for chinch bug and greenbug protection. Lorsban 4LE also applied on June 22 and June 28 to help control chinch bugs. Ramrod-atrazine mixture applied after planting for weed control. Cultivated twice.

ENVIRONMENTAL FACTORS AFFECTING 1989 PERFORMANCE: Chinch bugs stunted plant growth and killed many seedlings, even though insecticide was applied several times. Drouth also inhibited growth and reduced stalk strength, but heavy rains in August and September revived vegetative growth of full-season hybrids. Very little grain matured on any of the entries because of the severe drought and/or late blooming.

TABLE 7. RILEY COUNTY FORAGE SORGHUM PERFORMANCE TEST RESULTS, 1986-1989.

BRAND	VARIETY OR HYBRID	SILAGE YIELD TONS PER ACRE 1/											DAYS TO		1989			
						2YR 3YR 4YR				GRAIN YIELD 2/			1/2 BLOOM		PLANT HT. (IN)	LODG- %	STA- DM %	ND %
		89	88	87	86	AVG.	AV	AVG	89	88	87	86	2YR	89				
BUFFALO	CANEX	11	20	18	27	15	16	19	—	46	82	86	67	67	55	56	45	75
CARGILL	FS 466	12*	—	25*	36*	—	—	—	—	121*	35	—	104	71	38	36	70	
DEKALB	FS-25E	14*	29*	27*	39*	21	23	27	—	81	62	22	93	104	87	77	36	70
GERMAIN'S	FS-555	12	26*	—	—	19	—	—	—	90	—	—	91	97	97	80	35	72
GOLDEN ACRES	T-E SILOMAKER	11	28*	24*	36*	19	21	25	—	126*	98	23	89	100	69	56	40	77
GOLDEN ACRES	T-E YELDMAKER	14*	25*	—	—	19	—	—	—	82	—	—	91	98	93	94	36	72
GOLDEN ACRES	T-E MILK-A-LOT	11	27*	24*	—	19	21	—	—	127*	126*	—	82	89	55	13	44	77
GOLDEN ACRES	T-E HORSEPOWER	5	—	—	—	—	—	—	—	—	—	—	—	70	52	100	89	53
NORTHROP KING	SUCRO SORGO 405	14*	29*	—	—	21	—	—	—	41	—	—	101	109	102	99	36	72
NORTHROP KING	NK 300	11	25*	—	—	18	—	—	—	113*	—	—	83	91	56	34	43	71
TRIUMPH	SUPER SILE 20	14*	27*	21	37*	20	21	25	—	103	88	139	97	107	85	100	33	75
-----	EARLY SUMAC	8	9	19	30	8	12	16	—	48	47	90	68	69	57	62	45	61
-----	ROX ORANGE	8	20	22	28	14	17	19	—	79	94	72	70	70	55	67	43	70
-----	SUGAR DRIP	11	28*	22	33	19	20	23	—	57	58	55	92	106	86	99	32	64
TEST AVERAGES, ALL ENTRIES		11	23	22	33	17	19	22	—	80	74	61	83	90	72	70	42	70
L.S.D. (.05) 3/		3	5	4	3	—	—	—	—	20	25	—	—	4	6	31	3	10

* Upper LSD group; differences among those marked with an asterisk (for any one year) are not statistically significant.

1/ Silage yields adjusted to 70% moisture.

2/ Grain yields adjusted to 12.5% moisture.

3/ Unless two varieties differ by more than the L.S.D., little confidence can be placed in one being superior to the other.

SOUTHEASTERN KANSAS

COOPERATORS: Joe L. Moyer, agronomist, and Lyle W. Lomas, head, Southeastern Kansas Branch Experiment Station, Mound Valley Unit, LABETTE COUNTY.

TEST SITE: Parsons silty clay loam soil, planted to soybeans in 1987 and 1988. PLANTED: June 21. Thinned to uniform stands on July 10. HARVESTED: October 11.

PLANT POPULATION: Desired about 6 inches between plants in 30-inch rows or approximately 35,000 plants/acre. Final stands averaged 98 percent of desired.

FERTILIZATION AND PEST CONTROL: 125 lbs/a N, 40 lbs/a P205, and 60 lbs/a K2O before planting. Two lbs/a atrazine applied.

ENVIRONMENTAL FACTORS AFFECTING 1989 PERFORMANCE: The weather was relatively cool, and moisture was abundant. Tonnages were high, but grain yields were low. Fall drying was very slow because of the cool temperatures. The test was harvested at fairly low dry matter contents, when it appeared that lodging could become severe.

TABLE 8. LABETTE COUNTY FORAGE SORGHUM PERFORMANCE TEST RESULTS, 1986-1989.

BRAND	VARIETY OR HYBRID	SILAGE YIELD TONS PER ACRE 1/											DAYS TO		1989			
		2YR 3YR 4YR				GRAIN YIELD 2/				1/2 BLOOM	PLANT	LODG-	STA-					
		89	88	87	86	AVG	AV	AVG	89	88	87	86	2YR	AVG.	89	HT.	ING	DM
															HT.	ING	DM	ND
CARGILL	FS 455	27	---	---	---	---	---	---	22	---	---	---	---	76	94	2	23	107
CARGILL	FS 466	31*	---	29	27*	---	---	---	15	---	6	H	---	85	117	2	24	101
CARGILL	SWEET SIOUX V	19	---	---	---	---	---	---	8	---	---	---	---	66	116	64	26	97
DEKALB	FS-25E	28	19*	34*	29*	23	27	27	15	3	4	H	101	83	134	1	22	91
GERMAIN'S	FS-555	31*	21*	---	---	26	---	---	19	3	---	---	97	77	125	21	24	100
GOLDEN ACRES	T-E YIELDMAKER	31*	---	---	---	---	---	---	20	---	---	---	---	80	125	38	24	96
NORTHROP KING	SUCRO SORGO 405	33*	21*	---	---	27	---	---	11	4	---	---	108	96	152	2	25	96
NORTHROP KING	NK 300	27	---	---	---	---	---	---	59*	---	---	---	---	74	82	1	24	96
TRIUMPH	SUPER SILE 20	34*	21*	29	24	28	28	27	25	10	5	M	97	84	133	1	22	114
-----	EARLY SUMAC	19	12	20	19	16	17	17	32	11*	4	H	72	66	79	39	24	99
-----	ROX ORANGE	21	11	19	20	16	17	18	24	12*	5	H	76	68	85	13	24	95
-----	SUGAR DRIP	26	15	21	21	20	21	21	12	15*	3	H	93	79	118	0	23	78
TEST AVERAGES, ALL ENTRIES		27	16	25	22	22	23	23	25	10	10.2	---	87	78	111	14	24	98
L.S.D. (.05) 3/		6	3	4	4	---	---	---	12	4	10.9	---	---	3	10	23	NS	10

* Upper LSD group; differences among those marked with an asterisk (for any one year) are not statistically significant.

1/ Silage yields adjusted to 70% moisture.

2/ Grain yields adjusted to 12.5% moisture, or visual grain yield ratings of zero (0), low (L), medium (M), or high (H) at harvest.

3/ Unless two varieties differ by more than the L.S.D., little confidence can be placed in one being superior to the other.

NORTH CENTRAL KANSAS, ON FALLOW

COOPERATORS: Kenneth D. Kofoid, agronomist, and P. I. Coyne, head, Fort Hays Experiment Station, ELLIS COUNTY.

TEST SITE: Harney silt loam soil, fallowed in 1988 after sorghum in 1987. PLANTED: May 26. THINNED: June 20.
HARVESTED: September 15.

FERTILIZATION AND PEST CONTROL: 40 lbs N/a before planting. Propazine herbicide applied before planting.

PLANT POPULATION: Desired about 6 inches between plants in 30-inch rows or 35,000 plants/acre. Final stands averaged 83 percent of desired.

ENVIRONMENTAL FACTORS AFFECTING 1989 PERFORMANCE: Severe drouth reduced yields and resulted in considerable data variability. Some bloom dates were recorded between August 7 and September 5, but development was too irregular to collect meaningful data. A killing freeze did not occur until after the test was harvested.

TABLE 9. ELLIS COUNTY FORAGE SORGHUM PERFORMANCE TEST RESULTS, 1986-1989.

BRAND	VARIETY OR HYBRID	SILAGE YIELD											DAYS TO		1989			
		TONS PER ACRE 1/											1/2 BLOOM		PLANT HT. (IN)	LODG- ING %	STA- DM %	ND %
		89	88	87	86	2YR AVG.	3YR AVG.	4YR AVG.	GRAIN YIELD 2/			2YR AVG.	89					
BUFFALO	CANEX	15*	14	11	10	14	13	13	44*	M	M	59	---	---	74	38	32	86
CARGILL	FS 455	14*	---	---	---	---	---	---	7	---	---	---	---	---	52	0	28	90
CARGILL	FS 466	16*	---	18*	18*	---	---	---	3	---	0	64	---	---	62	2	28	92
CARGILL	MOR CANE	12	---	11	12	---	---	---	34*	---	H	88	---	---	68	27	28	79
CARGILL	X15645	14*	---	---	---	---	---	---	35*	---	---	---	---	---	69	12	29	89
DEKALB	FS-5	14*	---	---	12	---	---	---	30*	---	---	77	---	---	64	6	29	81
GERMAIN'S	FS-555	15*	17	---	---	16	---	---	10	0	---	---	---	---	70	5	26	92
GOLDEN ACRES	T-E SILOMAKER	14*	---	---	---	---	---	---	20	---	---	---	---	---	55	0	28	90
GOLDEN ACRES	T-E YIELDMAKER	15*	21*	16*	18*	18	17	17	5	L	0	87	---	---	68	5	25	82
GOLDEN ACRES	T-E HORSEPOWER	11	---	---	---	---	---	---	15	---	---	---	---	---	66	1	32	57
NORTHRUP KING	SUCRO SORGO 405	15*	16	---	---	15	---	---	3	L	---	---	---	---	91	9	24	82
NORTHRUP KING	NK 300	16*	19	---	---	18	---	---	48*	H	---	---	---	---	47	0	31	96
NORTHRUP KING	MILLEX 24	11	---	13	---	---	---	---	8	---	L	---	---	---	65	0	28	60
TRIUMPH	SUPER SILE 20	17*	16	17*	13	16	16	16	7	0	0	61	---	---	76	5	25	91
-----	EARLY SUMAC	12	15	13	11	13	13	13	17	H	H	56	---	---	63	19	28	88
-----	ROX ORANGE	12	13	10	9	13	12	11	19	M	M	61	---	---	62	4	26	88
-----	SUGAR DRIP	12	15	15	13	14	14	14	0	L	L	43	---	---	69	0	23	63
TEST AVERAGE, ALL ENTRIES		14	15	14	13	15	14	14	18	---	---	68	---	---	66	8	28	83
L.S.D. (.05) 3/		3	2	2	3	---	---	---	25	---	---	---	---	---	12	NS	3	10

* Upper LSD group; differences among those marked with an asterisk (for any one year) are not statistically significant.

1/ Silage yields adjusted to 70% moisture.

2/ Grain yields adjusted to 12.5% moisture, or visual grain yield ratings of zero (0), low (L), medium (M), or high (H) at harvest.

3/ Unless two varieties differ by more than the L.S.D., little confidence can be placed in one being superior to the other.

SOUTH CENTRAL KANSAS

COOPERATOR: William Heer, agronomist-in-charge, South Central Experiment Field, Hutchinson, RENO COUNTY.

TEST SITE: Ost loam, planted to grain sorghum in 1988 and alfalfa in 1987. About 100 lbs N/a (as urea) and 46 lbs P2O5/a applied before planting. Furadan insecticide applied in furrow at planting. Ramrod/Bladex herbicides applied after planting.

PLANTED: June 16. Thinned to uniform stands on July 5. HARVESTED: October 17.

PLANT POPULATION: Desired about 7 inches between plants in 30-inch rows or approximately 29,870 plants/acre. Final average stands were 83% of desired.

ENVIRONMENTAL FACTORS AFFECTING 1989 PERFORMANCE: The summer was unusually cool and wet. Silage yields were excellent, but some irregular stands contributed to data variability. The first freeze was recorded on September 24, but stalks were not killed until considerably later.

TABLE 10. RENO COUNTY FORAGE SORGHUM PERFORMANCE TEST RESULTS, 1986-1989.

BRAND	VARIETY OR HYBRID	SILAGE YIELD TONS PER ACRE 1/											DAYS TO 1/2 BLOOM		1989 PLANT LODG- STA-			
						2YR 3YR 4YR				GRAIN YIELD 2/			2YR	HT.	ING	DM	ND	
		89	88	87	86	AVG.	AV	AVG	89	88	87	86	AVG.	89	(IN)	%	%	%
BUFFALO	CANEX	19	23*	25	16	21	22	21	M	M	M	M	63	63	83	0	36	93
CARGILL	FS 466	29*	—	38*	22	—	—	—	M	—	H	L	—	86	97	0	36	80
CARGILL	SWEET SIOUX V	21	—	—	—	—	—	—	M	—	—	—	—	69	112	2	38	89
CARGILL	MOR CANE	21	—	26	—	—	—	—	M	—	M	—	—	66	80	1	38	82
CARGILL	X15645	20	—	—	—	—	—	—	M	—	—	—	—	69	87	0	41	95
GERMAIN'S	FS-555	32*	25*	—	—	29	—	—	H	H	—	—	89	91	118	0	38	86
GOLDEN ACRES	T-E SILOMAKER	26	25*	32	24*	26	28	27	M	H	M	M	88	91	89	0	37	85
GOLDEN ACRES	T-E YIELDMAKER	28*	24*	35*	26*	26	29	28	H	H	H	L	89	90	115	3	36	79
GOLDEN ACRES	T-E MILK-A-LOT	22	23*	29	—	23	25	—	M	H	H	—	77	76	67	1	37	80
NORTHRUP KING	SUCRO SORGO 405	29*	23*	35*	—	26	29	—	M	M	L	—	91	94	130	0	36	71
NORTHRUP KING	NK 300	22	24*	—	—	23	—	—	M	H	—	—	77	76	73	0	37	85
TRIUMPH	SUPER SILE 20	32*	24*	30	23*	28	29	27	M	H	M	M	89	92	119	0	34	93
-----	EARLY SUMAC	21	17	22	18	19	20	20	M	L	M	M	64	68	83	0	39	74
-----	ROX ORANGE	18	14	20	19	16	17	18	M	M	M	H	66	67	75	0	37	85
-----	SUGAR DRIP	23	23*	29	18	23	25	23	L	M	M	M	74	69	112	0	35	67
TEST AVERAGES, ALL ENTRIES		24	21	29	21	22	25	24	—	—	—	—	76	77	95	1	37	83
L.S.D. (.05) 3/		5	3	4	3	—	—	—	—	—	—	—	—	2	5	NS	NS	15

* Upper LSD group; differences among those marked with an asterisk (for any one year) are not statistically significant.

1/ Silage yields adjusted to 70% moisture.

2/ Visual grain yield ratings of zero (0), low (L), medium (M), or high (H) at harvest.

3/ Unless two varieties differ by more than the L.S.D., little confidence can be placed in one being superior to the other.

SOUTHWESTERN KANSAS, IRRIGATED

COOPERATORS: Merle Witt, agronomist, and James Schaffer, head, Southwest Kansas Research-Extension Center, Garden City, FINNEY COUNTY.

TEST SITE: Keith silt loam soil, planted to grain sorghum for the past 2 years. Irrigated three times: Pre-plant, July 24, and August 20 -- 4 to 6 inches each time. PLANTED: May 26. HARVESTED: October 19.

FERTILIZATION AND PEST CONTROL: 100 lbs N/a before planting. Ramrod herbicide. Parathion applied for greenbugs on June 11.

PLANT POPULATION DESIRED: About 3 inches between plants in 30-inch rows or 70,000 plants per acre. Not thinned.

ENVIRONMENTAL FACTORS AFFECTING 1989 PERFORMANCE: The season was unusually cool and humid, and rainfall was above normal (especially in June when 6.70 inches of rain were received). Plant development was slower than usual, but nearly all entries were mature before the the first killing freeze on October 17.

TABLE 11. FINNEY COUNTY FORAGE SORGHUM PERFORMANCE TEST RESULTS, 1986-1989.

BRAND	VARIETY OR HYBRID	SILAGE YIELD TONS PER ACRE 1/											DAYS TO 1/2 BLOOM		1989			
						2YR 3YR 4YR GRAIN YIELD 2/				2YR		PLANT HT. (IN)	LOGD- ING %	STA- DM %	ND %			
		89	88	87	86	AVG.	AV	AVG	89	88	87					86	AVG.	89
BUFFALO	CANEX	27*	28	20	17	27	25	23	63	69	73	M	77	79	113	0	33	—
DEKALB	FS-25E	30*	37*	30*	28*	34	32	31	80*	74	102	M	97	99	125	0	33	—
GARST	333	25	—	—	—	—	—	—	93*	—	—	—	—	96	103	3	36	—
GERMAIN'S	FS-555	26*	37*	—	—	31	—	—	69	92	—	—	92	91	120	85	34	—
GOLDEN ACRES	T-E SILOMAKER	24	—	—	—	—	—	—	101*	—	—	—	—	91	101	52	40	—
GOLDEN ACRES	T-E YIELDMAKER	28*	35	29*	25*	32	31	29	94*	78	120	M	94	93	123	50	35	—
NORTHROP KING	SUCRO SORGO 405	26*	39*	—	29*	33	—	—	74	46	—	L	101	100	144	0	32	—
NORTHROP KING	NK 300	24	28	—	—	26	—	—	87*	118*	—	—	89	90	86	10	44	—
TRIUMPH	SUPER SILE 20	23	42*	30*	27*	33	32	30	82*	76	129	M	98	97	111	0	32	—
-----	EARLY SUMAC	18	22	17	14	20	19	18	37	57	56	M	83	86	107	0	31	—
-----	ROX ORANGE	21	27	20	17	24	23	21	63	106*	100	M	83	86	103	0	31	—
-----	SUGAR DRIP	18	28	25	20	23	24	23	31	41	72	M	99	100	117	0	29	—
TEST AVERAGES, ALL ENTRIES		24	31	26	23	27	27	26	72	70	104	—	91	92	112	17	34	—
L.S.D. (.05) 3/		5	7	3	5	—	—	—	23	24	22	—	—	4	8	17	5	—

* Upper LSD group; differences among those marked with an asterisk (for any one year) are not statistically significant.

1/ Silage yields adjusted to 70% moisture.

2/ Grain yields adjusted to 12.5% moisture, or visual grain yield ratings of zero (0), low (L), medium (M), or high (H) at harvest.

3/ Unless two varieties differ by more than the L.S.D., little confidence can be placed in one being superior to the other.

CONTRIBUTORS

Department of Animal Science

K. K. Bolsen
J. T. Dickerson
L. Pfaff
R. N. Sonon
R. Suazo

Department of Agronomy

W. Heer, Hutchinson
J. Long, Powhattan
C. Swallow, Manhattan
T. L. Walter, Manhattan

Branch Experiment Stations

K.D. Kofoid, Hays
J.L. Moyer, Parsons
M. Witt, Garden City

Compiled by:

Dale Fjell,
Crop Production Specialist

Kraig Roozeboom,
Assistant Agronomist



Agricultural Experiment Station, Kansas State University, Manhattan 66506-4008

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