

Technical Report

TR93-1

Agricultural Experiment Station	Department of Agronomy	Plainsman Research Center at Walsh	Arkansas Valley Research Center at Rocky Ford	January 1993
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Sorghum Hybrid Performance Tests In Colorado, 1992

K.J. Larson, F.C. Schweissing, D.L. Thompson

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SORGHUM HYBRID PERFORMANCE TESTS IN COLORADO, 1992

	Page
Introduction:	
Firms Entered in Tests	2
Experimental Methods and Evaluations	3
Statistical Method	4
Acknowledgements	4
References	5
Dryland Grain Sorghum Hybrid Performance Tests	
Eads	6
Vilas, Continuous Sorghum (S-S-S) Rotation	10
Vilas, Wheat-Sorghum-Fallow (W-S-F) Rotation	13
Walsh	17
Irrigated Grain Sorghum Hybrid Performance Tests	
Holly	21
Walsh	25
Dryland Forage Sorghum Hybrid Performance Test at Walsh	29
Irrigated Forage Sorghum Hybrid Performance Tests	
Walsh	33
Rocky Ford	37
Grain Sorghum Seed Maturation and Yield	39
Performance of Greenbug-Resistant Sorghum Hybrids in the Arkansas Valley	43

Grain Sorghum Hybrid Performance Tables

	Page
Table 1. Firms Entered in Tests.	2
Table 2. Dryland Grain Sorghum Test at Eads.	7
Table 3. Summary: Dryland Grain Sorghum Tests at Eads, 1990-92.	8
Table 4. Dryland Grain Sorghum Test at Vilas, Continuous Sorghum (S-S-S) Rotation.	11
Table 5. Summary: Dryland Grain Sorghum Tests at Vilas, Continuous Sorghum (S-S-S) Rotation, 1991-92.	11
Table 6. Dryland Grain Sorghum Test at Vilas, Wheat-Sorghum-Fallow (W-S-F) Rotation.	14
Table 7. Summary: Dryland Grain Sorghum Tests at Vilas, Wheat-Sorghum-Fallow (W-S-F) Rotation, 1990-92.	15
Table 8. Dryland Grain Sorghum Test at Walsh.	18
Table 9. Summary: Dryland Grain Sorghum Tests at Walsh, 1990-92.	19
Table 10. Irrigated Grain Sorghum Test at Holly.	22
Table 11. Summary: Irrigated Grain Sorghum Tests at Holly, 1990-92.	23
Table 12. Irrigated Grain Sorghum Test at Walsh.	26
Table 13. Summary: Irrigated Grain Sorghum Tests at Walsh, 1990-92.	27

Forage Sorghum Hybrid Performance Tables

Table 14. Dryland Forage Sorghum Test at Walsh.	30
Table 15. Summary: Dryland Forage Sorghum Tests at Walsh, 1990-92.	31
Table 16. Dryland Forage Sorghum Dry Matter Analysis at Walsh.	31
Table 17. Irrigated Forage Sorghum Test at Walsh.	34
Table 18. Summary: Irrigated Forage Sorghum Tests at Walsh, 1990-92.	35
Table 19. Irrigated Forage Sorghum Dry Matter Analysis at Walsh.	35
Table 20. Irrigated Forage Sorghum Test at Rocky Ford.	38
Table 21. Summary: Irrigated Forage Sorghum Tests at Rocky Ford, 1990-92.	38

Performance of Greenbug-Resistant Sorghum Hybrid Tables

	Page
Table 1. Firms Entered in Greenbug Test.	44
Table 2. Agronomic Data for Hybrids in Greenbug Test.	45
Table 3. Greenbug Colonies, Leaf Counts, and Grain Yield for Hybrids in Greenbug Test.	46
Table 4. Yield Comparison of Hybrids in Greenbug Test.	48

Available Soil Water Graphs

Fig. 1. Dryland Grain Sorghum at Eads.	9
Fig. 2. Dryland Grain Sorghum at Vilas, S-S-S Rotation.	12
Fig. 3. Dryland Grain Sorghum at Vilas, W-S-F Rotation.	16
Fig. 4. Dryland Grain Sorghum at Walsh.	20
Fig. 5. Irrigated Grain Sorghum at Holly.	24
Fig. 6. Irrigated Grain Sorghum at Walsh.	28
Fig. 7. Dryland Forage Sorghum at Walsh.	32
Fig. 8. Irrigated Forage Sorghum at Walsh.	36
Fig. 10. Limited Irrigation on Grain Sorghum at Walsh.	42

Seed Maturation and Yield Graph

Fig. 9. Grain Sorghum: Seed Maturation and Yield.	41
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SORGHUM HYBRID PERFORMANCE TESTS IN COLORADO, 1992
K.J. Larson, F.C. Schweissing, and D.L. Thompson /1

Introduction

The 1992 Colorado grain sorghum crop was estimated at 7.79 million bushels, 28 % below the 1991 production level. The decrease in production is due to 80,000 less acres harvested since yield per acre actually rose slightly, from 40 bu/A in 1991 to 41 bu/A in 1992. The Colorado Agricultural Statistics Service reports that most grain sorghum acreages matured and produced good test weights and yields; however, the cool growing season delayed maturity of some acreages enough to lower test weights and yields. Sorghum silage production in 1991 was 330,000 tons, up 70,000 tons from 1990. The increase in silage production is attributed to more acres harvested and higher per acre yield (Colorado Agricultural Statistic Service, 1992).

This publication is a progress report of the sorghum trials conducted by the Department of Agronomy at Colorado State University, Colorado Agricultural Experiment Station, and Cooperative Extension. The sorghum tests were located at five sites in Southeastern Colorado: dryland grain sorghum trials were conducted at Eads, Vilas and Walsh; irrigated grain sorghum trials at Holly and Walsh; a greenbug study at Rocky Ford; irrigated forage sorghum trials at Rocky Ford and Walsh, and dryland forage sorghum trial at Walsh.

Tests are partially funded by entry fees paid by commercial firms. Commercial seed representatives who are interested in entering sorghum hybrids in any of the test locations are invited to write Kevin Larson, Plainsman Research Center, Box 477, Walsh, Colorado 81090, or phone (719) 324-5643 for further details. Names and addresses of firms submitting entries in 1992 are shown in Table 1. These firms selected entries for testing and furnished seed for the tests. Selected open-pedigree hybrids were included by the Agricultural Experiment Station as a standard of comparison for each test. A closed-pedigree corn check was included in the forage sorghum trials and was sponsored by the Colorado State Agricultural Experiment Station.

Summary tables for weather (NOAA, 1992), soil analysis and fertilization (Soil Testing Laboratory, Colorado State University) and available soil water graphs derived from gypsum block readings are provided for each trial location. Other information, where applicable or available, was included: site description, emergence date, irrigation, pest control, field history, and pertinent comments.

/1 Superintendent, Plainsman Research Center, Walsh;
Superintendent, Arkansas Valley Research Center, Rocky Ford;
Researcher I, Plainsman Research Center, Walsh.

Table 1.--Entrants in the Colorado Sorghum Performance Tests, 1992

Brand	Entered by
ASGROW	Asgrow Seed Co., P.O. Box 460, Parkersburg, IA 50665
BUFFALO	Sharp Brothers Seed Co., P.O. Box 140, Healy, KS 67850
CARGILL	Cargill Hybrid Seeds, P.O. Box 5645, Minneapolis, MN 55440
CASTERLINE	Casterline Seeds, P.O. Box 1377, Dodge City, KS 67801
DEKALB	Dekalb Plant Genetics, Route 2, P.O. Box 56, Lubbock, TX 79415
GOLDEN ACRES	Taylor Evans Seed Co., P.O. Box 68, Tulia, TX 79088
GOLDEN HARVEST	J.C. Robinson Seed Co., 100 J.C. Robinson Blvd. Waterloo, NE 68069
ICI (Garst)	ICI Seeds, P.O. Box 300, Coon Rapids, IA 50058
NORTHRUP KING	Northrup King Co., P.O. Box 12123, Fresno, CA 93776
ORO	R.C. Young Seed Co./Oro Hybrids, 624 27th Street, Lubbock, TX 79404
PIONEER	Pioneer Hi-Bred International, Inc., P.O. Box 5307, Lincoln, NE 68505
STINE	Stine Seed Co., 2225 Laredo Trail, Adel, IA 50003
TRIUMPH	Triumph Seed Co., Inc., P.O. Box 1050, Ralls, TX 79357

Colorado Agricultural Experiment Station entered the following as checks: grain sorghums TXms399 X TXR2536 (399 X 2536); forage sorghums NB 305F and NB 280S; corn hybrid ICI (Garst) 8272.

Growing Degree Days for sorghum were also calculated. The Growing Degree Days for sorghum are the heat units required for physiological development of sorghum. It is based on the maximum (111 F) and minimum (50 F) threshold temperatures under which sorghum growth occurs (Peacock and Heinrich, 1984). It is calculated by averaging daily high and low temperature and subtracting it from the base temperature of 50 F:

$$[(\text{Minimum Temp.} > 50 \text{ F} + \text{Maximum Temp.} < 111 \text{ F})/2] - 50 \text{ F}$$

Experimental Methods and Evaluations

Trials were seeded with a four row cone planter and harvested with a modified, self-propelled John Deere 3300 combine equipped with a specialized sorghum row head to enhance harvest of lodged tillers. Sorghum Forage was cut and chopped with a single row John Deere 8 silage cutter.

Days to emergence. Seedling emergence was determined as the number of days after planting until approximately half of the seedlings became visible down a planted row.

50 % Bloom. Number of days after planting until half of the main heads had pollinating florets. Number of days to half bloom provides a good measure of relative maturity between hybrids. It is also important because bloom is a sexual developmental stage very sensitive to environmental stresses.

50 % Maturity. Number of days after planting until half of the kernels in half of the main heads have reached physiological maturity, i.e., the black layer becomes visible at the base of the kernel.

Maturity Group. The relative maturity group of grain sorghum hybrids as stated by seed firms. The hybrids in the grain sorghum hybrid performance tables are grouped by maturity.

Plant Height. Plant height was measured in inches from the soil to the tip of the main head.

Lodging. The percentage of tillers with broken basal stems or broken peduncles or were leaning more than a 45 degree angle were considered lodged. Because the combine was equipped with a specialized sorghum row head, most of the leaning tillers were harvested.

Harvest Density. Plant population in plants per acre was counted prior to harvest.

Test Weight. Test weight was determined using a hand-held bushel weight tester. A low test weight is a good indicator of a hybrid which did not fully mature before the first freeze or which suffered environmental stress, such as water stress.

Grain Yield. The yield of grain in bushels per acre was corrected to 14 percent moisture content.

Yield as a % of Test Average. Yield as a percentage of test average provides a comparison between yields within an individual test and allows easy comparisons between years irrespective of high or low yielding years.

Forage Yield. Forage harvested in tons per acre corrected to 70 % moisture content. A representative sample of fresh silage was oven-dried at 167 F (75 C) until the moisture equilibrated with the oven temperature, i.e., until there was no more water loss, then yields were recalculated to 70 % moisture content.

Stem Sugar. The percentage of sugar content in the stem of forage sorghums at harvest was measured with a hand refractometer.

Available Soil Water

Available soil water was measured by placing gypsum blocks at 6, 18, 30, and 42 inches below the soil surface and electrical resistance readings were made weekly. Resistance readings vary with the amount of soil water present. Using the resistance readings, available soil water was determined by extrapolating from soil water depletion curves for each particular soil.

Statistical Method

Tests were planted in a randomized complete block design with four replications. No less than three replications were harvested from any of the locations. Analysis of variance was applied to the results and the least significant difference (LSD) was computed at 10 and 20 percent levels. A significant difference between hybrid yields, with 90 or 80 % confidence, can be determined using the LSD figures. Frequently only minor yield differences separate the top hybrids and these differences are meaningless if they are not greater than the LSD amount.

Acknowledgements

Thank you to the grower-cooperators for their assistance in the off-station trials: Tim Weeks, Eads; Donald and Dale Seuffer, Holly; and Terrill Swanson, Vilas. A thank you is also due to the NOAA weather observers for collecting the weather data utilized for the off-station trials: Ben Fisher, Eads; William Davis, Holly.

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Dryland Grain Sorghum Hybrid Performance Test at Eads, 1992

COOPERATORS: Tim Weeks Farm, Eads, and Kevin Larson,
Superintendent, Plainsman Research Center, Walsh, Colorado.

PURPOSE: To identify high yielding hybrids under a dryland,
continuous sorghum rotation with 2700 sorghum heat units in a
Loamy Sand soil.

PLOT: Four rows with 30"
row spacing, 50' long;
SEEDING DENSITY: 43,600
seed/A; PLANTED: June 5;
Re-planted: June 19.
HARVESTED: November 5.

EMERGENCE DATE: 7 days
after replanting; SOIL
TEMP: 68 F.

PEST CONTROL: Post
Emergent Herbicides:
bromoxynil 0.38 lb ai/A,
atrazine 0.25 lb ai/A,
2,4-D 0.25 lb ai/A,
dicamba 0.13 lb ai/A,
crop oil 1 qt/A. Insecticide: none. CULTIVATION: once.

FIELD HISTORY: Last crop: sorghum; FIELD PREPARATION: sweep plow.

COMMENTS: Planted in good soil moisture. Replanted because severe
soil crusting reduced plant stand. Weed control fair. Above
normal precipitation for growing season with September receiving
no rainfall. Cool growing season about 250 heat units (GDD) below
normal. No greenbug infestation and no plant lodging. Good yields
and moderate test weights on early maturing hybrids, but later
maturing hybrids had poor yields and very light test weights due
to late planting (replanting) and cool growing season.

SOIL: Loamy Sand for 0-8" and Sandy Clay Loam 8"-24" depths from
soil analysis.

Summary: Growing Season Precipitation and Temperature /1 Eads, Kiowa County.					
Month	Rainfall	GDD /2	> 90 F	> 100 F	DAP /3
	in		-----no. of days-----		
June	1.48	246	1	0	11
July	3.82	732	18	2	42
August	3.38	625	9	0	73
September	0	533	8	0	103
October	0.15	108	0	0	111
Total	8.83	2244	36	2	111

/1 Growing season from June 19 (replanting) to October 8
(first frost, 25 F).
/2 GDD: Growing Degree Days for sorghum.
/3 DAP: Days After Planting.

Summary: Soil Analysis.

Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	-----ppm-----				
0-8"	7.4	0.3	0.9	3	5.0	237	0.5	9.4
8"-24"	7.8	0.4	1.1	3	0.3	265	0.2	9.1
Comment	Alka	VLo	Lo	VLo	Lo	VHi	VLo	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P205	K2O	Zn	Fe
	-----lb/A-----				
Recommended	33	10	0	5	0
Applied	40	20	0	0	0

Yield Goal: 45 bu/A.

Actual Yield: 29 bu/A.

Table 2.--Dryland Grain Sorghum Hybrid Performance Test at Eads, 1992. \1

Brand	Hybrid	Days to Emerge	50% Bloom		50% Mature		Plant Ht.	Harvest Density	Test Wt.	Grain Yield	Yield % of Test Average	
			DAP	GDD	DAP	Group						
								in.	plant/A (1000 X)	lb/bu	bu/A	%
ASGROW	Madera	6	63	1429	108	E	41	28.3	55	52.9	184	
GOLDEN HARVEST	H-301	7	61	1392	107	E	41	32.9	55	47.4	165	
PIONEER	8771	8	65	1477	HD	E	44	28.5	51	45.0	157	
GOLDEN ACRES	T-E Chico	6	62	1407	108	E	39	33.3	55	39.7	138	
TRIUMPH	TR 52Y	7	67	1519	HD	E	41	25.9	50	37.2	130	
ICI (Garst)	5616	7	68	1529	HD	ME	43	28.1	50	42.7	149	
CARGILL	607E	8	68	1529	HD	ME	42	25.2	51	40.5	141	
PIONEER	8699	8	68	1529	HD	ME/E	42	31.6	52	39.8	139	
DEKALB	X-142	8	68	1529	HD	ME	43	24.6	51	39.3	137	
NORTHRUP KING	KS 555Y	7	70	1553	SD	ME/M	46	32.1	45	37.5	131	
PIONEER	8510Y	7	70	1553	SD	ME/M	46	28.5	47	36.1	126	
PIONEER	8505	7	71	1572	SD	ME/M	42	27.7	46	31.6	110	
NORTHRUP KING	KS 560Y	7	71	1572	SD	ME/M	39	30.0	44	30.7	107	
CARGILL	618Y	8	70	1553	SD	ME	41	24.2	46	30.2	105	
DEKALB	DK-39y	7	70	1553	SD	ME/E	41	24.8	48	30.1	105	
NORTHRUP KING	KS 383Y	7	70	1553	SD	ME	37	32.7	46	27.8	97	
DEKALB	DK-40	7	73	1602	ED	ME	42	31.6	43	27.5	96	
DEKALB	DK-38y	8	69	1538	SD	ME/E	37	28.3	46	26.9	94	
CASTERLINE	SR 314EC	6	73	1602	ED	ME	41	23.8	44	26.5	92	
GOLDEN ACRES	T-E X9115	10	69	1538	SD	ME	41	14.1	46	26.0	91	
DEKALB	DK-40y	7	72	1589	SD	ME	43	31.6	45	26.0	91	
CASTERLINE	SR 315E	6	74	1619	ED	ME	43	28.5	41	25.9	90	
GOLDEN ACRES	T-E Gage	9	73	1602	ED	ME	44	21.7	42	24.7	86	
GOLDEN HARVEST	H-388W	7	76	1654	ED	ME	44	26.9	41	18.7	65	
ASGROW	Seneca	6	77	1677	ED	ME	41	31.6	44	18.0	63	
GOLDEN HARVEST	H-361	8	79	1716	LM	M/ME	39	22.8	42	13.1	46	
CASTERLINE	SR 319E	6	83	1783	LM	M	43	29.6	40	11.2	39	
CARGILL	727	8	83	1783	LM	M	43	25.6	40	10.8	38	
(Check)	399 X 2536	7	85	1817	LM	ML	41	27.1	42	9.7	34	
CARGILL	837	7	84	1795	LM	ML	44	25.9	41	8.8	31	
CARGILL	797	9	86	1843	LM	ML/M	39	23.4	38	7.5	26	
AVERAGE		7	72	1594	SD	ME	42	27.4	46	28.7		
L.S.D. (0.10)										5.18		
L.S.D. (0.20)										4.02		

\1 Planted: June 5; Re-planted: June 19; Harvested: November 5.

DAP: Days After Planting or maturation of seed at first freeze.

Seed Maturation: LM, late milk; ED, early dough; SD, soft dough; HD, hard dough; mature (DAP).

GDD: Growing Degree Days for sorghum.

Maturity Group: E, early; ME, medium early; M, medium; ML, medium late; L, late.

Yields are corrected to 14.0 % seed moisture content.

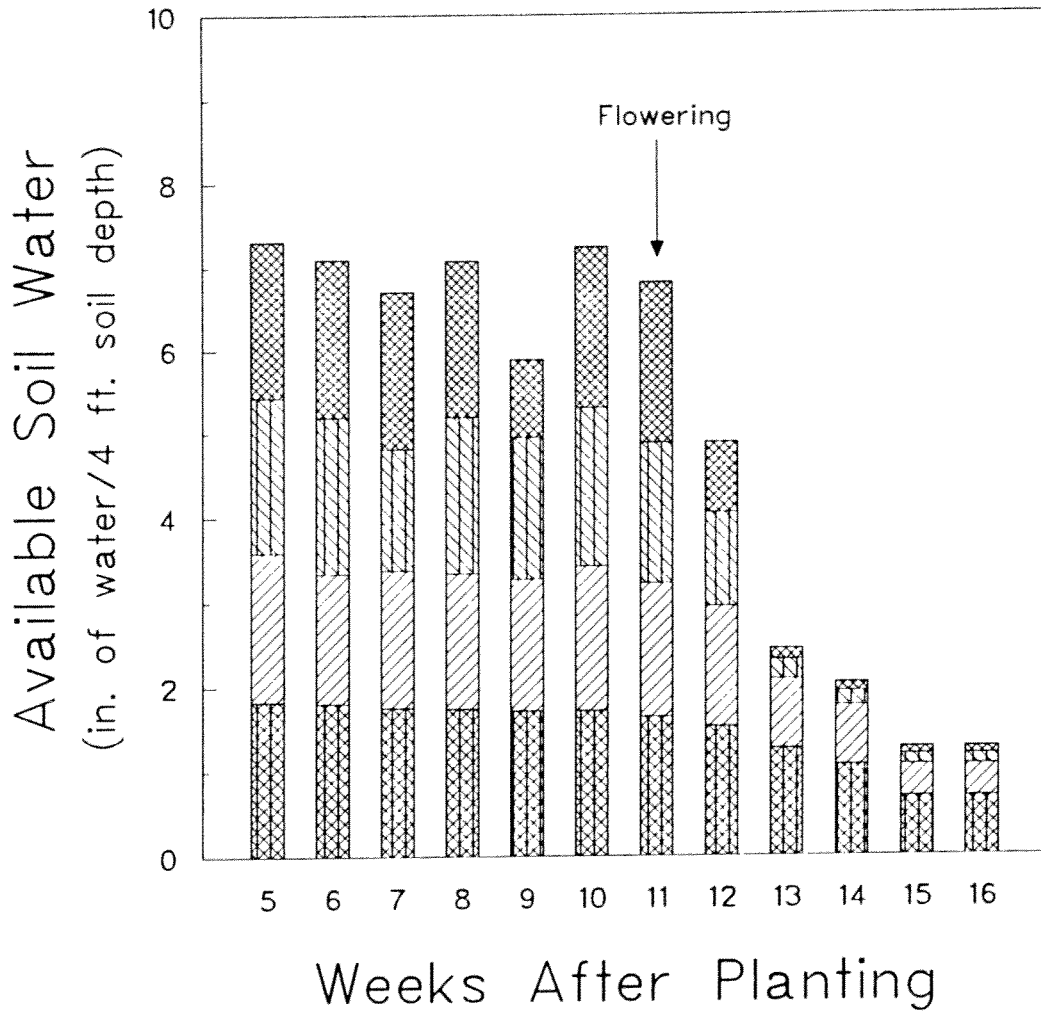
Table 3.--Summary: Dryland Grain Sorghum Hybrid Performance Tests at Eads, 1990-92. \1

Brand	Hybrid	-----Grain Yield-----					---Yield as % of Test Average---				
		1990	1991	1992	2-Year Avg	3-Year Avg	1990	1991	1992	2-Year Avg	3-Year Avg
		-----bu/A-----					-----%-----				
ASGROW	Madera	26.4	--	52.9	39.7	--	131	--	184	158	--
ASGROW	Seneca	24.2	--	18.0	21.1	--	120	--	63	92	--
CARGILL	607E	20.7	9.9	40.5	25.2	23.5	100	80	141	111	107
CARGILL	618Y	23.7	11.9	30.2	21.1	21.9	117	97	105	101	106
CARGILL	630	17.2	11.1	--	14.2	--	85	90	--	88	--
CASTERLINE	SR 314EC	--	7.4	26.5	17.0	--	--	60	92	76	--
CASTERLINE	SR 315E	--	17.9	25.9	21.9	--	--	145	90	118	--
CASTERLINE	SR 319E	--	17.7	11.2	14.5	--	--	144	39	92	--
DEKALB	DK-39y	23.6	9.0	30.1	19.6	20.9	117	73	105	89	98
DEKALB	DK-40	25.6	13.1	27.5	20.3	22.1	127	107	96	102	110
DEKALB	DK-40y	12.0	--	26.0	19.0	--	59	--	91	75	--
GOLDEN ACRES	T-E Y-60	18.4	13.9	--	16.2	--	91	113	--	102	--
GOLDEN HARVEST	H-301	--	9.3	47.2	28.3	--	--	75	165	120	--
GOLDEN HARVEST	H-361	--	12.2	13.1	12.7	--	--	99	46	73	--
GOLDEN HARVEST	H-388W	--	20.9	18.7	19.8	--	--	170	65	118	--
NORTHROP KING	KS 383Y	21.9	10.3	27.8	19.1	20.0	108	83	97	90	96
PIONEER	8510Y	--	10.6	36.1	23.4	--	--	86	126	106	--
PIONEER	8771	--	8.5	45.0	26.8	--	--	69	157	113	--
TRIUMPH	TR 52Y	22.9	12.8	37.2	25.0	24.3	113	104	130	117	116
TRIUMPH	TR 56yG	24.4	10.5	--	17.5	--	121	86	--	104	--
(Check)	399 X 2536	17.9	13.3	9.7	11.5	13.6	89	108	34	71	77
Test Average		20.2	12.3	28.7	20.5	20.4					

\1 Eads, 1991 and 1992 data; Brandon, 1990 data.

Available Soil Water

Dryland Grain Sorghum, Eads



- Soil Depth 1 ft.
- Soil Depth 2 ft.
- Soil Depth 3 ft.
- Soil Depth 4 ft.

Fig. 1. Available soil water in dryland grain sorghum at Eads. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Eads from planting to first frost was 8.83 in. Any increase in available soil water between weeks is from rain.

Dryland Grain Sorghum Hybrid Performance Test at Vilas, S-S-S
Rotation, 1992

COOPERATORS: Terrill Swanson Farm, Vilas, and Kevin Larson,
Superintendent, Plainsman Research Center, Walsh, Colorado.

PURPOSE: To identify high yielding hybrids under a dryland,
continuous sorghum rotation with 3000 sorghum heat units in a
Loamy Sand soil.

PLOT: Four rows with 30"
row spacing, 50' long;
SEEDING DENSITY: 43,600
seed/A; PLANTED: June 2;
HARVESTED: October 29.

EMERGENCE DATE: 12 days
after planting; SOIL
TEMP: 57 F.

PEST CONTROL: Preplant
Herbicides: none; Post
Emergent Herbicides:
atrazine 0.5 lb ai/A;
crop oil 1.0 qt/A;
Insecticide: none.
CULTIVATION: once.

Summary: Growing Season Precipitation and Temperature /1 Plainsman Research Center, Walsh, Baca County.					
Month	Rainfall	GDD /2	> 90 F	> 100 F	DAP /3
	in		-----no. of days-----		
June	3.66	479	4	0	29
July	3.00	747	15	2	60
August	3.51	648	8	0	91
September	0.20	542	4	0	121
October	0.07	114	0	0	129
Total	10.44	2530	31	2	129
/1 Growing season from June 2 (planting) to October 8 (first frost, 29 F).					
/2 GDD: Growing Degree Days for sorghum.					
/3 DAP: Days After Planting.					

FIELD HISTORY: Last crop: grain sorghum; FIELD PREPARATION:
chisel and sweep plow.

COMMENTS: Planted in good soil moisture. Very little soil
crusting. Weed control fair. Above normal precipitation for
growing season, with September much drier than normal. Cool
growing season about 300 heat units (GDD) below normal. No
greenbug infestation and no plant lodging observed. Good soil
water availability, but less than recorded in the Wheat-Sorghum-
Fallow Rotation. Very good yields.

SOIL: Loamy Sand for 0-8" and Sandy Clay 8"-24" depths from soil
analysis.

Summary: Soil Analysis.

Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	-----ppm-----				
0-8"	7.6	0.2	0.5	3	9.5	190	0.8	5.2
8"-24"	7.7	0.3	0.9	4	0.8	218	0.2	7.7
Comment	Alka	VLo	Lo	VLo	Med	VHi	Lo	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P205	K2O	Zn	Fe
	-----lb/A-----				
Recommended	20	0	0	5	0
Applied	15 ton/A of cow manure				

Yield Goal: 50 bu/A.

Actual Yield: 62 bu/A.

Table 4.--Dryland Grain Sorghum Hybrid Performance Test at Vilas, S-S-S Rotation, 1992. \1

Brand	Hybrid	Days to Emerge	50% Bloom		50% Mature		Plant Ht.	Harvest Density	Test Wt.	Grain Yield	Yield % of Test Average	
			DAP	GDD	DAP	Group						
								in.	plant/A (1000 X)	lb/bu	bu/A	%
GOLDEN HARVEST	H-388W	11	78	1674	124	ME	44	29.6	57	74.9	121	
STINE	S66B	11	76	1612	123	ME	41	25.0	57	73.2	118	
NORTHROP KING	KS 560Y	12	73	1577	121	ME/M	39	21.5	59	65.6	106	
DEKALB	DK-40y	13	75	1612	123	ME	42	25.0	56	63.3	102	
GOLDEN ACRES	T-E X9118	12	72	1557	120	ME/M	40	23.4	59	60.1	97	
NORTHROP KING	KS 383Y	12	72	1557	121	ME	36	22.8	59	59.6	96	
DEKALB	DK-38y	13	73	1577	123	ME/E	38	22.3	57	58.2	94	
GOLDEN ACRES	T-E Gage	12	73	1577	123	ME	46	19.9	57	56.0	91	
(Check)	399 X 2536	12	85	1813	HD \2	M	39	22.5	53	54.0	87	
GOLDEN HARVEST	H-361	13	80	1700	126	M/ME	41	21.5	56	53.0	86	
AVERAGE		12	76	1626	123	ME	41	23.4	57	61.8		
L.S.D. (0.10)										6.77		
L.S.D. (0.20)										5.25		

\1 Planted: June 2; Harvested: October 29.

\2 Hybrid was not mature; HD, hard dough stage at first freeze.

DAP: Days After Planting.

GDD: Growing Degree Days for sorghum.

Maturity Group: E, early; ME, medium early; M, medium; ML, medium late; L, late.

Yields are corrected to 14.0 % seed moisture content.

None of the hybrids lodged.

Table 5.--Summary: Dryland Grain Sorghum Hybrid Performance Tests at Vilas, S-S-S, 1990-92.

Brand	Hybrid	-----Grain Yield-----					---Yield as % of Test Average---				
		1990	1991	1992	2-Year Avg	3-Year Avg	1990	1991	1992	2-Year Avg	3-Year Avg
		-----bu/A-----					-----%-----				
GOLDEN HARVEST	H-361	--	55.9	53.0	54.5	--	--	91	86	89	--
GOLDEN HARVEST	H-388W	--	73.9	74.9	74.4	--	--	121	121	121	--
NORTHROP KING	KS 383Y	--	56.7	59.6	58.2	--	--	93	96	95	--
(Check)	399 X 2536	--	56.9	54.0	55.5	--	--	93	87	90	--
Test Average		--	61.3	61.8	61.6	--					

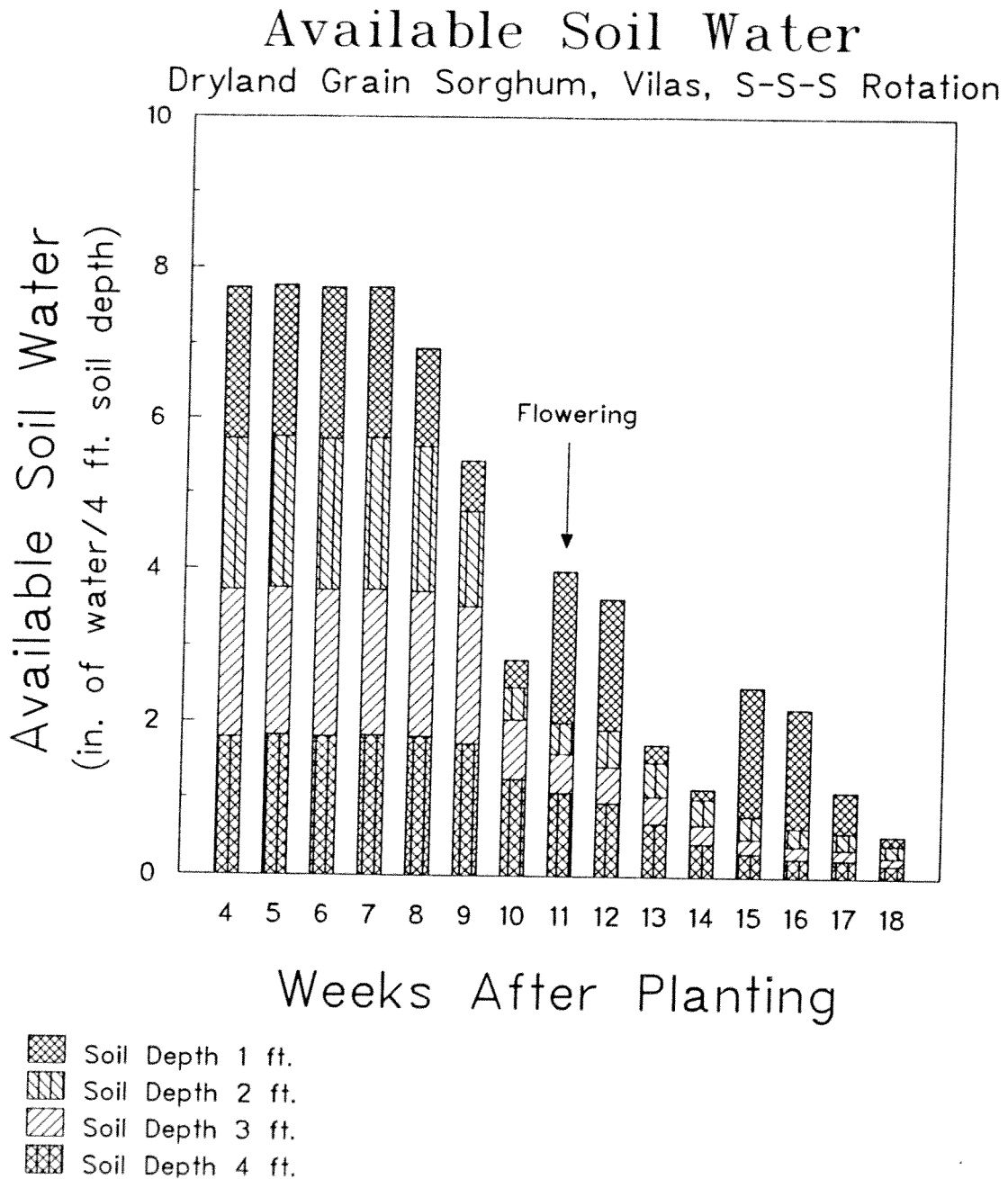


Fig. 2. Available soil water in dryland grain sorghum at Vilas, S-S-S rotation. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first frost was 10.44 in. Any increase in available soil water between weeks is from rain.

Dryland Grain Sorghum Hybrid Performance Test at Vilas, W-S-F Rotation, 1992

COOPERATORS: Terrill Swanson Farm, Vilas, and Kevin Larson, Superintendent, Plainsman Research Center, Walsh, Colorado.

PURPOSE: To identify high yielding hybrids under a dryland, wheat-sorghum-fallow rotation with 3000 sorghum heat units in a Sandy Clay soil.

PLOT: Four rows with 30" row spacing, 50' long;
SEEDING DENSITY: 43,600 seed/A; PLANTED: June 1;
HARVESTED: November 2.

EMERGENCE DATE: 12 days after planting; SOIL TEMP: 59 F.

PEST CONTROL: Preplant Herbicides: atrazine 0.5 lb ai/A; glyphosate 12 oz/A; Post Emergent Herbicides: none
Insecticide: none.
CULTIVATION: none.

Summary: Growing Season Precipitation and Temperature /1 Plainsman Research Center, Walsh, Baca County.					
Month	Rainfall	GDD /2	> 90 F	> 100 F	DAP /3
	in		-----no. of days-----		
June	3.85	489	4	0	30
July	3.00	747	15	2	61
August	3.51	648	8	0	92
September	0.20	542	4	0	122
October	0.07	114	0	0	130
Total	10.63	2540	31	2	130

/1 Growing season from June 1 (planting) to October 8 (first frost, 29 F).
/2 GDD: Growing Degree Days for sorghum.
/3 DAP: Days After Planting.

FIELD HISTORY: Last crop: wheat; FIELD PREPARATION: no-till.

COMMENTS: Planted in good soil moisture. Weed control good. Above normal precipitation for growing season, with September much drier than normal. Cool growing season about 300 heat units (GDD) below normal. No greenbug infestation and no plant lodging observed. Very good soil water availability throughout the growing season. Excellent yields.

SOIL: Sandy Clay for 0-8" and Sandy Clay Loam 8"-24" depths from soil analysis.

Summary: Soil Analysis.

Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	-----ppm-----				
0-8"	7.6	0.2	0.8	3	5.7	301	0.3	6.4
8"-24"	7.5	0.4	0.9	7	0.8	300	0.1	8.8
Comment	Alka	VLo	Lo	Lo	Lo	VHi	VLo	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P2O5	K2O	Zn	Fe
	-----lb/A-----				
Recommended	20	10	0	5	0
Applied	0	0	0	0	0

Yield Goal: 50 bu/A.
Actual Yield: 65 bu/A.

Table 6.--Dryland Grain Sorghum Hybrid Performance Test at Vilas, W-S-F Rotation, 1992. \1

Brand	Hybrid	Days to Emerge	50% Bloom		50% Mature		Plant Ht.	Harvest Density	Test Wt.	Grain Yield	Yield % of Test Average	
			DAP	GDD	DAP	Group						
								in.	plant/A (1000 X)	lb/bu	bu/A	%
ICI (Garst)	5616	12	73	1567	119	E/ME	43	20.5	58	64.6	99	
NORTHRUP KING	KS 560Y	14	74	1587	124	ME/M	39	22.1	58	70.5	108	
CASTERLINE	SR 315E	11	77	1644	125	ME	44	29.4	56	68.5	105	
GOLDEN ACRES	X9118	12	75	1606	123	ME/M	43	23.6	57	66.4	102	
NORTHRUP KING	KS 383Y	12	74	1587	124	ME	38	27.1	59	66.3	102	
ORO	Ivory	13	75	1606	125	ME	48	24.8	56	65.8	101	
GOLDEN ACRES	X9115	14	74	1587	125	ME	45	15.5	56	65.3	100	
GOLDEN ACRES	T-E Eden	12	80	1694	126	ME	42	23.6	55	63.1	97	
CASTERLINE	SR 314EC	11	74	1587	124	ME	46	24.4	56	62.4	96	
DEKALB	DK-40y	14	74	1587	124	ME	44	22.3	58	62.4	96	
DEKALB	DK-38y	12	74	1587	124	ME/E	39	21.9	56	61.4	94	
CASTERLINE	SR 319E	12	86	1823	130	M	45	21.9	56	67.0	103	
(Check)	399 X 2536	12	86	1823	HD \2	M	41	22.8	52	63.4	97	
AVERAGE		12	77	1637	124	ME	43	23.1	56	65.2		
L.S.D. (0.10)										12.88		
L.S.D. (0.20)										9.99		

\1 Planted: June 1; Harvested: November 2.

\2 Hybrid was not mature; HD, hard dough stage at first freeze.

DAP: Days After Planting.

GDD: Growing Degree Days for sorghum.

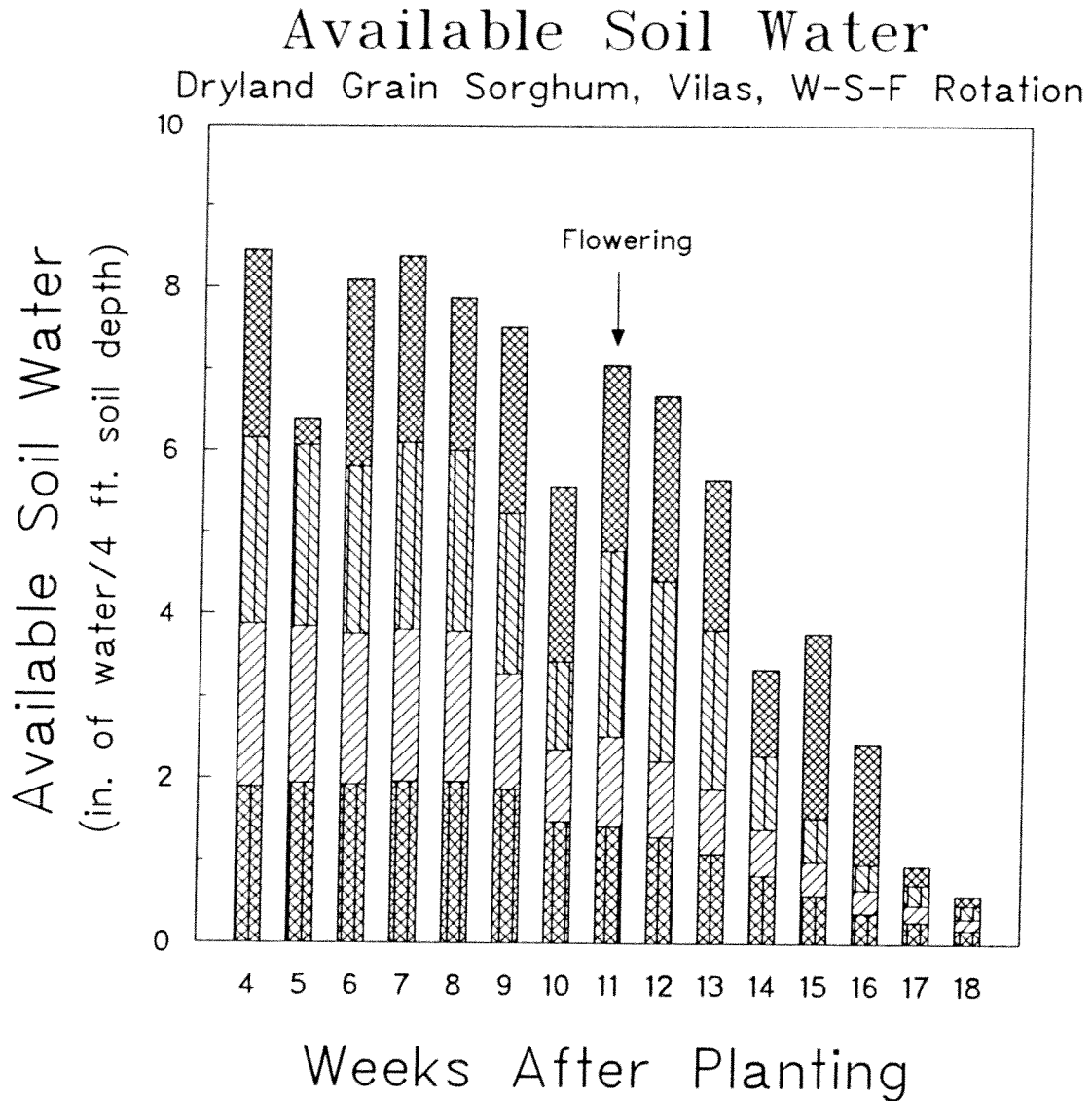
Maturity Group: E, early; ME, medium early; M, medium; ML, medium late; L, late.

Yields are corrected to 14.0 % seed moisture content.

None of the hybrids lodged.

Table 7.--Summary: Dryland Grain Sorghum Hybrid Performance Tests at Vilas, W-S-F, 1990-92.

Brand	Hybrid	-----Grain Yield-----					---Yield as % of Test Average---				
		1990	1991	1992	2-Year Avg	3-Year Avg	1990	1991	1992	2-Year Avg	3-Year Avg
		-----bu/A-----					-----%-----				
CASTERLINE	SR 314EC	--	52.2	62.4	57.3	--	--	81	96	89	--
CASTERLINE	SR 315E	--	88.0	68.5	78.3	--	--	137	105	121	--
CASTERLINE	SR 319E	--	89.4	67.0	78.2	--	--	139	103	121	--
DEKALB	DK-39y	62.6	42.0	--	52.3	--	91	65	--	78	--
DEKALB	DK-40y	64.6	53.8	62.4	58.1	60.3	94	84	96	90	91
GOLDEN ACRES	T-E Y-60	66.5	81.7	--	74.1	--	97	127	--	112	--
GOLDEN ACRES	T-E Eden	--	64.0	63.1	63.6	--	--	99	97	98	--
NORTHROP KING	KS 383Y	70.0	59.1	66.3	62.7	65.1	102	92	102	97	99
NORTHROP KING	KS 555Y	59.7	53.8	--	56.8	--	87	84	--	86	--
ORO	Ivory	75.4	72.3	65.8	69.1	71.2	110	112	101	107	108
(Check)	399 X 2536	68.0	66.9	63.4	65.2	66.1	99	104	97	101	100
Test Average		68.6	64.3	65.2	64.8	66.0					







-  Soil Depth 1 ft.
-  Soil Depth 2 ft.
-  Soil Depth 3 ft.
-  Soil Depth 4 ft.

Fig. 3. Available soil water in dryland grain sorghum at Vilas, W-S-F rotation. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first frost was 10.63 in. Any increase in available soil water between weeks is from rain.

Dryland Grain Sorghum Hybrid Performance Test at Walsh, 1992

COOPERATORS: Plainsman Agri-Search Foundation and Kevin Larson, Superintendent, Plainsman Research Center, Walsh, Colorado.

PURPOSE: To identify high yielding hybrids under dryland condition with 2900 sorghum heat units in a Silty Clay soil.

PLOT: Four rows with 30" row spacing, 50' long;
SEEDING DENSITY: 43,600 seed/A; PLANTED: June 15;
HARVESTED: November 6.

EMERGENCE DATE: 7 days after planting; SOIL TEMP: 68 F.

PEST CONTROL: Preplant Herbicides: glyphosate 16 oz/A and 2,4-D 0.68 lb ai/A; Post Emergent Herbicides: bromoxynil 0.38 lb ai/A; Insecticide: none. CULTIVATION: once.

Summary: Growing Season Precipitation and Temperature /1 Plainsman Research Center, Walsh, Baca County.					
Month	Rainfall	GDD /2	> 90 F	> 100 F	DAP /3
	in		-----no. of days-----		
June	2.05	337	4	0	15
July	3.00	747	15	2	46
August	3.51	648	8	0	77
September	0.20	542	4	0	107
October	0.07	114	0	0	115
Total	8.83	2388	31	2	115

/1 Growing season from June 15 (planting) to October 8 (first frost, 29 F).
/2 GDD: Growing Degree Days for sorghum.
/3 DAP: Days After Planting.

FIELD HISTORY: Last crop: wheat; FIELD PREPARATION: rodweeder.

COMMENTS: Planted late because of rains in early June. Planted in good soil moisture. Weed control fair. Above normal precipitation for growing season, with September much drier than normal. Cool summer, about 300 heat units (GDD) below normal. No greenbug infestation and no plant lodging observed. Good yields and heavy test weights on earlier maturing hybrids, but later maturing hybrids had poor yields and light test weights due to late planting and cool growing season.

SOIL: Silty Clay Loam for 0-8" and 8"-24" depths from soil test.

Summary: Soil Analysis.

Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	-----ppm-----				
0-8"	8.0	0.5	2.2	19	4.4	673	1.0	5.8
8"-24"	7.9	0.6	1.1	9	0.8	308	0.3	8.3
Comment	Alka	VLo	Hi	Mod	Lo	VHi	Lo	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P205	K20	Zn	Fe
	-----lb/A-----				
Recommended	0	25	0	5	0
Applied	12/25	40	0	0	0

Yield Goal: 50 bu/A.
Actual Yield: 56 bu/A.

Table 8.--Dryland Grain Sorghum Hybrid Performance Test at Walsh, 1992. \1

Brand	Hybrid	Days to Emerge	50% Bloom		50% Mature		Plant Ht.	Harvest Density	Test Wt.	Grain Yield	Yield %				
			DAP	GDD	DAP	Group					of Test Average				
											in.	plant/A	lb/bu	bu/A	%
											(1000 X)	(1000 X)	(1000 X)	(1000 X)	(1000 X)
TRIUMPH	TR 52Y	7	65	1512	109	E	42	25.4	56	64.4	115				
ASGROW	Madera	5	62	1512	106	E	39	28.1	57	62.5	112				
PIONEER	8699	7	64	1502	108	E	43	25.7	56	60.9	109				
PIONEER	8771	7	64	1502	106	E	42	25.4	57	58.3	104				
CARGILL	607E	8	67	1550	109	ME	41	25.7	57	72.2	129				
PIONEER	8505	7	68	1574	112	ME/M	43	28.8	56	68.8	123				
CARGILL	618Y	7	67	1550	112	ME	41	28.7	56	68.7	123				
DEKALB	X-142	8	68	1574	111	ME	42	25.6	57	66.9	120				
ICI (Garst)	5616	6	66	1528	109	ME	42	27.5	57	66.9	120				
NORTHROP KING	KS 555Y	7	68	1574	113	ME/M	42	30.6	57	65.5	117				
NORTHROP KING	KS 560Y	6	69	1600	112	ME/M	38	24.4	56	64.7	116				
CASTERLINE	SR 314EC	6	68	1574	112	ME	42	31.4	57	63.2	113				
NORTHROP KING	KS 383Y	7	68	1574	111	ME	37	31.4	56	61.7	110				
CASTERLINE	SR 315E	6	70	1624	113	ME	43	27.1	55	61.1	109				
GOLDEN ACRES	T-E X 9115	9	65	1512	111	ME	41	25.0	56	60.3	108				
GOLDEN ACRES	T-E Gage	7	69	1600	113	ME	42	24.8	55	59.4	106				
PIONEER	8601	7	66	1528	111	ME/M	42	25.7	56	58.7	105				
DEKALB	DK-40y	7	67	1550	112	ME	43	25.2	55	57.8	103				
ORO	Edge	5	74	1675	HD	ME	42	32.1	52	56.9	102				
ASGROW	Seneca	5	74	1675	HD	ME	41	30.4	54	56.4	101				
DEKALB	DK-40	7	70	1624	HD	ME	41	25.4	52	54.6	98				
GOLDEN ACRES	T-E X 9118	8	69	1600	HD	ME/M	42	25.0	53	50.2	90				
TRIUMPH	TR 58Y	8	71	1641	HD	ME/M	43	22.8	52	45.6	82				
CASTERLINE	SR 319E	7	83	1847	ED	M	44	27.7	47	43.0	77				
CARGILL	837	7	80	1788	ED	M/ML	46	27.5	48	41.5	74				
CARGILL	727	6	83	1847	ED	M	42	29.6	49	35.1	63				
CARGILL	797	9	79	1768	ED	M	41	24.4	49	34.8	62				
(Check)	399 X 2536	7	81	1833	ED	M	40	27.9	46	32.1	57				
ICI (Garst)	5522Y	7	80	1788	ED	M	43	27.1	47	29.9	53				
AVERAGE		7	71	1622	HD	ME	42	27.1	54	55.9					
L.S.D. (0.10)										10.26					
L.S.D. (0.20)										7.97					

\1 Planted: June 15; Harvested: November 6.

DAP: Days After Planting or maturation of seed at first freeze.

Seed Maturation: ED, early dough, SD, soft dough; HD, hard dough; MT, mature (DAP).

GDD: Growing Degree Days for sorghum.

Maturity Group: E, early; ME, medium early; M, medium; ML, medium late; L, late.

Yields are corrected to 14.0 % seed moisture content.

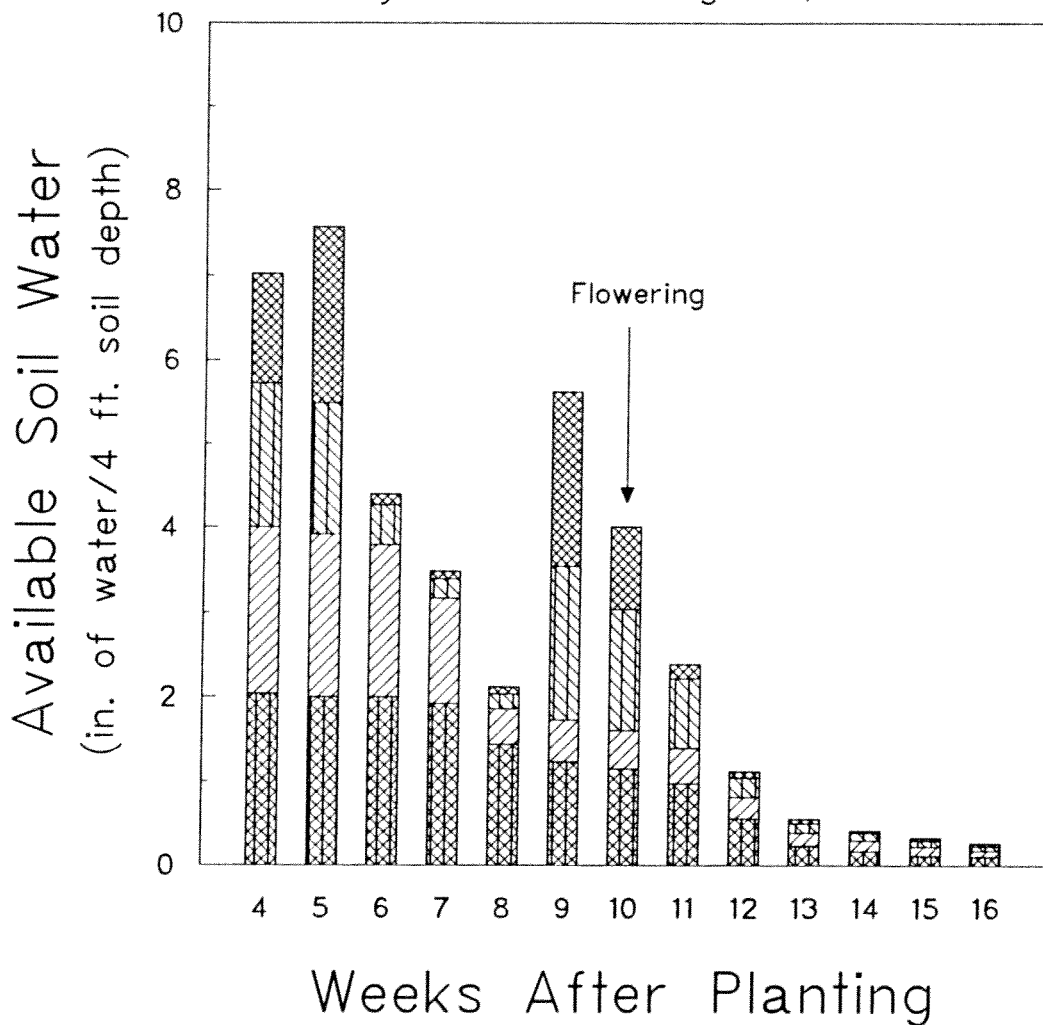
None of the hybrids lodged.

Table 9.--Summary: Dryland Grain Sorghum Hybrid Performance Tests at Walsh, 1990-92.

Brand	Hybrid	-----Grain Yield-----					---Yield as % of Test Average---				
		1990	1991	1992	2-Year Avg	3-Year Avg	1990	1991	1992	2-Year Avg	3-Year Avg
		-----bu/A-----					-----%-----				
ASGROW	Madera	55.9	--	62.5	59.2	--	111	--	112	112	--
ASGROW	Seneca	54.4	--	56.4	55.4	--	108	--	101	105	--
CARGILL	607E	50.3	60.4	72.2	66.3	61.0	100	104	129	117	111
CARGILL	618Y	46.0	64.2	68.7	66.5	59.6	91	110	123	117	108
CARGILL	630	41.9	66.1	--	54.0	--	83	114	--	99	--
CASTERLINE	SR 314EC	--	52.4	53.2	57.8	--	--	90	113	102	--
CASTERLINE	SR 315E	--	55.6	61.1	58.4	--	--	96	109	103	--
CASTERLINE	SR 319E	--	74.7	43.0	58.9	--	--	129	77	103	--
DEKALB	DK-40	48.5	52.6	54.6	53.6	51.9	96	91	98	95	95
DEKALB	DK-40y	54.5	61.7	57.8	59.8	58.0	108	106	103	105	106
GOLDEN ACRES	T-E Y-60	54.0	62.7	--	58.4	--	107	108	--	108	--
ICI (Garst)	5522Y	--	52.2	29.9	41.1	--	--	90	53	72	--
NORTHROP KING	KS 383Y	58.2	47.6	61.7	54.7	55.8	116	82	110	96	103
ORO	Ivory	56.7	52.2	--	54.5	--	112	90	--	101	--
PIONEER	8500	58.1	76.5	--	67.3	--	116	131	--	124	--
PIONEER	8601	46.1	60.3	58.7	59.5	55.0	92	104	105	105	100
PIONEER	8771	61.7	57.4	58.3	57.9	59.1	123	99	104	102	109
TRIUMPH	TR 52Y	41.9	66.1	64.4	65.3	57.5	83	114	115	115	104
TRIUMPH	TR 56yG	51.8	45.4	--	48.6	--	102	78	--	90	--
(Check)	399 X 2536	47.8	76.8	32.1	54.5	52.2	94	132	57	95	94
Test Average		50.3	58.2	55.9	57.1	54.8					

Available Soil Water

Dryland Grain Sorghum, Walsh



- Soil Depth 1 ft.
- Soil Depth 2 ft.
- Soil Depth 3 ft.
- Soil Depth 4 ft.

Fig. 4. Available soil water in dryland grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first frost was 8.83 in. Any increase in available soil water between weeks is from rain.

Irrigated Grain Sorghum Hybrid Performance Test at Holly, 1992

COOPERATORS: Dale and Donald Seufer Farm, Holly, and Kevin Larson, Superintendent, Plainsman Research Center, Walsh, Colorado.

PURPOSE: To identify high yielding hybrids under irrigated condition with 3000 sorghum heat units in a Sandy Clay soil.

PLOT: Four rows with 30" row spacing, 50' long;
SEEDING DENSITY: 104,500 seed/A; PLANTED: May 26;
HARVESTED: November 4.

EMERGENCE DATE: 15 days after planting; SOIL TEMP: 59 F.

IRRIGATION: Three furrow irrigations: July 16, August 1, August 13.

PEST CONTROL: Preplant Herbicide: none; Post Emergent Herbicide: atrazine 0.5 lb ai/A, 2,4-D 0.25 lb ai/A; Insecticide: none.
CULTIVATION: twice.

FIELD HISTORY: Last crop: corn; FIELD PREPARATION: disc.

COMMENTS: Planted in good soil moisture. Weed control good. Above normal precipitation for growing season with September much drier than normal. Cool growing season about 200 heat units (GDD) below normal. No greenbug infestation and only minor nonconsistent lodging. Soil water availability well maintained with irrigation. Very good yields.

SOIL: Sandy Clay for 0-8" and Sandy Clay Loam 8"-24" depths from soil analysis.

Summary: Growing Season Precipitation and Temperature /1 Holly, Prowers County.					
Month	Rainfall	GDD /2	> 90 F	> 100 F	DAP /3
	in		-----no. of days-----		
May	0.92	34	0	0	5
June	4.39	606	8	0	35
July	4.91	780	21	1	66
August	2.66	696	11	2	97
September	0.05	592	11	3	127
October	0.28	127	4	0	135
Total	13.21	2835	55	6	135

/1 Growing season from May 26 (planting) to October 8 (first frost, 28 F).
/2 GDD: Growing Degree Days for sorghum.
/3 DAP: Days After Planting.

Summary: Soil Analysis.

Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	-----ppm-----				
0-8"	8.0	2.2	2.2	16	6.0	333	1.9	8.8
8"-24"	7.9	2.7	1.1	7	0.5	227	0.6	6.3
Comment	Alka	Mod	VHi	Mod	Lo	VHi	Adeq	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P2O5	K2O	Zn	Fe
	-----lb/A-----				
Recommended	75	25	0	0	0
Applied	100	40	0	0	0

Yield Goal: 120 bu/A.
Actual Yield: 121 bu/A.

Table 10.--Irrigated Grain Sorghum Hybrid Performance Test at Holly, 1992. \1

Brand	Hybrid	Days to Emerge	50% Bloom		50% Mature		Plant Ht.	Harvest Density	Test Wt.	Grain Yield	Yield %
			DAP	GDD	DAP	Group					of Test Average
							in.	plant/A (1000 X)	lb/bu	bu/A	%
CASTERLINE	SR 315E	14	80	1773	124	ME	44	47.8	58	123.8	103
NORTHROP KING	KS 560Y	16	78	1729	121	ME/M	39	32.9	60	101.8	85
NORTHROP KING	KS 714Y	15	84	1852	128	M/ML	43	47.4	57	132.5	110
PIONEER	8379	15	84	1852	129	M/ML	43	43.8	59	130.5	109
DEKALB	DK-56	15	83	1837	127	M/ML	47	48.0	59	129.1	108
CASTERLINE	SR 319E	14	87	1921	129	M	46	50.3	59	126.8	106
CARGILL	797	17	86	1897	130	M	42	33.9	57	122.5	102
NORTHROP KING	2656	14	86	1897	126	M	41	48.2	58	121.0	101
NORTHROP KING	KS 710	15	85	1873	130	M	42	39.7	59	120.5	100
TRIUMPH	TR 65G	14	83	1837	126	M	45	48.4	59	118.7	99
GOLDEN ACRES	T-E Y-75	13	86	1897	127	M	46	50.7	57	107.3	89
PIONEER	8358	14	85	1873	130	ML	45	56.1	59	133.8	112
ICI (Garst)	5503	13	88	1949	130	ML/M	49	55.2	58	131.6	110
PIONEER	8231Y	14	87	1921	132	ML	47	51.9	59	128.3	107
(Check)	399 X 2536	14	86	1897	130	ML	41	44.3	56	123.9	103
GOLDEN ACRES	T-E Prosper	15	87	1921	132	ML	43	45.7	58	123.6	103
GOLDEN ACRES	T-E Rio	15	86	1897	131	ML	44	49.0	57	120.3	100
CARGILL	837	16	86	1897	131	ML	46	51.9	59	119.5	100
DEKALB	X-156	16	89	1978	133	ML	49	49.6	56	107.3	89
GOLDEN ACRES	T-E Omaha	16	87	1921	132	ML	46	29.4	57	98.1	82
GOLDEN ACRES	T-E X9202	15	90	1996	HD \2	L/ML	44	50.9	55	117.7	98
DEKALB	DK-66	15	92	2029	HD \2	L	54	53.2	54	100.4	84
AVERAGE		15	86	1893	129	M	45	46.7	58	120.0	
L.S.D. (0.10)										16.79	
L.S.D. (0.20)										13.00	

\1 Planted: May 26; Harvested: November 4.

\2 Hybrids were not mature; HD, hard dough stage at first freeze.

DAP: Days After Planting.

GDD: Growing Degree Days for sorghum.

Maturity Group: E, early; ME, medium early; M, medium; ML, medium late; L, late.

Yields are corrected to 14.0 % seed moisture content.

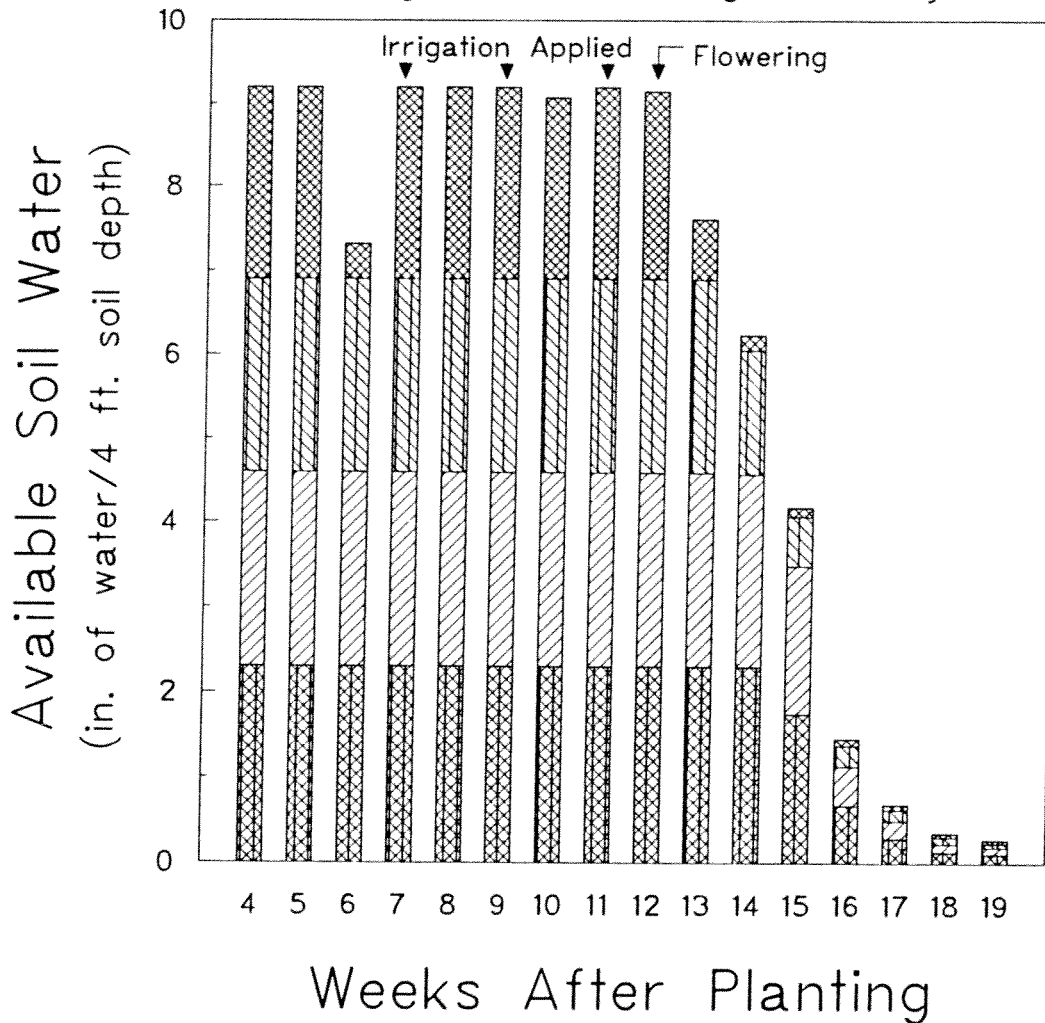
Only minor nonconsistent lodging.

Table 11.--Summary: Irrigated Grain Sorghum Hybrid Performance Tests at Holly, 1990-92.

Brand	Hybrid	----- Grain Yield-----					---Yield as % of Test Average---				
		1990	1991	1992	2-Year Avg	3-Year Avg	1990	1991	1992	2-Year Avg	3-Year Avg
		-----bu/A-----					-----%-----				
CARGILL	837	124.7	110.7	119.5	115.1	118.3	110	108	100	104	106
CARGILL	847	114.7	107.0	--	110.9	--	102	104	--	103	--
CASTERLINE	SR 319E	--	104.2	126.8	115.5	--	--	101	106	104	--
DEKALB	DK-56	120.8	108.4	129.1	118.8	119.4	107	106	108	107	107
DEKALB	DK-66	126.3	108.5	100.4	104.5	111.7	112	106	84	95	101
GOLDEN ACRES	T-E Dinero	120.3	103.4	--	111.9	--	107	101	--	104	--
GOLDEN ACRES	T-E Y-101-G	112.8	106.0	--	109.4	--	100	103	--	102	--
GOLDEN ACRES	T-E Y-75	104.2	--	107.3	105.8	--	92	--	89	91	--
GOLDEN ACRES	T-E 76	115.9	83.0	--	99.5	--	103	81	--	92	--
ICI (Garst)	5503	--	105.0	131.6	118.3	--	--	102	110	106	--
NORTHRUP KING	2656	112.5	--	121.0	116.8	--	100	--	101	101	--
NORTHRUP KING	KS 710	109.8	109.0	120.5	114.8	113.1	97	106	100	103	101
NORTHRUP KING	KS 714Y	114.9	114.2	132.5	123.4	120.5	102	111	110	111	108
PIONEER	8358	--	105.3	133.8	119.6	--	--	103	112	108	--
PIONEER	8379	--	104.6	130.5	117.6	--	--	102	109	106	--
PIONEER	8231Y	--	102.0	128.3	115.2	--	--	99	107	103	--
TRIUMPH	TR 65G	109.6	92.7	118.7	105.7	107.0	97	90	99	95	95
(Check)	399 X 2536	115.1	87.8	123.9	105.9	108.9	102	86	103	95	97
Test Average		112.9	102.7	120.7	111.4	111.9					

Available Soil Water

Irrigated Grain Sorghum, Holly



- Soil Depth 1 ft.
- Soil Depth 2 ft.
- Soil Depth 3 ft.
- Soil Depth 4 ft.

Fig. 5. Available soil water in irrigated grain sorghum at Holly. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Holly from planting to first frost was 13.21 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

Irrigated Grain Sorghum Hybrid Performance Test at Walsh, 1992

COOPERATORS: Plainsman Agri-Search Foundation and Kevin Larson, Superintendent, Plainsman Research Center, Walsh, Colorado.

PURPOSE: To identify high yielding hybrids under irrigated condition with 2900 sorghum heat units in a Silty Clay soil.

PLOT: Four rows with 30" row spacing, 50' long;
SEEDING DENSITY: 78,400 seed/A; PLANTED: June 11;
HARVESTED: November 9.

EMERGENCE DATE: 7 days after planting; SOIL TEMP: 66 F.

IRRIGATION: Three furrow irrigations: August 4, August 28, September 14 each irrigation approximately 3.2 acre-in/A, total applied 9.6 acre-in/A.

PEST CONTROL: Preplant Herbicides: glyphosate 16 oz/A and 2,4-D 0.68 lb ai/A; Post Emergent Herbicides: bromoxynil 0.38 lb ai/A; Insecticide: none. CULTIVATION: once.

FIELD HISTORY: Last crop: wheat; FIELD PREPARATION: rodweeder.

COMMENTS: Planted late because of rains in early June. Planted in good soil moisture. Weed control fair. Above normal precipitation for growing season, with September much drier than normal. No greenbug infestation and no plant lodging observed. Good yields and moderate test weights for the two medium early hybrids, but later maturing hybrids had poor yields and light test weights due to late planting and cool growing season (300 GDD < normal).

SOIL: Silty Clay Loam for 0-8" and 8"-24" depths from soil test.

Summary: Soil Analysis.

Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	ppm				
0-8"	8.0	0.4	2.2	13	2.0	505	0.5	7.1
8"-24"	8.0	0.5	1.2	9	1.1	322	0.2	8.5
Comment	Alka	VLo	Hi	Mod	VLo	VHi	VLo	Adeq

Manganese and Copper levels were adequate.

Summary: Growing Season Precipitation and Temperature /1
Plainsman Research Center, Walsh, Baca County.

Month	Rainfall	GDD /2	> 90 F	> 100 F	DAP /3
	in		-----no. of days-----		
June	2.18	375	4	0	19
July	3.00	747	15	2	50
August	3.51	648	8	0	81
September	0.20	542	4	0	111
October	0.07	114	0	0	119
Total	8.96	2426	31	2	119

/1 Growing season from June 11 (planting) to October 8 (first frost, 29 F).

/2 GDD: Growing Degree Days for sorghum.

/3 DAP: Days After Planting.

Summary: Fertilization.

Fertilizer	N	P2O5	K2O	Zn	Fe
	-----lb/A-----				
Recommended	75	50	0	10	0
Applied	12/110	40	0	0	0

Yield Goal: 120 bu/A.
Actual Yield: 78 bu/A.

Table 12.--Irrigated Grain Sorghum Hybrid Performance Test at Walsh, 1992. \1

Brand	Hybrid	Days to Emerge	50% Bloom		Stage\3 Mat.\2 at		Plant Ht.	Harvest Density	Test Wt.	Grain Yield	Yield % of Test Average
			DAP	GDD	Group	Freeze					
CASTERLINE	SR 315E	6	71	1800	ME	MT	47	32.7	56	109.9	141
ASGROW	Seneca	6	74	1874	ME	HD	43	34.3	56	103.3	132
ICI (GARST)	5503	5	80	1966	M	HD	47	33.7	53	88.0	113
TRIUMPH	TR 65G	6	78	1925	M	HD	49	36.0	54	85.9	110
CARGILL	837	6	77	1908	M/ML	HD	49	30.8	54	83.6	107
GOLDEN ACRES	T-E Y-75	5	79	1946	M	HD	48	35.8	52	83.1	107
DEKALB	DK-56	8	75	1891	M/ML	HD	50	31.2	52	81.2	104
CARGILL	797	9	79	1946	M	HD	47	25.2	52	73.1	94
NORTHRUP KING	2656	6	79	1946	M	HD	42	27.7	53	67.1	86
NORTHRUP KING	KS 710	6	80	1966	ML/M	SD	46	25.6	51	81.0	104
CASTERLINE	SR 319E	6	83	2018	ML/M	SD	48	35.8	52	80.2	103
ASGROW	Topaz	6	82	1999	ML/M	ED	49	30.8	51	75.9	97
ORO	Amigo	6	82	1999	ML	SD	49	34.3	51	75.8	97
GOLDEN ACRES	T-E Exp 9202	7	82	1999	ML	ED	46	30.8	50	75.2	96
GOLDEN ACRES	T-E Prosper	6	81	1982	ML	ED	43	31.9	51	73.3	94
NORTHRUP KING	KS 714Y	8	79	1946	ML	SD	47	27.1	51	72.8	93
GOLDEN ACRES	T-E Rio	7	79	1946	ML	SD	47	31.6	51	72.2	93
(Check)	399 X 2536	9	83	2018	ML	ED	45	27.7	48	69.6	89
GOLDEN ACRES	T-E Omaha	8	81	1982	ML	ED	47	21.1	48	54.2	69
DEKALB	X-156	8	85	2061	ML	ED	50	33.7	49	53.6	69
AVERAGE		7	79	1956	ML	SD	47	30.9	52	78.0	
L.S.D. (0.10)										10.39	
L.S.D. (0.20)										8.06	

\1 Planted: June 11; Harvested: November 9.

\2 Maturity Group: E, early; ME, medium early; M, medium; ML, medium late; L, late.

\3 Stage of maturation at freeze; ED, early dough; SD, soft dough; HD, hard dough; MT, mature.

First Freeze (28 F): October 8.

DAP: Days After Planting.

GDD: Growing Degree Days for sorghum.

Yields are corrected to 14.0 % seed moisture content.

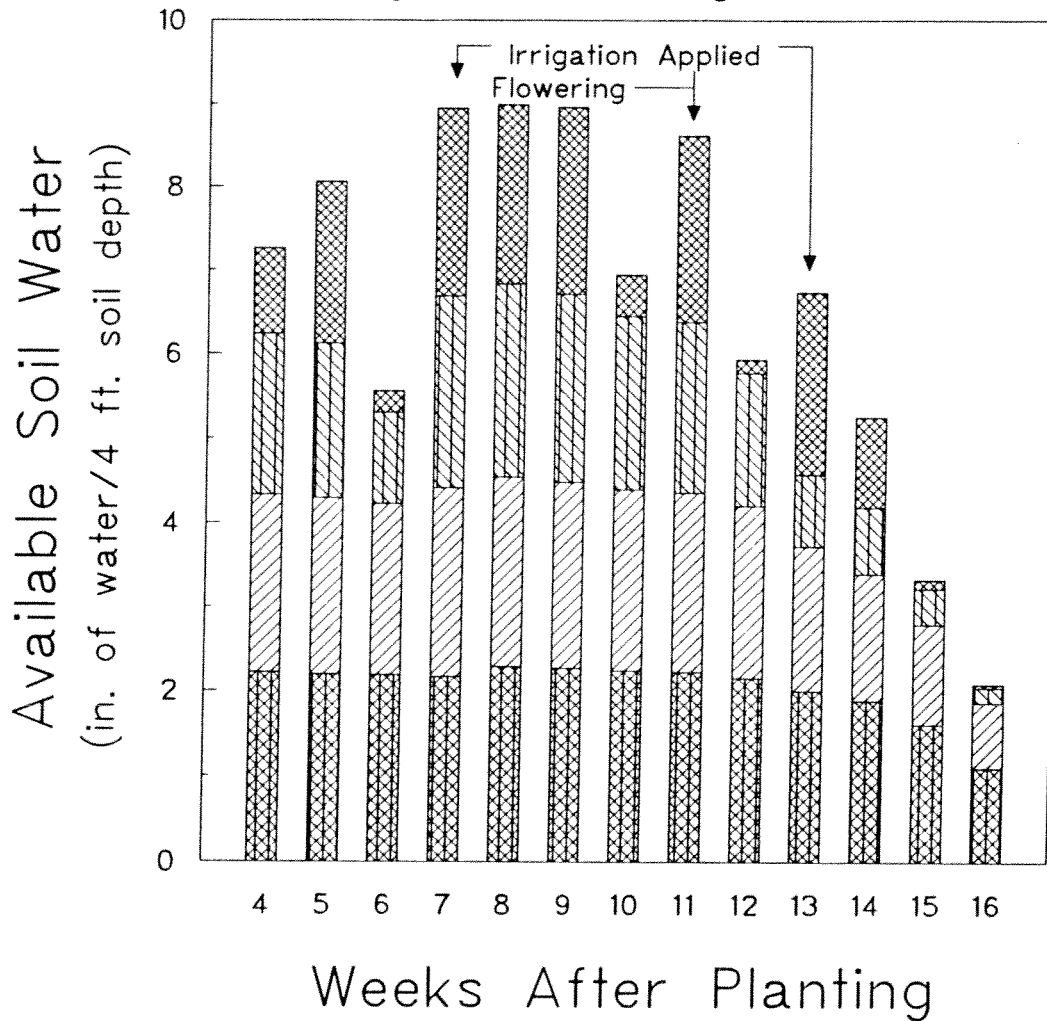
None of the hybrids lodged.

Table 13.--Summary: Irrigated Grain Sorghum Hybrid Performance Tests at Walsh, 1990-92.

Brand	Hybrid	----- Grain Yield-----					---Yield as % of Test Average---				
		1990	1991	1992	2-Year Avg	3-Year Avg	1990	1991	1992	2-Year Avg	3-Year Avg
		-----bu/A-----					-----%-----				
ASGROW	Seneca	111.4	--	103.3	107.4	--	102	--	132	117	--
CARGILL	837	115.6	115.8	83.6	99.7	105.0	106	108	107	108	107
CARGILL	847	118.9	106.5	--	112.7	--	109	100	--	105	--
CASTERLINE	SR 319E	--	113.3	80.2	96.8	--	--	106	103	105	--
DEKALB	DK-56	106.2	114.2	81.2	97.7	100.5	98	107	104	106	103
GOLDEN ACRES	T-E Rio	--	105.9	72.2	89.1	--	--	99	93	96	--
GOLDEN ACRES	T-E Y-101-G	99.9	108.7	--	104.3	--	92	102	--	97	--
GOLDEN ACRES	T-E Y-75	111.9	99.1	83.1	91.1	98.0	103	93	107	100	101
GOLDEN ACRES	T-E 76	113.5	98.1	--	105.8	--	104	92	--	98	--
ICI (Garst)	5503	--	108.6	88.0	98.3	--	--	102	113	108	--
NORTHRUP KING	2656	111.2	--	67.1	89.2	--	102	--	86	94	--
NORTHRUP KING	KS 710	--	119.3	81.0	100.2	--	--	112	104	108	--
NORTHRUP KING	KS 714Y	107.3	109.7	72.8	91.3	96.6	99	103	93	98	98
ORO	G Xtra	119.3	111.1	--	115.2	--	110	104	--	107	--
TRIUMPH	TR 60G	119.2	109.4	--	114.3	--	110	102	--	106	--
TRIUMPH	TR 65G	123.3	106.9	85.9	96.4	105.4	113	100	105	108	101
(Check)	399 X 2536	100.5	101.7	69.6	85.7	90.6	92	95	89	92	92
Test Average		108.7	106.9	78.0	92.5	97.9					

Available Soil Water

Irrigated Grain Sorghum, Walsh



- Soil Depth 1 ft.
- Soil Depth 2 ft.
- Soil Depth 3 ft.
- Soil Depth 4 ft.

Fig. 6. Available soil water in irrigated grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first frost was 8.96 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

Dryland Forage Sorghum Hybrid Performance Test at Walsh, 1992

COOPERATORS: Plainsman Agri-Search Foundation and Kevin Larson, Superintendent, Plainsman Research Center, Walsh, Colorado.

PURPOSE: To identify high yielding hybrids under dryland condition with 2900 sorghum heat units in a Silty Clay soil.

PLOT: Four rows with 30" row spacing, 50' long;
SEEDING DENSITY: 52,300 seed/A; PLANTED: June 15;
HARVESTED: October 13.

EMERGENCE DATE: 7 days after planting; SOIL TEMP: 68 F.

PEST CONTROL: Preplant Herbicides: glyphosate 16 oz/A and 2,4-D 0.68 lb ai/A; Post Emergent Herbicides: bromoxynil 0.38 lb ai/A; Insecticide: none. CULTIVATION: once.

Summary: Growing Season Precipitation and Temperature /1 Plainsman Research Center, Walsh, Baca County.					
Month	Rainfall	GDD /2	> 90 F	> 100 F	DAP /3
	in		-----no. of days-----		
June	2.05	337	4	0	15
July	3.00	747	15	2	46
August	3.51	648	8	0	77
September	0.20	542	4	0	107
October	0.07	114	0	0	115
Total	8.83	2388	31	2	115

/1 Growing season from June 15 (planting) to October 8 (first frost, 29 F).
/2 GDD: Growing Degree Days for sorghum.
/3 DAP: Days After Planting.

FIELD HISTORY: Last crop: wheat; FIELD PREPARATION: rodweeder.

COMMENTS: Planted late because of rains in early June. Planted in good soil moisture. Weed control fair. Above normal precipitation for growing season, with September much drier than normal. Cool summer, about 300 heat units (GDD) below normal. No greenbug infestation. Three hybrids had 30 percent or greater lodging. Good yields.

SOIL: Silty Clay Loam for 0-8" and 8"-24" depths from soil test.

Summary: Soil Analysis.

Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	-----ppm-----				
0-8"	8.0	0.5	2.2	19	4.4	673	1.0	5.8
8"-24"	7.9	0.6	1.1	9	0.8	308	0.3	8.3
Comment	Alka	VLo	Hi	Mod	Lo	VHi	Lo	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P2O5	K2O	Zn	Fe
	-----lb/A-----				
Recommended	0	25	0	5	0
Applied	12/25	40	0	0	0

Yield Goal: 10 ton/A @ 70 % M.C.
Actual Yield: 12.8 ton/A.

Table 14.--Dryland Forage Sorghum Hybrid Performance Test at Walsh, 1992. \1

Brand	Hybrid	Days	Days	Harvest	Plant	Stage \2		Plants	Forage	Yield %
		to	to 50%			at	Stem			
		Emerge	Bloom	Density	Ht.	Harvest	Sugar	Lodged	Yield	Average
				plant/A	in.		%	%	ton/A	%
				(1000 X)						
CARGILL	Mor Cane II	7	84	31.2	85	6.0	10.2	15	18.64	146
PIONEER	843F	6	92	28.3	88	4.5	15.2	15	17.76	139
(Check)	NB 305F	8	81	33.7	86	6.0	15.5	3	17.18	134
DEKALB	FS-5	6	91	33.7	76	4.8	16.0	5	15.14	119
BUFFALO	Canex	7	75	23.0	76	6.0	15.0	3	13.94	109
GOLDEN ACRES	T-E Milkmaker-T	6	79	36.4	84	5.0	13.2	35	13.85	108
CASTERLINE	Duro	5	69	29.0	56	6.0	3.8	0	13.75	108
CARGILL	FS 455	6	77	37.8	66	6.0	11.0	5	12.96	101
TRIUMPH	Super Sile 20	7	91	33.1	69	4.8	18.0	30	12.00	94
CARGILL	FS 466	6	82	29.4	68	4.8	16.6	15	11.20	88
(Check)	NB 280S	8	62	20.7	77	6.0	12.6	15	9.48	74
ICI (Garst)	8272 (corn)	5	72	22.1	76	4.8	11.3	40	9.45	74
(Check)	Fremont Cane	8	63	21.9	68	6.0	14.0	2	6.81	53
(Check)	Coes	8	62	12.2	45	6.0	16.4	0	6.71	53
AVERAGE		7	77	28	73	5.5	13.5	13	12.78	
L.S.D. (0.10)									6.067	
L.S.D. (0.20)									4.694	

\1 Planted: June 15; Harvest: October 13.

\2 2.0, pre-boot; 3.0, boot; 4.0, flowering; 5.0, soft dough; 6.0, hard dough.

Forage Yield corrected to 70 % moisture content based on oven-dried sample.

Table 15.--Summary: Dryland Forage Sorghum Hybrid Performance Tests at Walsh, 1990-92.

Brand	Hybrid	Forage Yield					Yield as % of Test Average				
		1990	1991	1992	2-Year Avg	3-Year Avg	1990	1991	1992	2-Year Avg	3-Year Avg
		-----ton/A-----					-----%-----				
BUFFALO	Canex	6.23	13.93	13.94	13.94	11.37	84	91	109	100	95
CARGILL	FS 455	7.40	19.23	12.96	16.10	13.20	100	126	101	114	109
CARGILL	FS 466	7.77	21.34	11.20	16.27	13.44	105	140	88	114	111
CARGILL	Mor Cane II	7.63	10.33	18.64	14.49	12.20	103	68	146	107	106
DEKALB	FS-5	8.97	18.26	15.14	16.70	14.12	121	119	119	119	120
GOLDEN ACRES	T-E Milkmaker-T	9.33	13.56	13.85	13.71	12.25	126	89	108	99	108
(Check)	NB 280S	6.60	9.34	9.48	9.41	8.47	89	61	74	68	75
(Check)	NB 305F	8.10	15.35	17.18	16.27	13.54	109	100	134	117	114
Test Average		7.40	15.17	12.78	13.98	11.78					

Forage yields for 1990 were reduced by hail damage.

Table 16.--Dryland Forage Sorghum Hybrid Dry Matter Analysis at Walsh, 1992

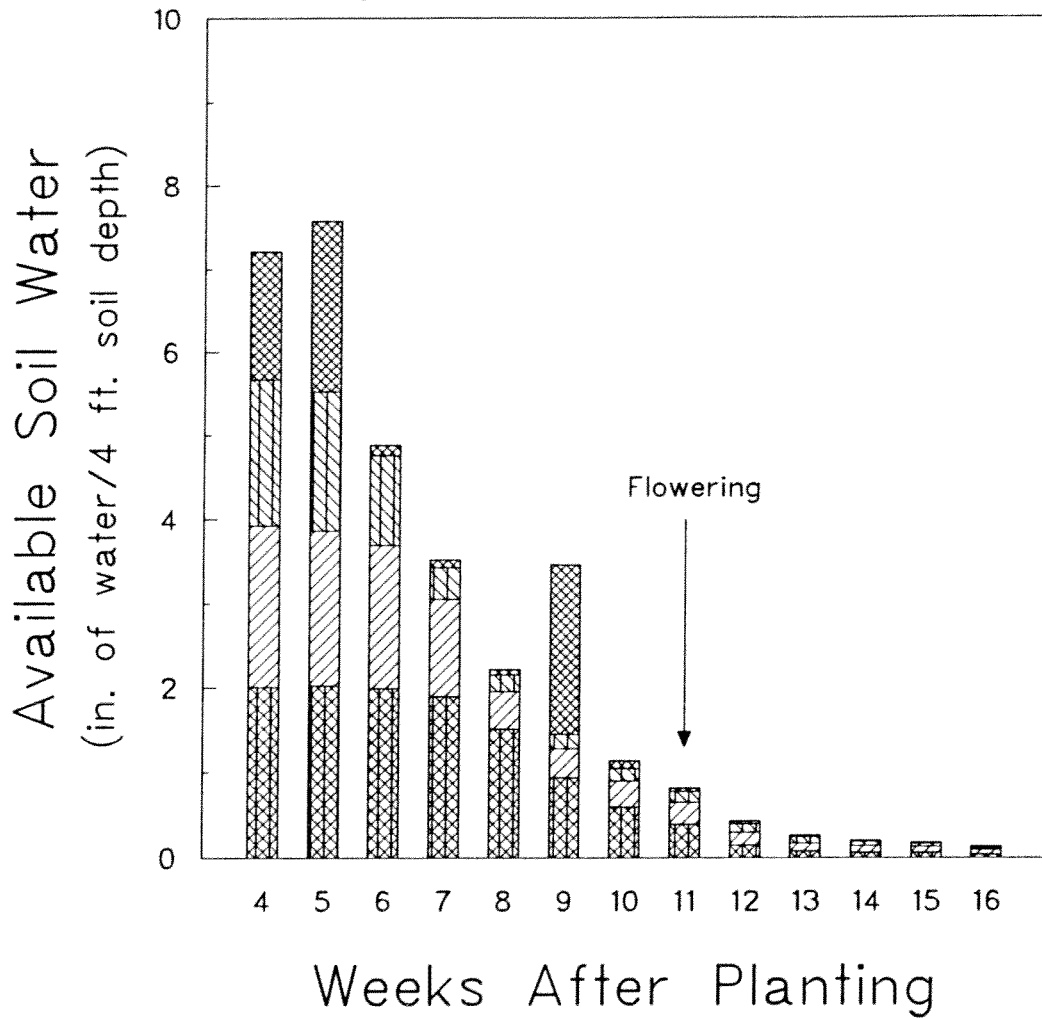
Brand	Hybrid	Days to Boot	Plant Height at Boot									
				CP	DP	ADF	NDF	TDN	P	Ca	K	Mg
		in.	-----%-----									
(Check)	Coes	58	31	13.5	9.0	37.2	64.1	64.7	0.35	0.44	2.46	0.22
(Check)	NB 280S	58	46	11.9	8.1	38.1	64.1	64.4	0.36	0.26	2.33	0.15
CASTERLINE	Duro	65	43	10.5	6.8	40.8	69.6	63.6	0.30	0.41	2.02	0.22
BUFFALO	Canex	64	61	9.6	6.3	39.3	64.9	64.0	0.30	0.27	1.76	0.18
CARGILL	FS 455	70	52	9.6	6.5	39.8	64.3	63.9	0.31	0.26	1.94	0.18
(Check)	NB 305F	70	52	9.6	6.1	39.3	66.3	64.0	0.30	0.26	1.71	0.19
GOLDEN ACRES	T-E Milkmaker-T	71	69	9.4	5.7	41.5	69.7	63.3	0.27	0.44	1.66	0.25
CARGILL	FS 466	75	57	8.6	5.3	41.0	68.7	63.5	0.26	0.36	1.56	0.22
PIONEER	843F	83	76	8.6	5.5	41.0	69.4	63.5	0.28	0.27	1.64	0.19
ICI (Garst)	8272 (corn)	72	77	8.2	5.3	41.2	66.2	63.4	0.26	0.39	1.66	0.20
DEKALB	FS-5	82	73	7.9	5.0	41.8	69.7	63.2	0.27	0.31	1.56	0.20
(Check)	Fremont Cane	59	47	7.8	5.0	42.0	68.8	63.2	0.26	0.33	1.47	0.20
CARGILL	Mor Cane II	75	71	7.5	4.6	42.9	69.3	62.9	0.25	0.33	1.37	0.21
TRIUMPH	Super Sile 20	82	68	6.8	4.3	41.1	67.0	63.5	0.25	0.27	1.30	0.17
AVERAGE		70	59	9.3	6.0	40.5	67.3	63.7	0.29	0.33	1.75	0.20

Infrared Analysis performed on whole plant samples taken at boot.

CP, Crude Protein; DP, Digestible Protein; ADF, Acid Detergent Fiber; NDF, Neutral Detergent Fiber; TDN, Total Digestible Nutrients; P, Phosphorus; Ca, Calcium; K, Potassium; Mg, Magnesium.

Available Soil Water

Dryland Forage Sorghum, Walsh







-  Soil Depth 1 ft.
-  Soil Depth 2 ft.
-  Soil Depth 3 ft.
-  Soil Depth 4 ft.

Fig. 7. Available soil water in dryland forage sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first frost was 8.83 in. Any increase in available soil water between weeks is from rain.

Irrigated Forage Sorghum Hybrid Performance Test at Walsh, 1992

COOPERATORS: Plainsman Agri-Search Foundation and Kevin Larson, Superintendent, Plainsman Research Center, Walsh, Colorado.

PURPOSE: To identify high yielding hybrids under irrigated condition with 2900 sorghum heat units in a Silty Clay soil.

PLOT: Four rows with 30" row spacing, 50' long;
SEEDING DENSITY: 87,100 seed/A; PLANTED: June 11;
HARVESTED: October 9.

EMERGENCE DATE: 7 days after planting; SOIL TEMP: 66 F.

IRRIGATION: Two furrow irrigations: August 6 and September 4, each irrigation approximately 3.5 acre-in/A, total applied 7.0 acre-in/A.

Summary: Growing Season Precipitation and Temperature /1 Plainsman Research Center, Walsh, Baca County.					
Month	Rainfall	GDD /2	> 90 F	> 100 F	DAP /3
	in		-----no. of days-----		
June	2.18	375	4	0	19
July	3.00	747	15	2	50
August	3.51	648	8	0	81
September	0.20	542	4	0	111
October	0.07	114	0	0	119
Total	8.96	2426	31	2	119

/1 Growing season from June 11 (planting) to October 8 (first frost, 29 F).
/2 GDD: Growing Degree Days for sorghum.
/3 DAP: Days After Planting.

PEST CONTROL: Preplant Herbicides: glyphosate 16 oz/A and 2,4-D 0.68 lb ai/A; Post Emergent Herbicides: bromoxynil 0.38 lb ai/A; Insecticide: none. CULTIVATION: once.

FIELD HISTORY: Last crop: wheat; FIELD PREPARATION: rodweeder.

COMMENTS: Planted late because of rains in early June. Planted in good soil moisture. Weed control fair. Above normal precipitation for growing season, with September much drier than normal. Cool summer, about 300 heat units (GDD) below normal. No greenbug infestation. Only three hybrids had 15 percent or greater lodging. Good yields.

SOIL: Silty Clay Loam for 0-8" and 8"-24" depths from soil test.

Summary: Soil Analysis.

Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	-----ppm-----				
0-8"	8.0	0.4	2.2	13	2.0	505	0.5	7.1
8"-24"	8.0	0.5	1.2	9	1.1	322	0.2	8.5
Comment	Alka	VLo	Hi	Mod	VLo	VHi	VLo	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P2O5	K2O	Zn	Fe
	-----lb/A-----				
Recommended	75	50	0	10	0
Applied	12/110	40	0	0	0

Yield Goal: 20 ton/A @ 70 % M.C.
Actual Yield: 18.6 ton/A.

Table 17.--Irrigated Forage Sorghum Hybrid Performance Test at Walsh, 1992. \1

Brand	Hybrid	Days to Emerge	Days to 50% Bloom	Harvest Density	Stage \2		Stem Sugar	Plants Lodged	Forage Yield	Yield % of Test Average
					Plant Ht.	at Harvest				
				plant/A (1000 X)	in.	%	%	ton/A	%	
GOLDEN ACRES (Check)	T-E Silomaker NB 305F	6	81	72.4	78	6.0	6.3	0	26.90	145
DEKALB	FS-25E	6	93	68.5	93	4.8	9.3	15	21.53	116
GOLDEN ACRES	T-E Milkmaker-T	6	85	70.5	98	5.0	8.4	5	21.03	113
CASTERLINE	Duro	6	74	70.1	72	6.0	3.2	0	21.01	113
NORTHROP KING	Sucro Sorgo 405	6	89	53.4	106	5.0	6.8	5	21.00	113
NORTHROP KING	KF 429	6	96	58.5	102	4.8	12.0	7	20.27	109
DEKALB	FS-5	6	94	70.9	103	4.8	10.8	15	19.76	106
CASTERLINE	Super Sile	7	94	64.3	107	4.8	15.3	5	19.53	105
PIONEER	843F	6	96	61.2	100	4.3	17.3	0	19.36	104
BUFFALO	Canex	8	80	49.9	90	6.0	13.0	0	18.63	100
ICI (Garst)	8272 (corn)	5	76	38.7	78	5.0	10.5	20	12.98	70
(Check)	NB 280S	8	66	36.4	91	6.0	8.6	5	11.51	62
(Check)	Fremont Cane	9	67	34.8	74	6.0	9.0	5	11.41	61
(Check)	Coes	9	66	43.0	62	6.0	8.6	0	11.29	61
AVERAGE		7	83	56.8	90	5.3	9.9	6	18.59	
L.S.D. (0.10)									2.579	
L.S.D. (0.20)									1.996	

\1 Planted: June 11; Harvest: October 9.

\2 2.0, pre-boot; 3.0, boot; 4.0, flowering; 5.0, soft dough; 6.0, hard dough.

Forage Yield corrected to 70 % moisture content based on oven-dried sample.

Table 18.--Summary: Irrigated Forage Sorghum Hybrid Performance Tests at Walsh, 1990-92.

Brand	Hybrid	Forage Yield					Yield as % of Test Average				
		1990	1991	1992	2-Year Avg	3-Year Avg	1990	1991	1992	2-Year Avg	3-Year Avg
		-----ton/A-----					-----%-----				
BUFFALO	Canex	19.73	20.47	18.63	19.55	19.61	103	90	100	95	98
DEKALB	FS-5	21.00	26.28	19.76	23.02	22.35	110	116	106	111	111
DEKALB	FS-25E	22.07	27.51	21.53	24.52	23.70	116	122	116	119	118
GOLDEN ACRES	T-E Milkmaker-T	24.53	25.63	21.03	23.33	23.73	126	113	113	113	117
GOLDEN ACRES	T-E Silomaker	23.27	22.43	26.90	24.67	24.20	122	99	145	122	122
NORTHROP KING	Sucro Sorgo 405	--	20.45	21.00	20.73	--	--	90	113	102	--
TRIUMPH	Super Sile 20	22.23	26.36	--	24.30	--	116	116	--	116	--
(Check)	NB 280S	19.70	15.42	11.51	13.47	15.54	103	68	62	65	78
(Check)	NB 305F	15.53	19.09	22.62	20.86	19.08	81	84	122	103	96
Test Average		19.10	22.63	18.59	20.61	20.11					

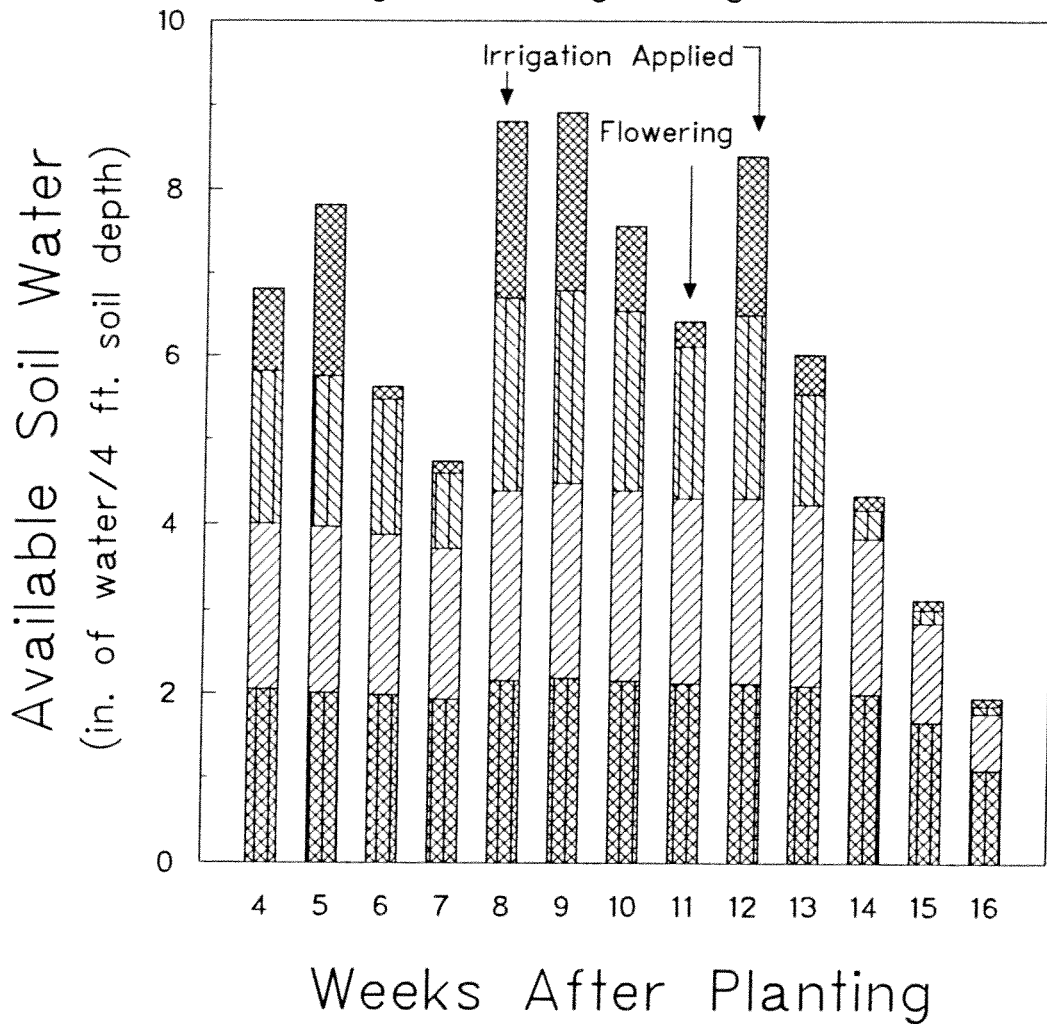
Table 19.--Irrigated Forage Sorghum Hybrid Dry Matter Analysis at Walsh, 1992

Brand	Hybrid	Days to Boot	Plant Height at Boot	CP	DP	ADF	NDF	TDN	P	Ca	K	Mg
(Check)	NB 280S	62	64	13.2	8.9	37.8	64.7	64.5	0.36	0.36	2.54	0.17
CASTERLINE	Duro	70	46	11.7	7.5	40.0	69.2	63.8	0.32	0.37	2.08	0.23
(Check)	Coes	62	39	11.2	7.5	39.8	66.2	63.9	0.32	0.38	2.22	0.20
(Check)	Fremont Cane	63	54	11.0	7.1	40.5	69.6	63.6	0.32	0.36	2.03	0.22
NORTHROP KING	Sucro Sorgo 405	79	87	9.7	6.3	41.5	70.0	63.3	0.30	0.37	1.97	0.20
CASTERLINE	Super Sile	83	88	9.6	6.3	41.4	70.4	63.4	0.31	0.28	1.91	0.19
BUFFALO	Canex	68	64	9.1	6.1	39.8	67.4	63.9	0.30	0.26	1.88	0.17
(Check)	NB 305F	71	57	9.0	5.9	41.5	68.0	63.3	0.29	0.29	1.80	0.18
PIONEER	843F	87	92	8.7	5.3	43.2	74.0	62.8	0.28	0.38	1.72	0.23
GOLDEN ACRES	T-E Milkmaker-T	74	74	8.6	5.2	43.8	73.1	62.6	0.27	0.45	1.71	0.27
NORTHROP KING	KF 429	85	89	8.5	5.5	41.9	69.4	63.2	0.29	0.27	1.70	0.18
GOLDEN ACRES	T-E Silomaker	71	56	8.4	5.3	43.0	71.4	62.9	0.26	0.41	1.68	0.23
DEKALB	FS-25E	85	75	7.7	4.9	42.8	72.8	62.9	0.28	0.25	1.65	0.18
DEKALB	FS-5	85	84	7.4	4.5	43.8	73.8	62.6	0.26	0.32	1.53	0.21
ICI (Garst)	8272 (corn)	76	82	3.7	2.6	43.7	64.8	62.7	0.23	0.21	1.17	0.17
AVERAGE		75	70	9.2	5.9	41.6	69.7	63.3	0.29	0.33	1.84	0.20

Infrared Analysis performed on whole plant samples taken at boot.

CP, Crude Protein; DP, Digestible Protein; ADF, Acid Detergent Fiber; NDF, Neutral Detergent Fiber; TDN, Total Digestible Nutrients; P, Phosphorus; Ca, Calcium; K, Potassium; Mg, Magnesium.

Available Soil Water Irrigated Forage Sorghum, Walsh



- Soil Depth 1 ft.
- Soil Depth 2 ft.
- Soil Depth 3 ft.
- Soil Depth 4 ft.

Fig. 8. Available soil water in irrigated forage sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first frost was 8.96 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

Irrigated Forage Sorghum and Greenbug-Resistant
Sorghum Hybrid Test at Rocky Ford, 1992

Purpose - To evaluate selected sorghum varieties to yield forage (FT) and selected grain sorghum varieties (GB) to resist greenbug infestation.

Data Collected - 1 - Forage Yields - FT
2 - Grain Yields - GB
3 - Greenbug Counts - GB
4 - Growth Factors - FT & GB

Plots - FT - 31' X 2 rows (5')
GB - 31' X 4 rows (10') Harvest - 2 rows

Design - Randomized Block - (4 replications) - FT
Randomized Block, split plot - (4 replications) - GB

Variety - FT - 15, GB - 16

Fertilizer - 50 lbs. P₂O₅/Acre - 12/9/91
150 lbs. N/Acre - 2/29/92

Herbicide - propachlor 2.5 lbs. + bifenox 1.5 lbs. AI/Acre-5/14/92

Insecticide - None on FT. See GB trial.

Soil - Silty, clay loam, 1 - 1.5% O.M., pH - ca. 7.8

Plant - May 13, 1992 Stand Count (FT) - June 12, 1992

Irrigate - 5/15, 7/12, 7/31, 8/12

Rainfall - May - .57", June - 3.84", July - 1.84", August - 1.78",
September - 0".

Harvest - Forage Trial - September 16, 1992 - forage harvester.
Greenbug Trial - October 27, 1992 - self propelled two
row plot combine.

Table 20.-Forage Sorghum Hybrid Performance Test at Rocky Ford, 1992.¹

Brand	Hybrid	Days	Stand	Plant	Stage ²	Stem	Dry	Yield ³	Yield as
		to			at				
		Bloom	Ht.		Harvest			Avg.	
		(No.)	(plts/A)	(In.)	(No.)	(%)	(%)	(T/A)	(%)
NORTHROP KING	SS 405	95	97737	104	5.5	8.5	32	40.20	138
PIONEER	843F	111	84398	103	4.5	5.0	32	34.23	118
DELTAPINE	G1990	--	86576	97	2.0	8.5	24	33.82	116
GOLDEN ACRES	T-E Milkmaker-T	83	92565	84	6.0	4.5	35	30.27	104
DEKALB	FS-25E	92	92293	85	4.5	5.5	30	30.01	103
NORTHROP KING	KF 429	96	96104	89	6.0	2.0	30	29.66	102
(Check)	NB305F	99	89843	93	5.0	15.0	25	29.09	100
CASTERLINE	Super Sile	94	96377	99	5.0	15.0	29	28.65	99
CARGILL	MorCane II	100	81947	95	4.5	13.5	24	28.45	98
CARGILL	FS 466	88	96649	76	6.0	2.0	27	25.83	89
CARGILL	FS 455	84	81675	63	5.0	15.5	38	23.88	82
BUFFALO BRAND	Canex	93	97466	90	5.0	17.0	25	23.88	82
(Check)	NB280S	81	66157	89	6.0	6.5	32	22.63	78
GOLDEN ACRES	T-E Silomaker	82	95559	80	6.0	2.5	33	22.12	76
DEKALB	DK656(corn)	80	31581	84	5.5	10.0	32	33.26	114
Average		91	89668	89				29.07	
LSD (P=0.05)								4.84	
C.V. (%)								17	

¹Planted May 13, 1992; Harvest Sept. 16, 1992; Severe wind & rain storm Aug. 24.

²2.0, preboot; 3.0, boot; 4.0, flowering; 5.0, soft dough; 6.0 hard dough

³Adjusted to 70% moisture.

Table 21.-Summary: Forage Sorghum Hybrid Performance Tests at Rocky Ford, 1990-92.

Brand	Hybrid	Forage Yield per Acre					Yield as % of		
		1990	1991	1992	2 Year	3 Year	Test Average		
		1990	1991	1992	Avg.	Avg.	1990	1991	1992
		(T/A)	(T/A)	(T/A)	(T/A)	(T/A)	(%)	(%)	(%)
BUFFALO BRAND	Canex	25.53	32.65	23.88	28.27	27.35	82	98	82
CARGILL	FS 455	30.27	25.05	23.88	24.47	26.40	97	75	82
CARGILL	FS 466	39.57	29.25	25.83	27.54	31.55	127	88	89
CARGILL	MorCane II	30.70	33.97	28.45	31.21	31.04	99	102	98
DEKALB	FS-25E	39.40	36.05	30.01	33.03	35.15	127	108	103
DELTAPINE	G1990	35.13	35.44	33.82	34.63	34.80	113	106	116
GOLDEN ACRES	T-E Milkmaker-T	27.30	-----	30.27	28.79	-----	88	---	104
GOLDEN ACRES	T-E Silomaker	36.30	29.02	22.12	25.57	29.15	117	87	76
NORTHROP KING	SS 405	27.07	40.29	40.20	40.25	35.85	87	121	138
	NB280S	30.90	29.23	22.63	25.93	27.59	99	88	78
	NB305F	24.93	31.81	29.09	30.45	28.61	80	95	100
Average Test Yield		31.13	33.36	29.07					

Grain Sorghum Seed Maturation and Yield, Walsh 1992
Kevin Larson

Selecting a grain sorghum hybrid from the proper maturity group can mean the difference between good yields and heavy test weights or poor yields and light test weights. When weather delays planting or dictates replanting, it may be necessary to plant an earlier maturing hybrid than previously selected. Choosing an earlier maturing hybrid will lessen the risk of harvesting immature grain, and increase the potential for higher test weights and yields.

Originally this study was devised to test limited irrigation on 18 hybrids, but rain delayed planting and a cool growing season (300 heat units below normal) contributed to retardation of physiological development and segregation of test weight and yield by maturity group. After the first frost, I rated the 18 hybrids by seed maturation. At harvest, I realized that test weight and grain yield were linearly related and that seed maturation helped define the relationship. The linear equation, $\% \text{ yield} = 4.6888(\text{test weight}) - 177.4$, closely predicted the relationship between yield and test weight ($r = 0.97$). This relationship states: the more mature the seed at frost, the heavier the test weight and the higher the yield; conversely, the more immature the seed at frost, the lighter the test weight and the lower the yield.

Grain sorghum growers who consistently produce light test weight grain are not achieving maximum potential yield. If seed maturation is a problem, growers need to select earlier maturing hybrids in order to obtain high test weights and high yields.

Hybrid selection should be based on a minimum of two criteria:

- 1) on past performance in at least two years of unbiased testing;
- 2) from the proper maturity group according to area and planting date.

Grain Sorghum Hybrid Test Weight and Yield Comparison at Walsh, 1992

COOPERATORS: Plainsman Agri-Search Foundation and Kevin Larson, Superintendent, Plainsman Research Center, Walsh, Colorado.

PURPOSE: Originally to test single irrigation on 18 hybrids, but test weight and % yield relationship dominated the study.

PLOT: Four rows with 30" row spacing, 600' long;
SEEDING DENSITY: 43,600 seed/A; PLANTED: June 16;
HARVESTED: November 16.

EMERGENCE DATE: 7 days after planting; SOIL TEMP: 68 F.

PEST CONTROL: Preplant Herbicides: glyphosate 16 oz/A and 2,4-D 0.68 lb ai/A; Post Emergent Herbicides: dicamba 0.25 lb ai/A; Insecticide: none. CULTIVATION: once.

Summary: Growing Season Precipitation and Temperature /1 Plainsman Research Center, Walsh, Baca County.					
Month	Rainfall	GDD /2	> 90 F	> 100 F	DAP /3
	in		-----no. of days-----		
June	2.05	317	4	0	14
July	3.00	747	15	2	45
August	3.51	648	8	0	76
September	0.20	542	4	0	106
October	0.07	114	0	0	114
Total	8.83	2368	31	2	114

/1 Growing season from June 16 (planting) to October 8 (first frost, 29 F).
/2 GDD: Growing Degree Days for sorghum.
/3 DAP: Days After Planting.

FIELD HISTORY: Last crop: wheat; FIELD PREPARATION: rodweeder.

COMMENTS: Planted late because of rains in early June. Planted in good soil moisture. Weed control fair. Above normal precipitation for growing season, with September much drier than normal. Cool summer, about 300 heat units (GDD) below normal. No greenbug infestation and no plant lodging observed. Good yields and heavy test weights on earlier maturing hybrids, but later maturing hybrids had poor yields and light test weights due to late planting and cool growing season. The linear equation % yield = 4.6888(test weight) - 177.4, closely predicts the relationship between yield and test weight (r = 0.97).

SOIL: Silty Clay Loam for 0-8" and 8"-24" depths from soil test.

Summary: Soil Analysis.

Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	-----ppm-----				
0-8"	7.9	0.7	2.0	28	4.7	495	1.2	5.6
8"-24"	8.1	0.5	0.9	11	1.4	335	0.4	7.6
Comment	Alka	VLo	Hi	Hi	Lo	VHi	Marg	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P2O5	K2O	Zn	Fe
	-----lb/A-----				
Recommended	0	25	0	5	0
Applied	12/40	40	0	0	0

Yield Goal: 80 bu/A.
Actual Yield: 59 bu/A, range 19 to 87.

Seed Maturation and Yield

Grain Sorghum

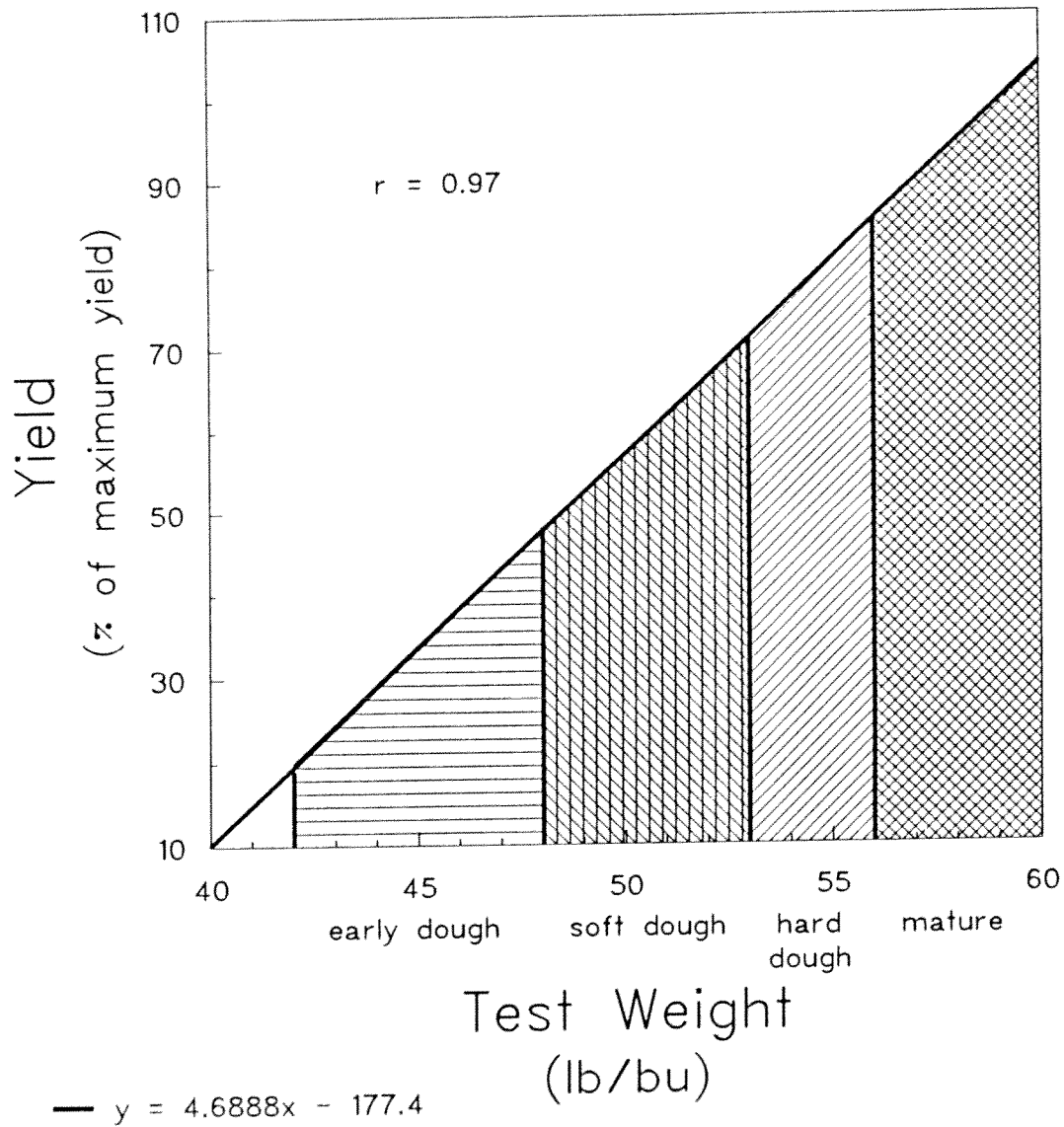
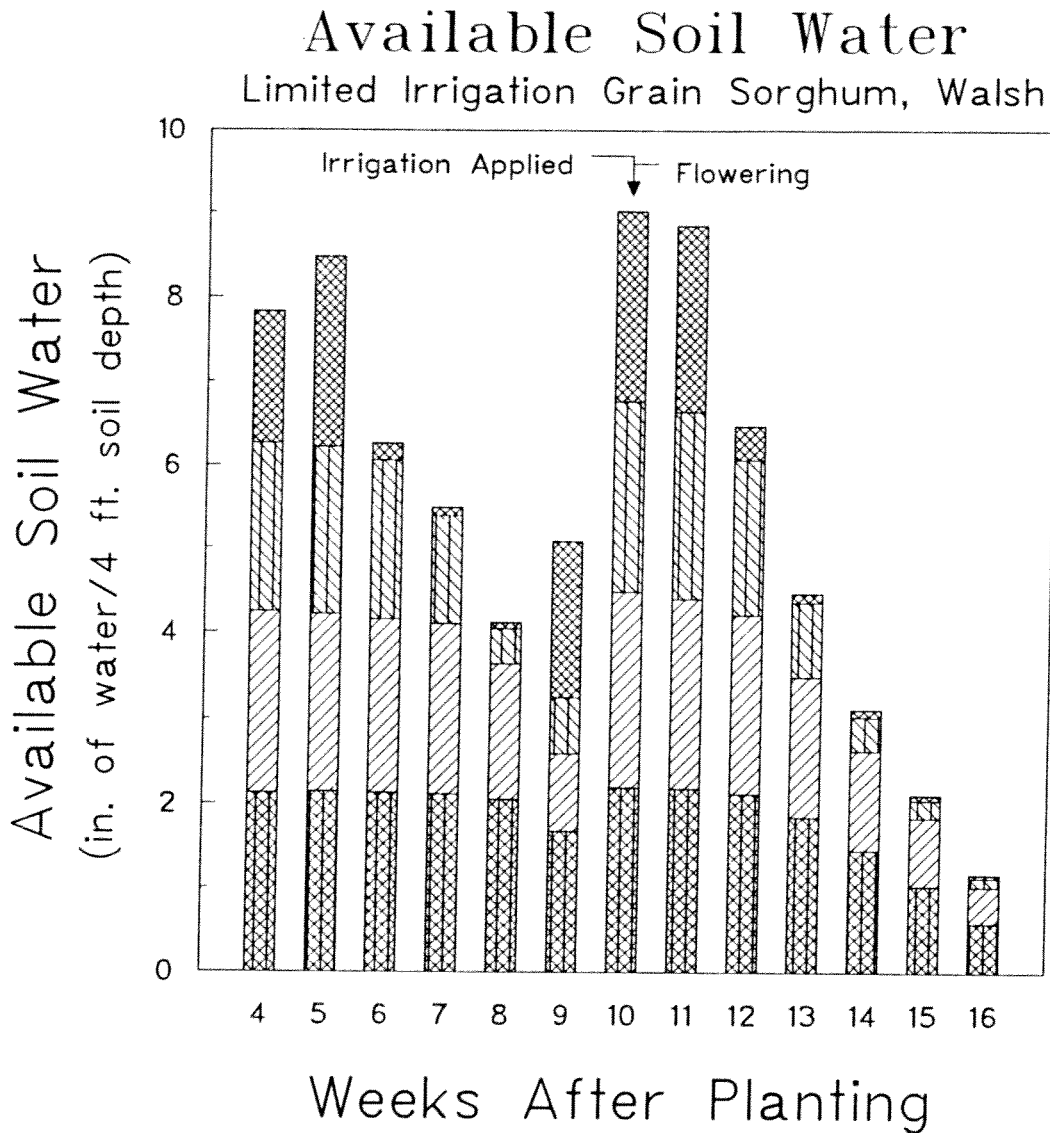


Fig. 9. Test weight and % yield comparison. Linear equation, % yield = 4.6888(test weight) - 177.4, closely predicts relationship between yield and test weight ($r = 0.97$).







-  Soil Depth 1 ft.
-  Soil Depth 2 ft.
-  Soil Depth 3 ft.
-  Soil Depth 4 ft.

Fig. 10. Available soil water in limited irrigated grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first frost was 8.83 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

Performance of Greenbug Resistant Sorghum Hybrids in the
Arkansas Valley, 1992
by
F. C. Schweissing¹

1992 was the 17th year commercial greenbug-resistant hybrids were planted in a Colorado test. Since greenbugs can cause large yield reductions, producers of sorghum seed are continuing to incorporate greenbug resistance into their new hybrids.

This is a report of the grain sorghum test conducted at the Arkansas Valley Research Center. It provides farmers, Cooperative Extension personnel and commercial personnel with information on the performance of selected sorghum hybrids under a light infestation of greenbugs. Information from this test can assist the sorghum producer in knowing how much extra yield may result from control of greenbugs and yield reductions caused by greenbug feeding, under the existing populations, on cultivars entered in the test.

The test was financed, in part, by entry fees paid by participating firms. A comparable test is planned for 1993. Any firm or individual wishing to take part in the test should contact the author at the Arkansas Valley Research Center, Rocky Ford, CO 81067, telephone (719)254-6312; or Kevin Larson, Plainsman Research Center, Walsh, CO 81090, (719)324-5643.

Five commercial seed firms entered fourteen hybrids in the test. Names and addresses of the firms involved are given in Table 1. Two hybrids were included as greenbug-susceptible check entries. These were DeKalb DK-64, a closed pedigree hybrid, and 399 X 2536, an open pedigree hybrid. The two check hybrids were entered by the Colorado Agricultural Experiment Station.

¹Superintendent and Entomologist, Arkansas Valley Research Center, Rocky Ford, CO.

Table 1.-Entrants in the Greenbug-Resistant Grain Sorghum Trial at Rocky Ford, 1992.

Brand	Entered by
CARGILL	CARGILL HYBRID SEEDS, Box 5645, Minneapolis, MN 55440
DEKALB	DEKALB PLANT GENETICS, Rt. 2, Box 56, Lubbock, TX 79415
GOLDEN ACRES	TAYLOR-EVANS SEED CO., P.O. Box 68, Tulia, TX 79088
NORTHRUP KING	NORTHRUP KING CO., P.O. Box 12123, Fresno, CA 93776
ORO HYBRIDS	R C YOUNG SEED CO., 624 27 th St., Lubbock, TX 79404

Colorado Agricultural Experiment Station
entered the checks: DeKalb brand DK-64 and
TXms 399 X TXR2536.

TESTING PROCEDURE

Individual plots of each hybrid consisted of four rows spaced 30 inches apart and 70 feet long. Each plot was split by four foot alleys, with one-half sprayed, at random, with an insecticide. Plots were replicated four times.

Plots were planted May 13, 1992 at ca. 6 lbs. per acre. Conditions were very dry at the time, but due to an irrigation, soil moisture and temperature were favorable for good germination and seedling emergence. The plot area had been fertilized during the winter with 150 pounds of nitrogen and 50 pounds of P_2O_5 per acre. A pre-emergence application of 2.5 pounds of propachlor and 1.5 pounds of bifenoX AI/Acre was used for weed control and troublesome annual weeds were rogued during the season.

The plot area was irrigated four times: May 15, July 12, July 31 and August 12. Chlorpyrifos was applied for greenbug control at 0.5 pounds AI/Acre on August 10 on the sprayed plots.

All plots were harvested October 27, 1992.

RESULTS

Agronomic data for the cultivars entered in the test are presented in Table 2. The light greenbug activity did not influence the number of days to flowering or test weight. Due to the cooler than usual temperatures during the growing season, the days to flower was about 10 days later than the previous two years. This was another exceptional production year for grain sorghum at the Center, comparable to 1991 and substantially higher than the 1989 and 1990 yields.

Table 2.-Agronomic Data for Cultivars Tested in the Greenbug-Resistant Trial at Rocky Ford, 1992.

Brand	Hybrid	Sprayed		Unsprayed	
		Days to Bloom	Test Wt	Days to Bloom	Test Wt
		(No)	(Lbs)	(No)	(Lbs)
CARGILL	607E	85	54	85	54
CARGILL	X10216	91	53	91	54
CARGILL	797	91	53	91	53
DEKALB	DK-56	90	56	90	56
DEKALB	X-156	95	52	95	53
DEKALB	DK-64 (CHK)	88	56	88	57
GOLDEN ACRES	T-E PROSPER	93	54	93	52
GOLDEN ACRES	T-E Y-75	89	57	89	57
GOLDEN ACRES	T-E OMAHA	94	54	94	54
GOLDEN ACRES	T-E Exp 9202	91	55	91	55
NORTHRUP KING	KS 710	89	55	89	56
NORTHRUP KING	KS 714Y	90	55	90	55
NORTHRUP KING	2656	89	55	89	56
NORTHRUP KING	KS 560Y	86	55	86	55
ORO HYBRIDS	Baron	90	56	90	56
	399 X 2536 (CHK)	89	54	89	53
Average		90	55	90	55

Greenbug counts, obtained on August 17 and 26 in both sprayed and unsprayed plots, are presented in Table 3 as the average number of greenbugs per plant. The population was determined by counting the number of greenbugs on two plants in each plot. Greenbug counts are an indication of relative levels of nonpreference (antixenosis) and/or antibiosis factors in the plant. Populations were very light throughout the untreated plots including the open pedigree check hybrid. The populations involved did not appear to effect leaf loss, nor did the overall average yields between treated and untreated plots show a significant difference.

Greenbug samples collected on August 5 and 25 from the plot area were forwarded to Dr. T. L. Harvey at the Fort Hays Branch Agricultural Experiment Station, K.S.U., Hays, Kansas for biotype determinations. The tests indicated the greenbugs were E- biotype. However, a third sample was taken from an E-biotype resistant

Table 3.-Greenbug Counts, Leaf Data, and Grain Yield per Acre for Cultivars Tested in the Greenbug-Resistant Trial at Rocky Ford, 1992.

Brand	Hybrid	Sprayed										Unsprayed					
		Counts					Leaf Data		Yield			Counts		Leaf Data		Yield	
		8-17 (No)	8-26 (No)	Total (No)	Loss (%)	Yield (Lbs)	Rank (No)	8-17 (No)	8-26 (No)	Total (No)	Loss (%)	Yield (Lbs)	Rank (No)	8-17 (No)	8-26 (No)	Total (No)	Loss (%)
GOLDEN ACRES	T-E Y-75	0	6	14	45	9820	11	11	18	39	10183	11	11	18	13	39	10183
ORO HYBRIDS	Baron	0	1	14	32	10163	4	1	3	33	10137	4	1	3	14	33	10137
NORTHROP KING	KS 710	0	6	13	30	10015	7	5	37	32	10136	7	5	37	13	32	10136
NORTHROP KING	KS 714Y	0	0	14	33	11109	1	116	82	33	10082	1	116	82	14	33	10082
DEKALB	DK-64(CK)	0	1	13	36	10733	2	114	50	34	9969	2	114	50	13	34	9969
GOLDEN ACRES	T-E Exp. 9202	3	2	13	30	9916	10	86	92	33	9922	10	86	92	14	33	9922
NORTHROP KING	2656	0	2	13	28	10130	5	115	131	29	9871	5	115	131	12	29	9871
CARGILL	X10216	0	1	13	32	10395	3	67	83	27	9812	3	67	83	13	27	9812
CARGILL	797	0	2	14	33	10106	6	361	131	38	9236	6	361	131	13	38	9236
CARGILL	607E	0	5	12	29	9037	14	85	22	29	9154	14	85	22	12	29	9154
DEKALB	DK-56	0	0	13	28	9358	12	49	96	35	9057	12	49	96	13	35	9057
GOLDEN ACRES	T-E OMAHA	0	3	14	33	9011	16	217	141	38	9030	16	217	141	13	38	9030
GOLDEN ACRES	T-E PROSPER	0	0	14	37	9953	9	98	107	34	8997	9	98	107	14	34	8997
NORTHROP KING	KS 560Y	0	7	12	34	9267	13	46	61	35	8920	13	46	61	13	35	8920
	399 X 2536(CK)	0	2	13	35	10007	8	227	254	36	8536	8	227	254	13	36	8536
DEKALB	X-156	0	0	15	20	9036	15	35	119	30	8188	15	35	119	15	30	8188
Average																	9879
LSD (P=.05)																	1009
CV (%)																	8.6

hybrid planted in bulk about 60 rows away from the plots and these greenbugs gave a strong I-biotype reaction. In addition, Ms. R. A. Shufran of the Kansas State University Entomology Department determined the greenbugs in the first sample to be insecticide susceptible. Predators and parasites were not factors in this years trial.

Percent leaf loss or leaf damage is presented in Table 3. Leaf loss or damage was determined from average number of leaves lost by October 1 divided by total number of green leaves on the plant on July 10. Leaves lost in the sprayed plots are considered to be due to natural senescence of lower leaves and actual leaf loss due to greenbug damage should approximate the difference in leaf loss between sprayed and unsprayed plots for a particular hybrid. Data presented indicates, that although there are differences between hybrids, differences between the two treatments for each hybrid are small and probably had little effect on whatever yield differences occurred. Past years results have shown that loss of lower leaves, under 50%, has no effect on yields.

Growers interested in the maximum yield available from a resistant cultivar in the presence of a very light greenbug population should note the ranking of the yields in the unsprayed plots in either Table 3 or 4. In Table 3, the sixteen hybrids are ranked according to their yield performance in the unsprayed plots. It should be noted there was not a statistical difference in the top thirteen hybrids in the test. A number of the hybrids have substantially lower greenbug populations than the open pedigree check (399 X 2536) so it is possible to assume that these resistant hybrids exhibit some degree of non-preference and/or antibiosis.

In Table 4, the hybrids are ranked from high to low according to their grain yield in the sprayed plots. It should be noted that under the conditions of this trial, the advantage for controlling greenbugs on the resistant hybrids was small or none. The difference between the yield of the sprayed and unsprayed plots is also presented and ranked. Although there is little agreement between yields of hybrids that produce higher in the unsprayed plots and their ranking in the difference column, it is apparent the non-resistant check (399 X 2536) produced significantly lower yields in the unsprayed plots and had the largest reduction in yield between sprayed and unsprayed plots. This could indicate greenbug resistance under the light populations encountered this year was still important.

Table 4.-Comparison of Grain Yields of Cultivars Tested in the Greenbug-Resistant Trial at Rocky Ford, 1992.

Brand	Hybrid	Sprayed	Unsprayed	Difference	
		Yield per Acre (Lbs)	Yield per Acre (Lbs)	Yield (Lbs)	Rank (No)
NORTHROP KING	KS 714Y	11109	10082	1028	15
DEKALB	DK-64(CK)	10733	9969	765	11
CARGILL	X10216	10395	9812	583	10
ORO HYBRIDS	Baron	10163	10137	25	6
NORTHROP KING	2656	10130	9871	259	7
CARGILL	797	10106	9236	870	13
NORTHROP KING	KS 710	10015	10136	-121	2
	399 X 2536(CK)	10007	8536	1471	16
GOLDEN ACRES	T-E PROSPER	9953	8997	956	14
GOLDEN ACRES	T-E Exp 9202	9916	9922	-6	5
GOLDEN ACRES	T-E Y-75	9820	10183	-363	1
DEKALB	DK-56	9358	9057	301	8
NORTHROP KING	KS 560Y	9267	8920	347	9
CARGILL	607E	9037	9154	-117	3
DEKALB	X-156	9036	8188	848	12
GOLDEN ACRES	T-E OMAHA	9011	9030	-20	4
Average		9879	9452	427	
LSD (P=.05)		1009	1189	1267	
CV (%)		8.6	9.9		