

Technical Report

TR12-02 January 2012

Colorado
State
University

***Agricultural
Experiment Station***

College of
Agricultural Sciences

Department of
Soil and Crop Sciences

Extension

Plainsman
Research Center

**Sorghum Hybrid Performance
Trials in Eastern Colorado, 2011**

K. J. Larson, Superintendent/Research Scientist II, Plainsman Research Center

J. J. Johnson, Associate Professor and Extension Crop Specialist, Dept. of Soil and
Crop Sciences

D. L. Thompson, Technician III, Plainsman Research Center

Funded by the National Sorghum Producers, the Colorado Sorghum Producers and
the Colorado Agricultural Experiment Station,

Crop Management and Sorghum Improvement, Project No. COL00654

- **Mention of a trademark or proprietary product does not constitute endorsement by the Colorado Agricultural Experiment Station.**

Colorado State University is an equal opportunity/affirmative action institution and complies with all Federal and Colorado State laws, regulations, and executive orders regarding affirmative action requirements in all programs. The Office of Equal Opportunity is located in 101 Student Services. In order to assist Colorado State University in meeting its affirmative action responsibilities, ethnic minorities, women, and other protected class members are encouraged to apply and to so identify themselves.

SORGHUM HYBRID PERFORMANCE TRIALS IN EASTERN COLORADO, 2011

	Page
Introduction:	
Seed Companies that Participated in Trials	2
Experimental Methods and Evaluations	3
Statistical Method	4
Acknowledgments	4
References	5
Dryland Grain Sorghum Performance Trial at Akron	6
Dryland Grain Sorghum Performance Trial at Brandon	9
Dryland Grain Sorghum Hybrid Performance Trial at Walsh	13
Dryland Forage Sorghum Hybrid Performance Trial at Walsh	17
Irrigated Forage Sorghum Hybrid Performance Trial at Walsh	22

SORGHUM HYBRID PERFORMANCE TRIALS IN EASTERN COLORADO, 2011
K.J. Larson, J.J. Johnson and D.L. Thompson \1

Introduction

The 2011 Colorado grain sorghum crop was estimated at 6.24 million bushels, 17 percent below the 2010 sorghum crop of 7.52 million bushels (National Agricultural Statistics Service, Colorado Field Office, 2011). For Colorado, the 2011 grain sorghum crop of 6.24 million bushels is the third highest in the last 10 years, and the 2010 grain sorghum crop had the record high production in 10 years. The decrease in sorghum production this year was primarily due to an 8 bu/a yield reduction compared to last year, 39 bu/a for 2011 and 47 bu/a for 2010. Nonetheless, the 39 bu/a yield is the third highest in the last 10 years. The harvested acreage in 2011 was 160,000 acres, which is the same as last year. Sorghum silage statistics are not published during the current year; however, Colorado sorghum silage statistics are available for last year. In 2010, 260,000 tons of sorghum silage were produced. The average yield was 13 tons/a from 20,000 harvested acres. (National Agricultural Statistics Service, Colorado Field Office, 2011).

This publication is a progress report of the sorghum hybrid performance trials conducted by the Department of Soil and Crop Sciences at Colorado State University, Colorado Agricultural Experiment Station, and Colorado State University Extension. The sorghum trials were conducted at three sites in eastern Colorado: dryland grain sorghum trials at Akron, Brandon, and Walsh; a dryland forage sorghum trial at Walsh; and an irrigated forage sorghum trial at Walsh.

Tests are partially funded by entry fees paid by commercial firms. Commercial seed representatives interested in entering sorghum hybrids in any of the trials should contact Jerry Johnson, Dept. of Soil and Crop Sciences, C12 Plant Sciences Bldg., Fort Collins, Colorado 80523, phone (970) 491-1454, email Jerry.Johnson@colostate.edu; or Kevin Larson, Plainsman Research Center, Box 477, Walsh, Colorado 81090, phone (719) 324-5643, email Kevin.Larson@colostate.edu for further details. Names and addresses of firms submitting entries in 2011 are shown in Table 1. Each firm selected entries for testing and furnished seed for the trials. AES researchers selected open-pedigree hybrids as a standard of comparison. A closed-pedigree corn hybrid was also included in the forage sorghum trials as a comparative standard and was sponsored by the Colorado State Agricultural Experiment Station.

Summary tables for weather data (CoAgMet and NOAA, 2011), soil analysis, fertilization (Soil, Plant and Water Testing Laboratory, Colorado State University), and available soil water graphs derived from gypsum block readings are provided for each trial location. Other information, where available, was included: site description, emergence date, irrigation, pest control, field history, and pertinent comments.

\1 Superintendent, Plainsman Research Center, Walsh;
Extension Crop Specialist, Dept. of Soil and Crop Sciences;
Technician III, Plainsman Research Center, Walsh.

Table 1.--Entrants in the 2011 Colorado Sorghum Performance Trials.

Brand	Entered by
ASGROW	Monsanto Company, 800 N. Lindbergh Blvd., St. Louis, MO 63167
DEKALB	Monsanto Company, 800 N. Lindbergh Blvd., St. Louis, MO 63167
HIGH PLAINS BRAND	Eastern Colorado Seeds, LLC, P.O. Box 546, Burlington, CO 80807
MYCOGEN	Mycogen Seeds, 1614 Safford Ave., Garden City, KS 67846
PIONEER	Pioneer Hi-Bred International, Inc., 4200 W. Service Road, Unit #4, Evans, CO 80620
SORGHUM PARTNERS	Sorghum Partners, Inc., P.O. Box 189, New Deal, TX 79350
TRIUMPH	Triumph Seed Co., Inc., P.O. Box 1050, Hwy. 62 Bypass, Ralls, TX 79357

AES researchers entered the following as checks: grain sorghum, TXms399 X TXR2737 (399 X 2737), Pioneer 88P68 and 87P06, Syngenta 5556, 5745, and H-307; forage sorghum, NB 305F; corn hybrid, Mycogen 2T806.

Growing Degree Days for sorghum were calculated from planting through first freeze using a maximum of 111°F and a minimum of 50°F for threshold temperatures (Peacock and Heinrich, 1984). They are calculated by averaging daily high and low temperatures and subtracting the base temperature of 50°F from the average. When daily temperatures are less than 50°F, 50°F is used, when temperatures are above 111°F a maximum temperature of 111°F is used:

$$\frac{(\text{Daily Minimum Temp.} + \text{Daily Maximum Temp.})}{2} - 50^{\circ}\text{F}$$

Experimental Methods and Evaluations

Trials were planted with a four-row cone planter and harvested with modified, self-propelled combines: a John Deere 4420 combine equipped with a four-row row-crop head, or a Gleaner A with a Roll-A-Cone sorghum 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 become 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.

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

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. Since the combine was equipped with a row crop 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 an Ohaus (one quart), hand-held, grain test weight scale. A low test weight indicates that a hybrid did not fully mature prior to the first freeze or that it suffered environmental stress, such as a water deficiency.

Grain Yield. The grain yield in bushels per acre by mass was adjusted to 14 percent moisture content.

Yield as a % of Test Average. Yield as a percentage of test average provides a comparison between yields within a trial and allows easy comparisons among years, irrespective of annual growing conditions.

Forage Dry Matter Analysis. Whole plant samples were taken at boot for each hybrid and sent to Ward Laboratories, Inc., Kearney, Nebraska for forage feed quality using Near Infrared (NIR) analysis.

Forage Yield. Forage yield in tons per acre was adjusted to 70% moisture content. A representative sample of fresh silage was oven-dried at 167°F (75°C) until there was no additional weight loss, and then yields were adjusted to 70% moisture content.

Stem Sugar. The sugar content, expressed as a percent, in the stem of forage sorghums at harvest was measured with a Misco PA203X, 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. Electrical resistance readings were made weekly. Resistance readings increase as plant available soil moisture is depleted. Using resistance readings, available soil water was determined by extrapolating from soil water depletion curves for each particular soil. Available soil water measurements were not made at Akron.

Statistical Methods

Trials were planted in a randomized complete block design with four replications. Analysis of variance was applied to the yield results and the least significant difference (LSD) was computed at $\alpha = 0.20$ for all trials, except the Akron trial where $\alpha = 0.30$ and 0.05 were used. Analysis of variance and regression were performed with CoStat Statistical Software a product of Cohort Software, Berkeley, California and SAS statistical software, SAS Institute Inc., SAS 9.1.3 Help and Documentation, Cary, NC: SAS Institute Inc., 2000-2004.

Acknowledgements

We are sincerely grateful to the National Sorghum Producers for providing funding through the Colorado Sorghum Producers to support these performance trials, and to Burl Scherler, the grower-cooperator for the Brandon trial for his assistance.

References

National Agricultural Statistics Service, Colorado Field Office. November 23, 2011. Ag Update, vol. 31, no. 22. NASS, CDA, USDA. 3p.

National Agricultural Statistics Service, Colorado Field Office. 2011. Colorado agricultural statistics 2011. NASS, CDA, USDA. 55p.

NOAA, May-October, 2011. Climatological data, Colorado. vol. 116, no.5-10. NOAA, Dept. of Commerce, NWS, NESDIS, NCDC.

Peacock, J.M. and G.M. Heinrich. 1984. Light and temperature response in sorghum. pp. 143-158. In: Agrometeorology of Sorghum and Millet in the Semi-Tropics: Proceedings of the International Symposium. November 15-20, 1982. India, ICRISAT, WMO.

Dryland Grain Sorghum Hybrid Performance Trial at Akron, 2011

COOPERATORS: USDA-ARS, Central Great Plains Research Station, Akron, Colorado, and Jerry Johnson, Colorado State University.

PURPOSE: To identify high yielding hybrids under dryland conditions with 2600 sorghum heat units in a silty loam soil.

HARVEST PLOT SIZE: 5 ft. wide, 31 ft. long. **REPLICATIONS:** Four.
PLANTED: June 7, 2011.
HARVESTED: October 25, 2011.

WEED CONTROL: Glyphosate and Lumax. **CULTIVATION:** None.
INSECTICIDES: None.

FIELD HISTORY: Last Crop: Wheat.
FIELD PREPARATION: No-till.

SOIL: Weld silty loam. **FERTILIZER:** 40 lb N/a.

Summary: Growing Season Precipitation and Temperature \1
 Akron, Washington County.

Month	Rainfall	GDD \2	>90 F	>100 F	DAP \3
	In		-----no. of days-----		
June	1.41	416	5	1	23
July	4.11	797	21	0	31
August	0.09	804	20	1	31
September	1.22	423	1	0	30
October	0.22	159	0	0	14
Total	7.05	2599	47	2	154

\1 Growing season from June 7 (planting) to October 14 (first freeze, 30F).

\2 GDD: Growing Degree Days for sorghum.

\3 DAP: Days After Planting.

COMMENTS: The trial site experienced drought conditions during late summer and received only 0.27 in. of precipitation from July 15 to September 13. Yields and test weights were good, especially considering the dry conditions during flowering and grain fill.

Table 2.--Dryland Grain Sorghum Hybrid Performance Trial at Akron, 2011.

Brand	Hybrid	Grain Yield	Moisture	Test Wt.	Plant Ht.	Lodging	50% Bloom	Maturity Group
		bu/a	%	lb/bu	in	score (0-10)	DAP	
SYNGENTA	H-307	63	11.9	57	42	1	77	E
SORGHUM PARTNERS	SP3303	55	11.4	57	37	1	74	E
SORGHUM PARTNERS	KS310	51	11.9	58	41	2	76	E
TRIUMPH	TR424	50	10.7	54	37	3	70	E
DEKALB	DKS29-28	49	10.3	53	37	3	70	E
PIONEER HI-BRED	87P06	49	11.2	58	40	3	71	E
SYNGENTA	5745	48	12.3	57	40	1	78	ME
DEKALB	DKS28-05	44	10.9	53	38	5	70	E
SORGHUM PARTNERS	251	40	10.1	54	36	2	67	E
TRIUMPH	TRX00464	39	9.6	49	34	2	72	E
PIONEER HI-BRED	88P68	37	11.3	57	40	7	71	E
SYNGENTA	SY5556	37	13.3	58	38	1	80	ML
Average		47	11.2	55	38	3	73	
LSD 0.30		5.3						
LSD 0.05		10.3						

Planted: June 7; Harvested: October 25, 2011.

50% Flowering: minimum date on which a hybrid flowers on half of its population.

DAP: days after planting.

Maturity Group: E=early; ME=medium early; ML=medium late.

Yields are adjusted to 14.0% seed moisture content.

Table 3.--Summary: Dryland Grain Sorghum Hybrid Performance Trials at Akron, 2009-2011.

Brand	Hybrid	Grain Yield					Yield as % of Test Average				
		2009	2010	2011	2-Year Avg	3-Year Avg	2009	2010	2011	2-Year Avg	3-Year Avg
		-----bu/a-----					-----%-----				
AERC	CGSH-8	79	38	--	--	--	95	86	--	--	--
DEKALB	DKS37-07	68	43	--	--	--	81	98	--	--	--
DEKALB	DKS29-28	99	52	49	51	67	118	118	105	110	115
DEKALB	DKS28-05	--	51	44	48	--	--	116	93	103	--
PIONEER	88P68	--	45	37	41	--	--	102	80	89	--
SORGHUM PARTNERS	KS310	88	53	51	52	64	104	120	108	113	110
SORGHUM PARTNERS	251	94	44	40	42	59	112	100	86	91	102
SORGHUM PARTNERS	NK5418	64	36	--	--	--	77	82	--	--	--
SORGHUM PARTNERS	K35-Y5	81	34	--	--	--	97	77	--	--	--
SORGHUM PARTNERS	SP3303	59	42	55	49	52	70	95	117	105	90
TRUIMPH	TR420	83	37	--	--	--	98	84	--	--	--
TRUIMPH	TR424	--	50	50	50	--	--	114	107	109	--
Average		84	44	47	46	58					

Grain Yields were adjusted to 14.0% seed moisture content.

Cooperator: Central Great Plains Research Station.

Dryland Grain Sorghum Hybrid Performance Trial at Brandon, 2011

COOPERATORS: Burl Scherler, Sand Creek, Inc., Brandon, Colorado, and Kevin Larson, Plainsman Research Center, Walsh, Colorado.

PURPOSE: To identify high yielding hybrids under dryland conditions with 3100 sorghum heat units in silty loam soil.

PLOT: Four rows with 30" row spacing, 50' long. **SEEDING DENSITY:** 43,600 seed/a. **PLANTED:** June 2. **HARVESTED:** October 31 and November 1.

WEED CONTROL: Preemergence Herbicides: Glyphosate 32 oz/a, Atrazine 0.9 lb/a, Dual 21 oz/a. Post Emergence Herbicides: 2,4-D amine (with drops). **CULTIVATION:** None. **INSECTICIDES:** None.

FIELD HISTORY: Last Crop: Sunflower. **FIELD PREPARATION:** No-till.

COMMENTS: Planted in good soil moisture. Weed control was good. Near normal precipitation for the growing season, however, September was dry. No greenbug infestation. Yields and test weights were fair. Because of the dry weather late in the season, later maturing hybrids did not fully mature and subsequently had low test weights and poor yields.

SOIL TEXTURE: Silty loam for 0-8" and silty loam 8"-24" depths from soil analysis.

Summary: Growing Season Precipitation and Temperature \1
Chivington, Kiowa County.

Month	Rainfall	GDD \2	>90 F	>100 F	DAP \3
	In		-----no. of days-----		
June	2.39	657	17	6	28
July	3.15	931	29	13	31
August	1.94	854	26	7	31
September	0.70	477	5	1	30
October	0.16	149	2	0	10
Total	8.34	3068	79	27	130

\1 Growing season from June 2 (planting) to October 10 (first freeze, 29 F).

\2 GDD: Growing Degree Days for sorghum.

\3 DAP: Days After Planting.

Summary: Soil Analysis of Plant Available Nutrients.

Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	-----ppm-----				
0-8"	7.5	0.6	1.9	10	5.6	467	0.6	3.5
8"-24"				11				
Comment	Alka	VLo	Hi	Mod	Lo	VHi	Lo	Marg
Manganese and Copper levels were adequate.								

Summary: Fertilization.

Fertilizer	N	P ₂ O ₅	Zn	Fe
	-----lb/a-----			
Recommended	0	20	0	0
Applied	90	20	0	0
Yield Goal: 45 bu/a.				
Actual Yield: 16 bu/a.				

Available Soil Water Dryland Grain Sorghum, Brandon, 2011

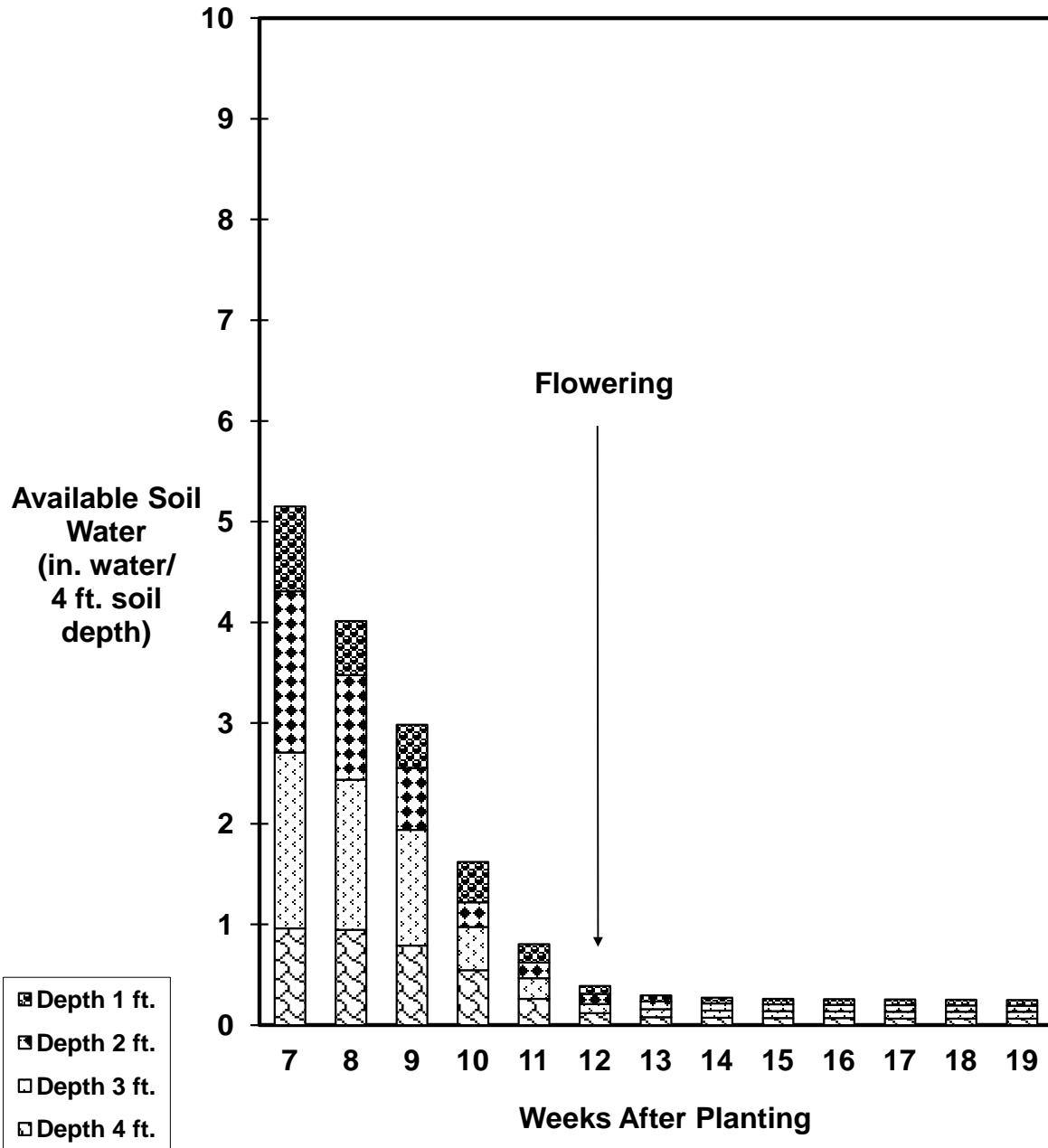


Fig. 1. Available soil water in dryland grain sorghum at Brandon. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Brandon from planting to first freeze was 8.32 in. Any increase in available soil water between weeks is from rain.

Table 4.--Dryland Grain Sorghum Hybrid Performance Trial at Brandon, 2011. \1

Brand	Hybrid	Yield %		Test Weight	Plants Lodged	Harvest Density	Plant Height	<u>50% Bloom</u>		<u>50% Mature</u>	
		Grain Yield	of Test Average					DAP	GDD	DAP	Group
		bu/a	%	lb/bu	%	plants/a (1000 X)	in				
DEKALB	DKS28-05	37	197	56	7	17.8	36	74	1990	115	E
TRIUMPH	TR424	32	172	56	5	18.4	33	74	1990	116	E
MYCOGEN	1G557	26	139	57	10	18.4	33	70	1883	112	E
DEKALB	DK-28E	14	76	57	6	14.3	34	68	1836	110	E
SORGHUM PARTNERS	251	11	57	58	5	15.5	32	66	1784	107	E
SORGHUM PARTNERS	SP3303	10	52	57	3	14.7	35	74	1990	117	E
SORGHUM PARTNERS	KS310	32	172	59	1	18.0	37	77	2071	118	ME
SORGHUM PARTNERS	K35-Y5	25	132	55	0	14.5	35	78	2097	121	ME
ASGROW	Pulsar	22	115	59	4	14.7	34	77	2071	122	ME
SORGHUM PARTNERS	NK4420	16	87	54	2	17.4	34	86	2358	129	ME
MYCOGEN	M3838	13	67	48	1	17.0	34	87	2385	HD	ME
SORGHUM PARTNERS	NK5418	21	111	55	1	19.9	33	89	2442	131	M
TRIUMPH	TRX03473	3	16	45	0	14.1	32	90	2472	HD	M
SYNGENTA	SY5556	2	9	NS	0	14.1	33	96	2568	SD	M
Average		16		51	3	15.1	31	74	1996	121	ME
LSD 0.20		10.8			2.9						

\1 Planted: June 2; Harvested: October 31 and November 1, 2011.

Yields are adjusted to 14.0% seed moisture content.

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

Seed Maturation: SD, soft dough; HD, hard dough.

GDD: Growing Degree Days for sorghum.

Maturity Group: E, early; ME, medium early; M, medium.

Table 5.--Summary: Dryland Grain Sorghum Hybrid Performance Trials at Brandon, 2009-2011.

Brand	Hybrid	Grain Yield					Yield as % of Test Average				
		2009	2010	2011	2-Year Avg	3-Year Avg	2009	2010	2011	2-Year Avg	3-Year Avg
		-----bu/a-----					-----%-----				
ASGROW	Pulsar	58	70	22	46	50	102	104	115	107	106
DEKALB	DKS37-07	66	61	--	--	--	117	91	--	--	--
DEKALB	DKS29-28	64	69	--	--	--	114	103	--	--	--
DEKALB	DKS28-05	61	80	37	59	59	115	105	197	136	126
MYCOGEN	1G557	67	78	26	52	57	118	116	139	121	121
MYCOGEN	M3838	49	48	13	31	37	87	71	67	71	78
SORGHUM PARTNERS	KS310	62	79	32	56	58	110	118	172	129	123
SORGHUM PARTNERS	251	60	55	11	33	42	106	81	57	77	89
SORGHUM PARTNERS	NK5418	55	60	21	41	45	97	90	111	94	96
SORGHUM PARTNERS	K35-Y5	53	72	25	49	50	94	108	132	113	106
SORGHUM PARTNERS	SP3303	47	60	10	35	39	84	89	52	81	83
TRUIMPH	TR424	--	76	32	54	--	--	114	172	126	--
TRUIMPH	TR452	54	66	--	--	--	96	98	--	--	--
Average		57	66	19	43	47					

Grain Yields were adjusted to 14.0% seed moisture content.

Dryland Grain Sorghum Hybrid Performance Trial at Walsh, 2011

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

PURPOSE: To identify high yielding hybrids under dryland conditions with 3700 sorghum heat units in a silty loam soil.

PLOT: Four rows with 30" row spacing, 50' long. **SEEDING DENSITY:** 43,600 seed/a. **PLANTED:** June 9. **HARVESTED:** November 4.

IRRIGATION: The trial was irrigated up with furrow irrigation for stand establishment then left rainfed for the remaining season.

WEED CONTROL: Preemergence Herbicides: Glyphosate, 28 oz/a; 2,4-D, 0.5 lb/a, Banvel 4 oz/a. Post Emergence Herbicides: Banvel 4.0 oz/a, Atrazine 1.0 lb/a, COC 32 oz/a. **CULTIVATION:** Twice. **INSECTICIDES:** None.

Summary: Growing Season Precipitation and Temperature \1
Walsh, Baca County.

Month	Rainfall	GDD \2	>90 F	>100 F	DAP \3
	In		-----no. of days-----		
June	1.11	523	15	3	21
July	1.42	1021	30	20	31
August	0.75	973	29	10	31
September	0.32	539	8	2	30
October	1.01	237	1	0	19
Total	4.61	3696	69	10	132

\1 Growing season from June 9 (planting) to October 19 (first freeze, 30 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 dry soil moisture and irrigated up for stand establishment. Weed control was poor to fair due to excessive sandbur infestation. Much below normal precipitation for the growing season with dry and hot June to September. No greenbug infestation and only minor lodging. Yields and test weights were good despite the dry and hot season (trial was furrow irrigated up).

SOIL TEXTURE: Silty loam for 0-8" and silty loam 8"-24" depths from soil analysis.

Summary: Soil Analysis of Plant Available Nutrients.								
Depth	pH	Salts	OM	N	P	K	Zn	Fe
		mmhos/cm	%	-----ppm-----				
0-8" 8"-24"	7.6	0.9	1.9	10 9	4.3	425	0.7	4.0
Comment	Alka	VLo	Hi	Mod	Lo	VHi	Lo	Marg
Manganese and Copper levels were adequate.								

Summary: Fertilization.				
Fertilizer	N	P ₂ O ₅	Zn	Fe
	-----lb/a-----			
Recommended	0	20	0	0
Applied	50	20	0	0
Yield Goal: 45 bu/a. Actual Yield: 43 bu/a.				

**Available Soil Water
Dryland Grain Sorghum, Walsh, 2011**

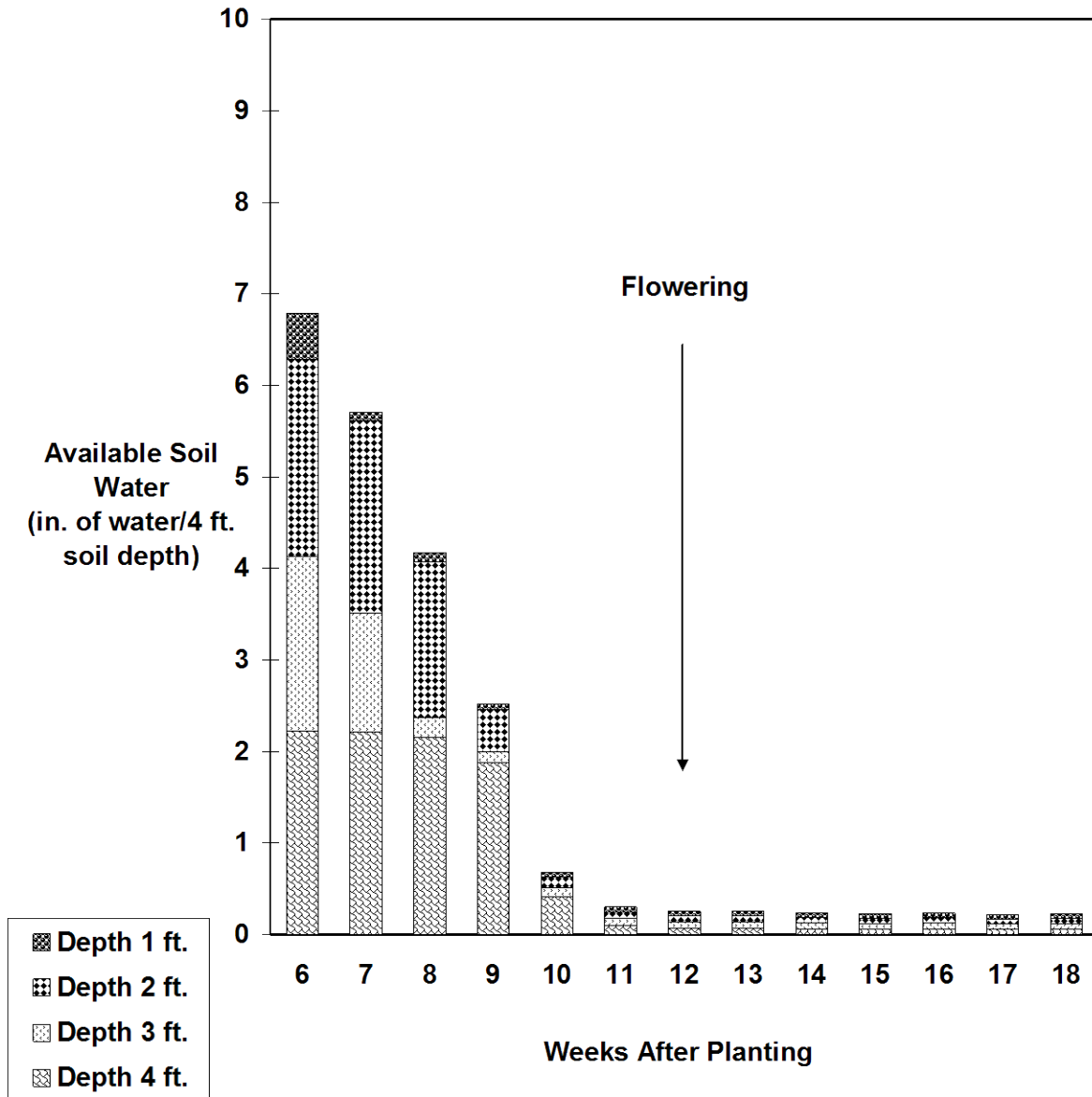


Fig. 2. Available soil water in dryland grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze was 4.61 in. Any increase in available soil water between weeks is from rain.

Table 6.--Dryland Grain Sorghum Hybrid Performance Test at Walsh, 2011. \1

Brand	Hybrid	Yield %		Test Wt.	Harvest Density	Plant Height	<u>50% Bloom</u>		<u>50% Mature</u>	
		Grain Yield	of Test Average				DAP	GDD	DAP	Group
		bu/a	%	lb/bu	plants/a (1000 X)	in				
MYCOGEN	1G557	49	113	60	27.5	36	67	2002	106	E
TRIUMPH	TR424	48	111	61	26.3	34	67	2002	107	E
TRIUMPH	TRX00464	46	105	58	25.6	34	68	2038	108	E
SORGHUM PARTNERS	SP3303	34	78	59	24.0	36	71	2133	114	E
SORGHUM PARTNERS	251	32	75	58	27.9	33	62	1862	101	E
SORGHUM PARTNERS	NK4420	61	140	61	24.8	38	77	2324	122	ME
DEKALB	DKS44-20	56	130	61	27.5	38	76	2291	120	ME
TRIUMPH	TR438	50	115	60	29.0	40	73	2196	110	ME
SORGHUM PARTNERS	K35-Y5	47	108	60	25.6	35	73	2196	113	ME
SORGHUM PARTNERS	KS310	43	99	59	25.9	37	72	2166	110	ME
SORGHUM PARTNERS	NK5418	63	144	60	25.6	34	81	2460	123	M
DEKALB	DKS37-07	48	111	56	23.7	37	82	2486	129	M
TRIUMPH	TRX03473	37	84	55	29.0	37	83	2516	128	M
SYNGENTA	SY5556	34	79	55	28.7	37	83	2516	127	M
MYCOGEN	M3838	31	72	57	21.7	38	81	2460	129	M
(Check)	399 X 2737	15	35	54	20.1	34	90	2682	HD	ML
Average		43		58	25.8	36	75	2271	116	ME
LSD 0.20		9.1								

\1 Planted: June 9; Harvested: November 4, 2011.

This study was irrigated after planting for stand establishment with furrow irrigation.

Yields are adjusted to 14.0% seed moisture content.

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

Seed Maturation: HD, hard dough.

GDD: Growing Degree Days for sorghum.

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

Table 7.--Summary: Dryland Grain Sorghum Hybrid Performance Trials at Walsh, 2009-2011.

Brand	Hybrid	Grain Yield					Yield as % of Test Average				
		2009	2010	2011	2-Year Avg	3-Year Avg	2009	2010	2011	2-Year Avg	3-Year Avg
		-----bu/a-----					-----%-----				
ASGROW	Pulsar	56	88	--	--	--	104	98	--	--	--
DEKALB	DKS37-07	65	91	48	70	52	121	102	111	105	111
DEKALB	DKS29-28	60	80	--	--	--	130	89	--	--	--
DEKALB	DKS28-05	61	80	--	--	--	115	97	--	--	--
MYCOGEN	M3838	--	88	31	60	--	--	99	72	90	--
SORGHUM PARTNERS	KS310	72	79	43	61	50	135	89	99	92	107
SORGHUM PARTNERS	251	45	57	32	45	34	83	63	75	67	72
SORGHUM PARTNERS	NK5418	65	112	63	88	59	122	126	144	133	126
SORGHUM PARTNERS	K35-Y5	55	95	47	71	50	103	107	108	108	106
SORGHUM PARTNERS	SP3303	46	64	34	49	37	86	72	78	74	78
TRUIMPH	TR424	--	83	48	66	--	--	93	111	99	--
TRUIMPH	TR438	62	100	50	75	54	116	112	115	114	115
TRUIMPH	TR448	64	93	--	--	--	119	104	--	--	--
TRUIMPH	TR452	62	108	--	--	--	116	121	--	--	--
TRUIMPH	TRX84732	63	89	--	--	--	117	100	--	--	--
(Check)	399 X 2737	38	101	15	58	46	72	113	35	88	99
Average		53	89	43	66	47					

Grain Yields were adjusted to 14.0% seed moisture content.

The site was pre-irrigated with furrow irrigation in 2011.

Dryland Forage Sorghum Hybrid Performance Trial at Walsh, 2011

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

PURPOSE: To identify high yielding hybrids under dryland conditions with 3200 sorghum heat units in a silty loam soil.

PLOT: Four rows with 30" row spacing, 50' long. **SEEDING DENSITY:** 69,700 seed/a. **PLANTED:** June 9. **HARVESTED:** October 11.

IRRIGATION: The trial was irrigated up with furrow irrigation for stand establishment then left rainfed for the remaining season.

WEED CONTROL: Preemergence Herbicides: Glyphosate 28 oz/a, 2,4-D 0.5 lb/a, Banvel 4 oz/a. Post Emergence Herbicides: Atrazine 1.0 lb/a, Banvel 4 oz/a, COC 32 oz/a. **CULTIVATION:** Twice. **INSECTICIDES:** None.

Summary: Growing Season Precipitation and Temperature \1
Walsh, Baca County.

Month	Rainfall	GDD \2	>90 F	>100 F	DAP \3
	In		-----no. of days-----		
June	1.11	523	15	3	21
July	1.42	1021	30	20	31
August	0.75	973	29	10	31
September	0.32	539	8	2	30
October	1.01	160	1	0	11
Total	4.61	3216	83	35	124

\1 Growing season from June 9 (planting) to October 11 (harvest).

\2 GDD: Growing Degree Days for sorghum.

\3 DAP: Days After Planting.

FIELD HISTORY: Last Crop: Wheat. **FIELD PREPARATION:** No-till.

COMMENTS: Planted in dry soil moisture and irrigated up for stand establishment. Weed control was only fair due to sandbur infestation. Much below normal precipitation for the growing season with dry and hot June to September. No greenbug infestation. Lodging was minor, except for one hybrid that had 20% lodging. Forage yields were good despite the dry and hot season (trial was furrow irrigated up).

SOIL TEXTURE: Silty loam for 0-8" and silty 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	0.9	1.9	10	4.3	425	0.7	4.0
8"-24"				9				
Comment	Alka	VLo	Hi	Mod	Lo	VHi	Lo	Marg
Manganese and Copper levels were adequate.								

Summary: Fertilization.				
Fertilizer	N	P ₂ O ₅	Zn	Fe
	-----lb/a-----			
Recommended	0	20	2	0
Applied	50	20	0	0
Yield Goal: 8 ton/a. Actual Yield: 10.9 ton/a @ 70% MC.				

Available Soil Water Dryland Forage Sorghum, Walsh, 2011

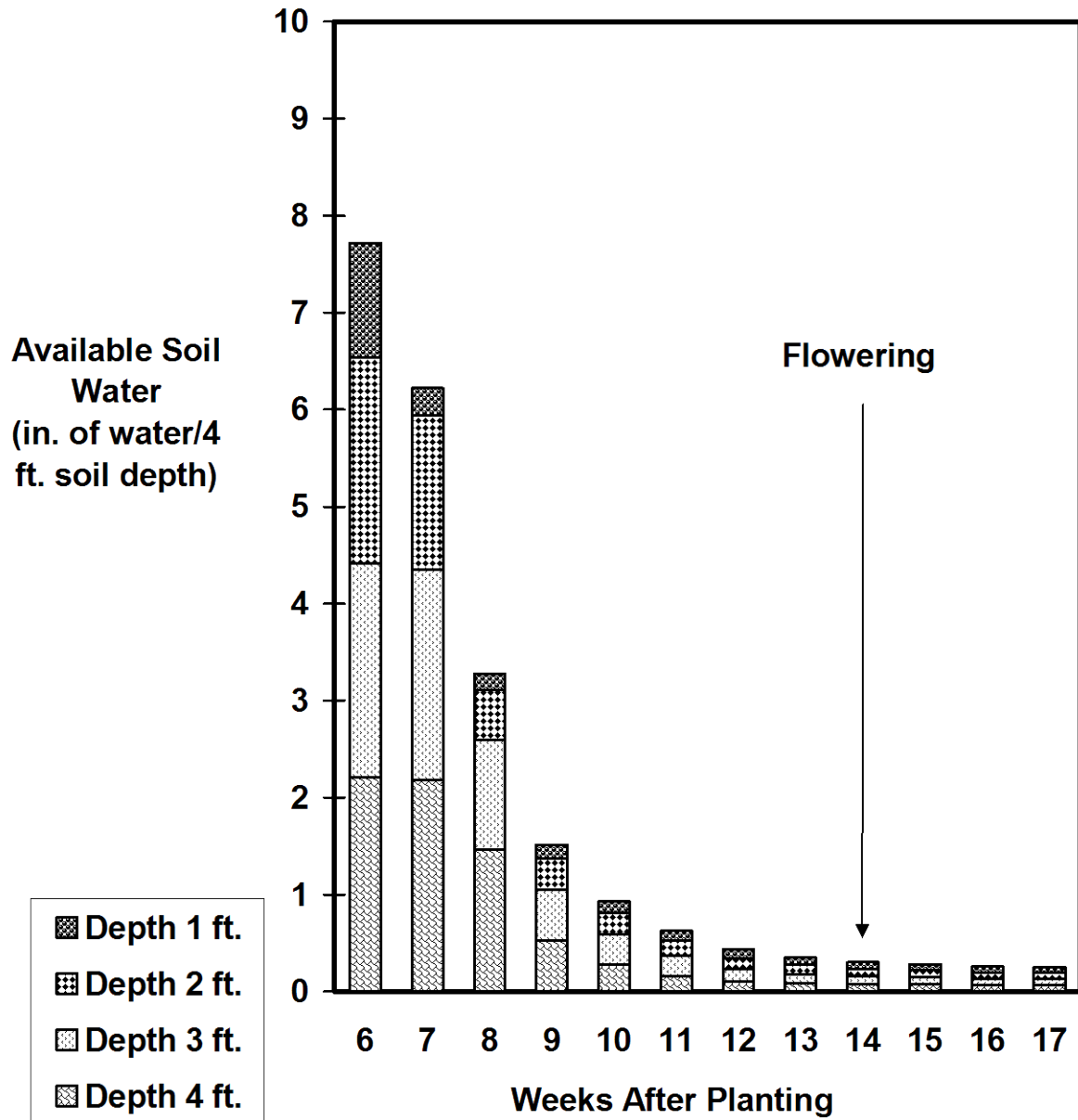


Fig. 3. Available soil water in dryland forage sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to harvest was 4.61 in. Any increase in available soil water between weeks is from rain.

Table 8.--Dryland Forage Sorghum Hybrid Performance Trial at Walsh, 2011. \1

Brand	Hybrid	Forage Yield	Yield %	Stage \2	Stem Sugar	Plant Lodging	Harvest Density	Plant Ht.	Days	Forage Type \3
			of Test Avg.	at Harvest					to 50% Bloom	
		tons/a	%		%	%	plants/a (1000 X)	in		
SORGHUM PARTNERS	SS304	12.8	118	BT	16	0	35.6	59	BT	FS
SORGHUM PARTNERS	NK300	12.7	117	PM	19	0	35.5	45	106	FS
SORGHUM PARTNERS	HIKANE II	12.3	113	HD	19	6	37.6	71	80	FS
SORGHUM PARTNERS	SS405	11.1	103	PM	17	20	39.3	96	113	FS
(Check)	NB 305F	8.5	78	EM	21	6	15.0	72	102	FS
MYCOGEN	2T806	7.7	71	SD	13	2	21.7	75	73	Corn
Average		10.9		LM	17	6	30.8	70	94	FS
LSD 0.20		1.72								

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

This study was irrigated after planting for stand establishment with furrow irrigation.

\2 Harvest Stage: BT, boot; PM, premilk; EM, early milk; LM, late milk; ED, early dough; SD, soft dough; HD, hard dough.

\3 Forage Type: FS, Forage Sorghum.

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

Table 9.--Summary: Dryland Forage Sorghum Hybrid Performance Tests at Walsh, 2008, 2009 and 2011.

Brand	Hybrid	Forage Yield					Yield as % of Test Average				
		2008	2009	2011	2-Year Avg	3-Year Avg	2008	2009	2011	2-Year Avg	3-Year Avg
		-----tons/a-----					-----%-----				
MISS. STATE UNIV.	Topper 76-6	15.9	13.9	--	--	--	100	102	--	--	--
SORGHUM PARTNERS	NK 300	19.0	15.1	12.7	13.9	15.6	120	112	117	114	116
SORGHUM PARTNERS	HIKANE II	15.5	16.1	12.3	14.2	14.6	98	119	113	116	109
SORGHUM PARTNERS	Sordan 79	15.1	13.7	--	--	--	96	101	--	--	--
SORGHUM PARTNERS	Sordan Headless	19.0	15.4	--	--	--	120	114	--	--	--
SORGHUM PARTNERS	Trudan Headless	19.0	14.0	--	--	--	120	103	--	--	--
(Check)	NB 305F	16.2	13.6	8.5	11.1	12.8	103	101	78	91	95
(Check)	Corn	15.9	11.1	7.7	9.4	11.6	101	82	71	77	86
Average		15.8	13.5	10.9	12.2	13.4					

Forage Yields were adjusted to 70% moisture content based on oven-dried sample.

The site was pre-irrigated with furrow irrigation in 2008 and 2011.

There was no forage trial in 2010.

Table 10.--Dryland Forage Sorghum Hybrid Dry Matter Analysis at Walsh, 2011.

Brand	Hybrid	Forage Type \1	RFV	CP	TDN	<u>Net Energy</u>			ADF	NDF	Ht	Days to Boot
						Main.	Gain	Lact.				
			-----%-----	-----MCal/lb-----	----%----							
SORGHUM PARTNERS	SS304	FS	128	4.7	66.4	0.69	0.42	0.69	31.7	46.5	58	118
SORGHUM PARTNERS	NK300	FS	122	7.9	65.5	0.68	0.41	0.68	32.5	48.3	40	97
(Check)	NB 305F	FS	115	7.7	64.0	0.66	0.39	0.66	33.8	50.7	63	89
SORGHUM PARTNERS	HIKANE II	FS	104	6.3	61.6	0.62	0.36	0.63	35.9	54.7	55	71
SORGHUM PARTNERS	SS405	FS	95	6.7	61.3	0.62	0.35	0.63	36.1	59.8	82	101
MYCOGEN	2T806	Corn	89	9.9	57.4	0.56	0.30	0.59	39.6	60.6	66	67
Sorghum Average		FS	109	7.2	62.7	0.64	0.37	0.65	34.9	53.4	61	91

\1 Forage Type: FS, Forage Sorghum.

Infrared analysis performed on whole plant samples taken at boot.

CP, Crude Protein; ADF, Acid Detergent Fiber; NDF, Neutral Detergent Fiber; TDN, Total Digestible Nutrients; RFV, Relative Feed Value; Net Energy: Maintenance, Gain, Lactation..

Irrigated Forage Sorghum Hybrid Performance Trial at Walsh, 2011

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

PURPOSE: To identify high yielding hybrids under irrigated conditions with 3200 sorghum heat units in a silty loam soil.

PLOT: Four rows with 30" row spacing, 50' long. **SEEDING DENSITY:** 113,250 seed/a. **PLANTED:** June 9. **HARVESTED:** October 11 and 12.

IRRIGATION: Three furrow irrigations: June 10, August 10, and September 14, total applied 20 a-in./a.

WEED CONTROL: Preemergence Herbicides: Glyphosate 28 oz/a, 2,4-D 0.5 lb/a, Banvel 4 oz/a. Post Emergence Herbicides: Atrazine 1.0 lb/a, Banvel 4 oz/a, COC 32 oz/a. **CULTIVATION:** Twiec. **INSECTICIDES:** None.

Summary: Growing Season Precipitation and Temperature \1 Walsh, Baca County.

Month	Rainfall	GDD \2	>90 F	>100 F	DAP \3
	In		-----no. of days-----		
June	1.11	523	15	3	21
July	1.42	1021	30	20	31
August	0.75	973	29	10	31
September	0.32	539	8	2	30
October	1.01	173	1	0	12
Total	4.61	3229	83	35	125

\1 Growing season from June 9 (planting) to October 12 (harvest).

\2 GDD: Growing Degree Days for sorghum.

\3 DAP: Days After Planting.

FIELD HISTORY: Last Crop: Wheat. **FIELD PREPARATION:** No-till.

COMMENTS: Planted in dry soil moisture and irrigated up. Weed control was only fair due to sandbur infestation. Much below normal precipitation for the growing season with dry and hot June to September. No greenbug infestation. Lodging was minor, except for two hybrids that had 15% to 30% lodging. Forage yields were good despite the dry and hot season.

SOIL TEXTURE: Silty loam for 0-8" and silty 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	0.9	1.9	15	3.1	418	0.7	3.9
8"-24"				19				
Comment	Alka	VLo	Hi	Hi	VLo	VHi	Lo	Marg

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P ₂ O ₅	Zn	Fe
	-----lb/a-----			
Recommended	0	40	0	0
Applied	50	20	0	0

Yield Goal: 18 ton/a.

Actual Yield: 18.7 ton/a @ 70% MC.

Available Soil Water Irrigated Forage Sorghum, Walsh, 2011

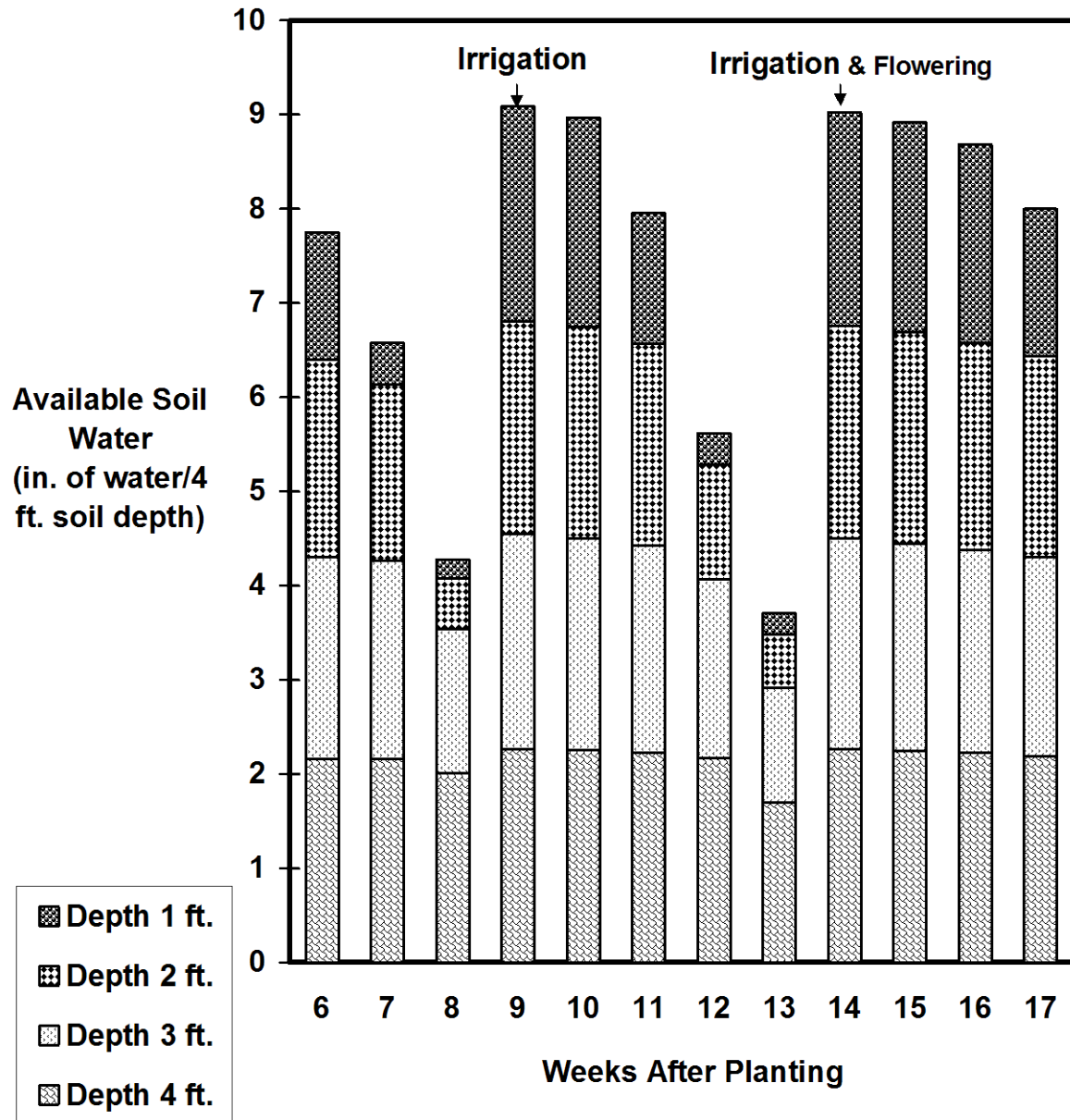


Fig. 4. Available soil water in irrigated forage sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to harvest was 4.61 in. Any increase in available soil water between weeks not attributed to applied irrigation of 20 a-in./a is from rain.

Table 11.--Irrigated Forage Sorghum Hybrid Performance Trial at Walsh, 2011. \1

Brand	Hybrid	Forage Yield	Yield % Stage \2		Stem Sugar	Plant Lodging	Harvest Density	Days		Forage Type \3
			of Test Avg.	at Harvest				Plant to 50% Bloom	Harvest	
		tons/a	%		%	%	plants/a (1000 X)	in		
SORGHUM PARTNERS	SS405	22.3	119	EM	14	2	61.2	127	111	FS
SORGHUM PARTNERS	NK300	21.9	117	PM	15	0	56.4	74	104	FS
HIGH PLAINS BRAND	HP1010 BMR	20.5	110	MM	17	2	47.8	90	97	FS
HIGH PLAINS BRAND	HP120 BMR	19.9	107	FL	16	0	58.1	68	115	FS
HIGH PLAINS BRAND	HP95 BMR	19.9	107	HD	13	1	57.1	94	86	FS
(Check)	NB 305F	18.1	97	MM	18	0	25.7	103	102	FS
SORGHUM PARTNERS	HIKANE II	17.4	93	HD	18	30	50.6	105	81	FS
SORGHUM PARTNERS	SS304	16.6	89	FL	15	15	54.8	110	111	FS
MISS. STATE UNIV.	Topper 76-6	13.7	73	MM	21	6	29.7	86	100	SW
MYCOGEN	2T806	16.7	89	SD	12	1	32.5	80	74	Corn
Average		18.7		LM	16	6	47.4	94	98	FS
LSD 0.20		1.26								

\1 Planted: June 9; Harvested: October 11 and 12.

\2 Harvest Stage: FL, flow ering; PM, premilk; EM, early milk; MM, midmilk; LM, late milk; SD, soft dough; HD, hard dough.

\3 Forage Type: FS, Forage Sorghum; SW, Sw eet Sorghum.

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

Table 12.--Summary: Irrigated Forage Sorghum Hybrid Performance Tests at Walsh, 2008, 2009, and 2011.

Brand	Hybrid	Forage Yield					Yield as % of Test Average				
		2008	2009	2011	2-Year Avg	3-Year Avg	2008	2009	2011	2-Year Avg	3-Year Avg
		-----tons/a-----					-----%-----				
MISS. STATE UNIV.	Topper 76-6	17.4	--	13.7	--	--	103	--	73	--	--
SORGHUM PARTNERS	NK 300	19.4	21.5	21.9	21.7	20.9	115	107	117	112	113
SORGHUM PARTNERS	HIKANE II	16.6	--	17.4	--	--	98	--	93	--	--
SORGHUM PARTNERS	Sordan Headless	19.4	21.4	--	--	--	115	107	--	--	--
SORGHUM PARTNERS	Trudan Headless	19.4	22.0	--	--	--	115	110	--	--	--
(Check)	NB 305F	16.4	19.4	18.1	18.8	18.0	97	97	97	97	97
(Check)	Corn	18.4	18.5	16.7	17.6	17.9	109	92	89	91	97
Average		16.9	20.0	18.7	19.4	18.5					

Forage Yields were adjusted to 70% moisture content based on oven-dried sample.
There was no forage trial in 2010.

Table 13.--Irrigated Forage Sorghum Hybrid Dry Matter Analysis at Walsh, 2011.

Brand	Hybrid	Forage Type \1	RFV	CP	TDN	Net Energy			ADF	NDF	Boot Plant Ht	Days to Boot
						Main.	Gain	Lact.				
			-----%-----	-----MCal/lb-----			----%----		in			
HIGH PLAINS BRAND	HP120 BMR	FS	108	6.5	61.0	0.61	0.35	0.63	36.4	52.0	53	105
SORGHUM PARTNERS	NK300	FS	95	5.6	60.5	0.60	0.34	0.62	36.8	58.9	58	94
(Check)	NB 305F	FS	95	8.7	59.9	0.59	0.33	0.61	37.4	58.4	85	90
SORGHUM PARTNERS	SS304	FS	95	5.5	57.4	0.56	0.30	0.59	39.6	57.1	95	101
MYCOGEN	2T806	Corn	94	10.6	58.9	0.58	0.32	0.60	38.3	58.2	76	70
SORGHUM PARTNERS	HIKANE II	FS	94	10.0	58.5	0.57	0.31	0.60	38.7	58.4	69	72
MISS. STATE UNIV.	Topper 76-6	SW	94	11.3	58.1	0.57	0.31	0.59	39.0	57.9	80	88
HIGH PLAINS BRAND	HP1010 BMR	FS	90	8.0	56.5	0.54	0.29	0.58	40.4	59.5	81	86
HIGH PLAINS BRAND	HP95 BMR	FS	90	10.5	56.4	0.54	0.29	0.57	40.5	59.2	73	78
SORGHUM PARTNERS	SS405	FS	88	6.7	55.4	0.53	0.27	0.56	41.4	60.0	110	99
Sorghum Average		FS	94	8.3	58.3	0.57	0.31	0.60	38.9	58.0	78	88

\1 Forage Type: FS, Forage Sorghum; SW, Sweet Sorghum.

Infrared analysis performed on whole plant samples taken at boot.

CP, Crude Protein; ADF, Acid Detergent Fiber; NDF, Neutral Detergent Fiber; TDN, Total Digestible Nutrients;

RFV, Relative Feed Value; Net Energy: Maintenance, Gain, Lactation..