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Arkansas Valley
Research Center

Plainsman
Research Center

**Sorghum Hybrid Performance
Trials in Colorado, 2006**

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SORGHUM HYBRID PERFORMANCE TRIALS IN COLORADO, 2006

K.J. Larson, A. Berrada and D.L. Thompson \1

The 2006 Colorado grain sorghum crop was estimated at 3.36 million bushels, slightly below the 2005 sorghum crop of 3.41 million bushels. For Colorado, the 3.36 million bushels is the second lowest in 30 years. The decrease in sorghum production this year was due to a reduction in average yield per acre compared to last year. The 2006 average yield was 28.0 bu/a, 3 bu/a less than the average yield for 2005, and 4 bu/a less than the 5-year average. There was a 25% increase in planted acres in 2006 compared to 2005 from 160,000 acres in 2005 to 200,000 acres in 2006. There are no statistics for the Colorado sorghum silage crop in 2006 because the Colorado Field Office of the National Agricultural Statistics Service no longer records sorghum silage as a separate commodity (National Agricultural Statistics Service, Colorado Field Office, 2006).

This publication is a progress report of the sorghum variety trials conducted by the Department of Soil and Crop Sciences at Colorado State University, Colorado Agricultural Experiment Station, and Cooperative Extension. The sorghum trials were conducted at two sites in Southeastern Colorado: a dryland grain sorghum trial was conducted at Walsh; irrigated grain sorghum trials at Walsh; a dryland forage sorghum trial at Walsh; and irrigated forage sorghum trials at Rocky Ford and 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 Kevin Larson, Plainsman Research Center, Box 477, Walsh, Colorado 81090, or phone (719) 324-5643, or email Kevin.Larson@colostate.edu for further details. Names and addresses of firms submitting entries in 2006 are shown in Table 1. Each firm selected entries for testing and furnished seed for the trials. The Agricultural Experiment Station 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 (on-site portable weather stations and NOAA, 2006), soil analysis, 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 available, was included: site description, emergence date, irrigation, pest control, field history, and pertinent comments.

\1 Superintendent, Plainsman Research Center, Walsh;
Research Scientist, Arkansas Valley Research Center, Rock Ford;
Technician III, Plainsman Research Center, Walsh.

Table 1.--Entrants in the 2006 Colorado Sorghum Performance Trials.

Brand	Entered by
ASGROW	Monsanto, 7159 N. 247 W., P.O. Box 7, Mt. Hope, KS 67108
DEKALB	Monsanto, 7159 N. 247 W., P.O. Box 7, Mt. Hope, KS 67108
FONTANELLE	Fontanelle Hybrids, 1614 Safford Ave., Garden City, KS 67846
MYCOGEN	Mycogen Seeds, 9330 Zionville Road, Indianapolis, IN 46268
PIONEER	Pioneer Hi-Bred International, Inc., 1616 S. Kentucky, Suite C-350, Amarillo, TX 79102
RICHARDSON SEEDS	Richardson Seeds, Ltd., P.O. Box 60, Vega, TX 79092
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

Colorado Agricultural Experiment Station entered the following
as checks: grain sorghum, TXms399 X TXR2737 (399 X 2737);
forage sorghum, NB 305F; corn hybrid, GARST 8247 YG1.

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 a modified, self-propelled John Deere 4420 combine equipped with a four-row row-crop 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 a hand-held bushel weight tester. 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 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 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 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 more 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 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 vary with the amount of soil water present. Using 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. Analysis of variance was applied to the results and the least significant difference (LSD) was computed at $\alpha = 0.20$. Analysis of variance and regression were performed with CoStat Statistical Software a product of Cohort Software, Berkeley, California.

References

National Agricultural Statistics Service, Colorado Field Office. November 1, 2006. Ag Update, vol. 26, no. 22. NASS, CDA, USDA. 4p.

National Agricultural Statistics Service, Colorado Field Office. 2006. Colorado agricultural statistics 2006, 2005 preliminary – 2004 revised. NASS, CDA, USDA. 142p.

NOAA, May-October, 2006. Climatological data, Colorado. vol. 111, 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.

Early Maturing Irrigated Grain Sorghum Hybrid Performance Trial at Walsh, 2006

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

PURPOSE: To identify high yielding hybrids, when planted late in the season (June 28), under dryland conditions with 2400 sorghum heat units in Silty Loam soil.

PLOT: Four rows with 30" row spacing, 50' long. SEEDING DENSITY: 43,600 seed/a. PLANTED: June 28. HARVESTED: November 7.

EMERGENCE DATE: 7 days after planting. SOIL TEMP: 75 F.

PEST CONTROL: Preemergence Herbicides: Glyphosate 24 oz/a, 2,4-D 0.5 lb/a. Post Emergence Herbicides Banvel 4 oz/a, Atrazine 1.0 lb/a, COC 32 oz/a. CULTIVATION: Once. 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	0.00	77	3	0	3
July	4.09	874	23	3	34
August	4.04	765	13	3	65
September	0.96	431	1	0	95
October	1.18	208	3	0	114
Total	10.27	2355	43	6	114

\1 Growing season from June 28 (planting) to October 19 (first freeze, 28 F).

\2 GDD: Growing Degree Days for sorghum.

\3 DAP: Days After Planting.

FIELD HISTORY: Last Crop: Sunflower. FIELD PREPARATION: Disc.

COMMENTS: Planted in good soil moisture. Weed control was good. Near normal precipitation for the growing season but poorly distributed: May and June were dry and July and August were wet. No greenbug infestation. Only one hybrid had minor lodging. Late freeze date. Yields were fair.

SOIL: 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"	7.4	0.5	1.9	18	6.8	535	2.6	5.9
8"-24"				19				
Comment	Alka	VLo	Hi	Hi	Lo	VHi	Adeq	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P ₂ O ₅	Zn	Fe
	-----lb/a-----			
Recommended	0	20	0	0
Applied	150	20	0.3	0

Yield Goal: 100 bu/a.

Actual Yield: 64 bu/a.

Available Soil Water
Irrigated Grain Sorghum, Early Maturing, Walsh, 2006

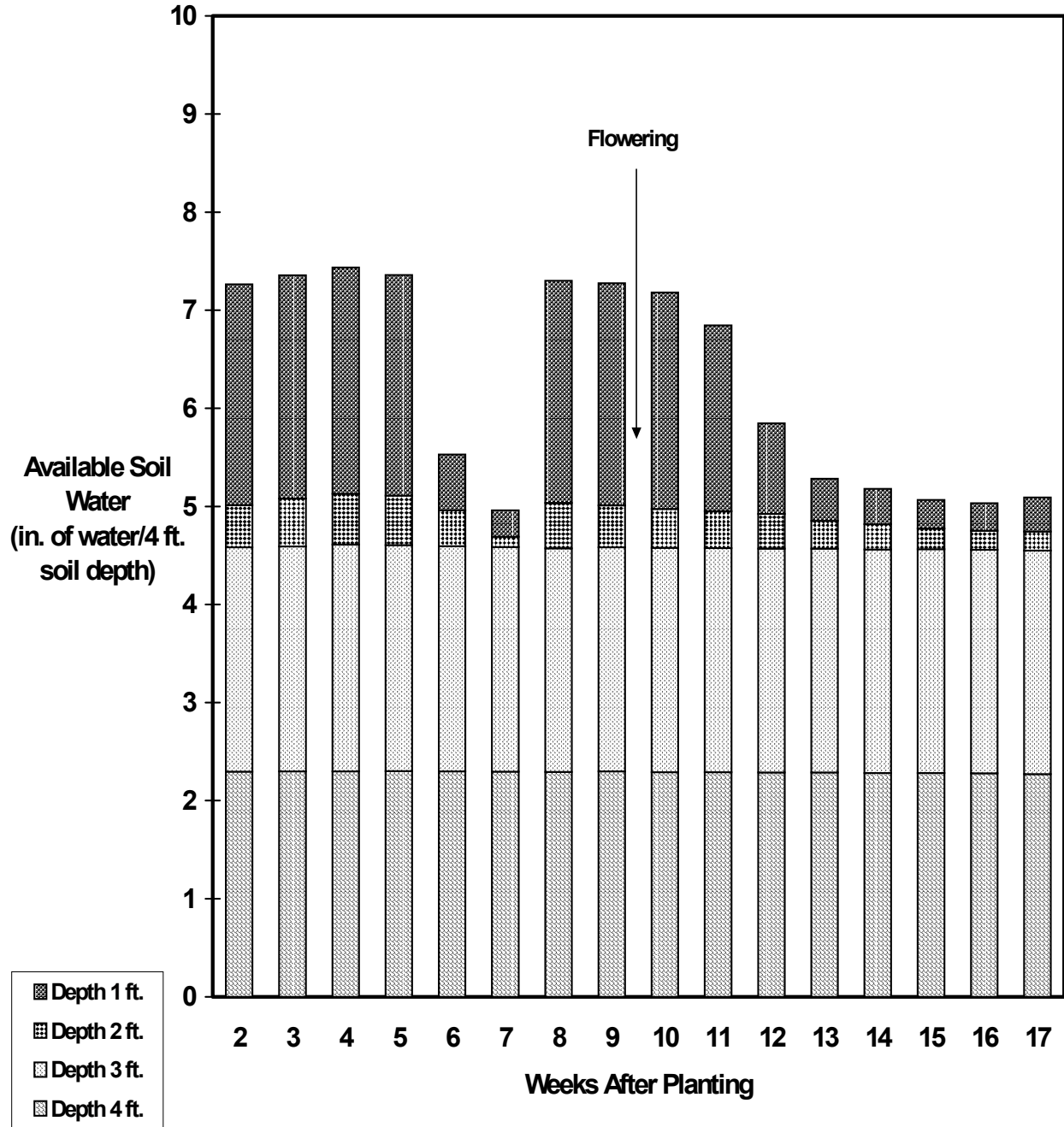


Fig. 1. Available soil water in irrigated grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze was 10.27 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

Dryland Grain Sorghum Hybrid Performance Trial at Walsh, 2006

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

PURPOSE: To identify high yielding hybrids under dryland conditions with 2400 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 26. HARVESTED: November 8.

EMERGENCE DATE: 10 days after planting. SOIL TEMP: 66 F.

PEST CONTROL: Preemergence Herbicides: Glyphosate, 24 oz/a; 2,4-D, 0.5 lb/a. Post Emergence Herbicides: Banvel 4.0 oz/a, Atrazine 1.0 lb/a, COC 32 oz/a. CULTIVATION: Once. INSECTICIDES: None.

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

COMMENTS: Planted in marginal soil moisture. Weed control was good. Near normal precipitation for the growing season but poorly distributed: May and June were dry and July and August were wet. No greenbug infestation. None of the hybrids lodged. Late freeze date. Yields and test weights were poor due to the dry conditions.

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

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	0.00	110	3	0	5
July	4.09	874	23	3	36
August	4.04	765	13	3	67
September	0.96	431	1	0	97
October	1.18	208	3	0	116
Total	10.27	2388	43	6	116

\1 Growing season from June 26 (planting) to October 19 (first freeze, 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"	7.5	0.5	1.8	22	5.3	439	1.0	5.8
8"-24"				29				
Comment	Alka	Vlo	Hi	Hi	Lo	VHi	Lo	Adeq

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	0.3	0

Yield Goal: 45 bu/a.

Actual Yield: 6 bu/a.

Available Soil Water

Dryland Grain Sorghum, Walsh, 2006

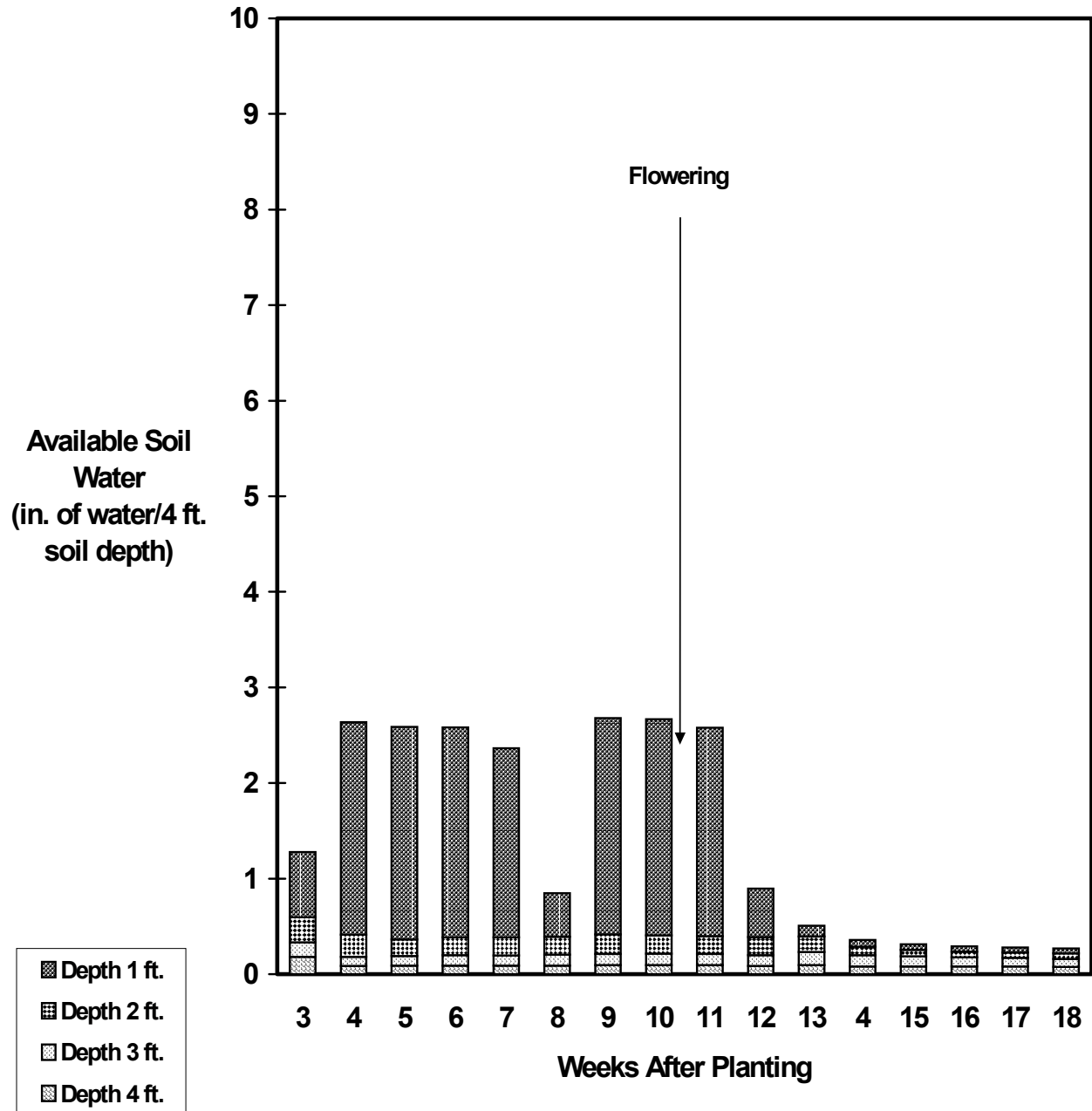


Fig. 2. Available soil water in dryland grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze was 10.27 in. Any increase in available soil water between weeks is from rain.

Table 4.--Dryland Grain Sorghum Hybrid Performance Test at Walsh, 2006. \1

Brand	Hybrid	Days to Emerge	<u>50% Bloom</u>		<u>50% Mature</u>		Plant Ht.	Harvest Density	Plants Lodged	Test Wt.	Grain Yield	Yield % of Test Average
			DAP	GDD	DAP	Group						
NC+	NC+ 5C35	8	62	1697	112	E	46	20.9	0	52	17	290
ASGROW	Pulsar	6	69	1809	HD	ME	44	22.1	0	50	10	163
NC+	NC+ 5B89	7	67	1788	HD	ME/E	47	24.0	0	49	7	117
DEKALB	DK-44	7	76	1915	SD	ME	46	19.0	0	48	6	93
ASGROW	Seneca	6	76	1915	SD	ME	43	25.2	0	49	5	87
NC+	NC+ Y363	7	75	1900	SD	ME	45	29.0	0	49	5	82
DEKALB	DKS 37-07	6	76	1915	SD	ME	49	25.9	0	48	5	78
DEKALB	DKS 35-70	8	73	1869	SD	ME	46	23.2	0	49	4	60
NC+	NC+ 6B50	6	75	1900	SD	ME	47	27.9	0	49	3	55
(Check)	399 X 2737	7	81	2009	LM	ML	42	20.9	0	44	2	40
Average		7	73	1872	SD	ME	46	23.8	0	49	6	
LSD 0.20											5.8	

\1 Planted: June 26; Harvested: November 8, 2006.

Yields are corrected to 14.0% seed moisture content.

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

Seed Maturation: EM, early milk; MM, mid milk; 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.

Table 5.--Summary: Dryland Grain Sorghum Hybrid Performance Tests at Walsh, 2004-2006.

Brand	Hybrid	Grain Yield					Yield as % of Test Average				
		2004	2005	2006	2-Year Avg	3-Year Avg	2004	2005	2006	2-Year Avg	3-Year Avg
		-----bu/a-----					-----%-----				
ASGROW	Seneca	66	56	5	31	42	107	97	87	92	97
ASGROW	Pulsar	64	60	10	35	45	105	104	163	134	124
DEKALB	DK-44	52	61	6	34	40	85	105	93	99	94
DEKALB	DKS 37-07	28	68	5	48	34	78	117	78	98	91
(Check)	399 X 2737	43	44	2	23	30	70	76	40	58	62
Average		61	58	5	32	41					

Grain Yields were corrected to 14.0% seed moisture content.

Irrigated Grain Sorghum Hybrid Performance Trial at Walsh, 2006

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

PURPOSE: To identify high yielding hybrids under irrigated conditions with 2700 sorghum heat units in a Silty Loam soil.

PLOT: Four rows with 30" row spacing, 50' long. **SEEDING DENSITY:** 87,100 seed/a. **PLANTED:** June 14. **HARVESTED:** November 7.

EMERGENCE DATE: 9 days after planting. **SOIL TEMP:** 65 F.

IRRIGATION: Drip irrigated for 15 weeks with 12.6 a-in./a.

PEST CONTROL: Preemergence Herbicides: Glyphosate 24 oz/a, 2,4-D 0.5 lb/a. Post Emergence Herbicides: Banvel 4 oz/a, Atrazine 1.0 lb/a, COC 32 oz/a. **CULTIVATION:** Once. **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	1.10	439	10	4	16
July	4.09	874	23	3	47
August	4.04	765	13	3	78
September	0.96	431	1	0	108
October	1.18	208	3	0	127
Total	11.37	2717	50	10	127

\1 Growing season from June 14 (planting) to October 19 (first freeze, 28 F).

\2 GDD: Growing Degree Days for sorghum.

\3 DAP: Days After Planting.

FIELD HISTORY: Last Crop: Sunflower. **FIELD PREPARATION:** Disc.

COMMENTS: Planted in good soil moisture. Weed control was good. Near normal precipitation for the growing season but poorly distributed: May and June were dry and July and August were wet. Late freeze date. No greenbug infestation. None of the hybrids lodged. Grain yields were fair.

SOIL: 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"	7.4	0.5	1.9	18	6.8	535	2.6	5.9
8"-24"				19				
Comment	Alka	VLo	Hi	Hi	Lo	VHi	Adeq	Adeq
Manganese and Copper levels were adequate.								

Summary: Fertilization.				
Fertilizer	N	P ₂ O ₅	Zn	Fe
	-----lb/a-----			
Recommended	0	20	0	0
Applied	150	20	0.3	0
Yield Goal: 125 bu/a.				
Actual Yield: 83 bu/a.				

Available Soil Water

Irrigated Grain Sorghum, Walsh, 2006

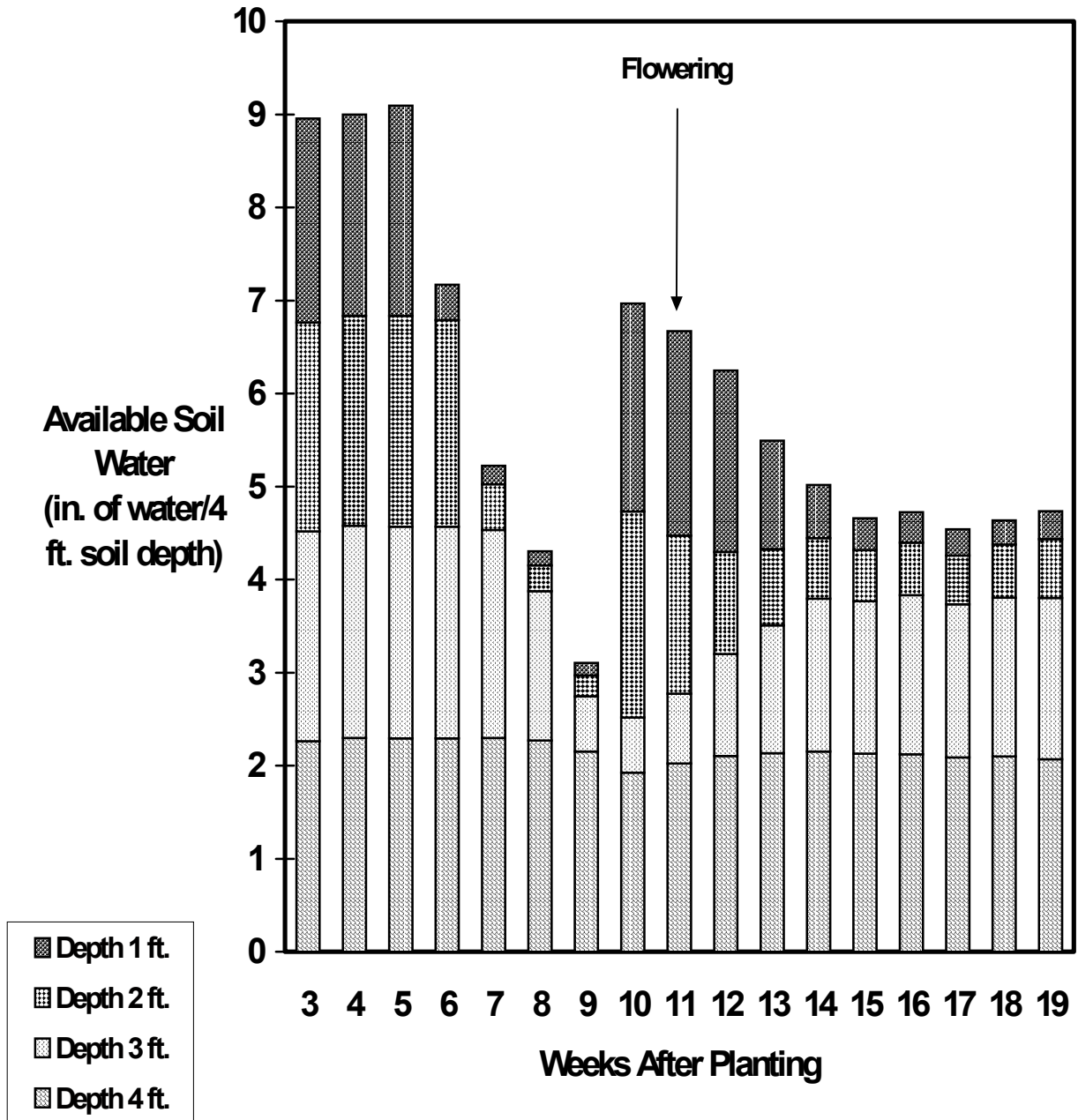


Fig. 3. Available soil water in irrigated grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze was 11.37 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

Table 6.--Irrigated Grain Sorghum Hybrid Performance Test at Walsh, 2006. \1

Brand	Hybrid	Days to Emerge	<u>50% Bloom</u>		<u>50% Mature</u>		Plant Ht.	Harvest Density	Lodged Plants	Test Wt.	Grain Yield	Yield % of Test Average	
			DAP	GDD	DAP	Group							
								in.	plants/a (1000 X)	%	lb/bu	bu/a	%
NC+	NC+ 6B50	7	64	1797	115	ME	49	63.1	0	56	101	122	
RICHARDSON SEEDS	RS 225	7	64	1797	115	ME/M	50	51.1	0	57	91	110	
NC+	NC+ 7C22	7	63	1772	114	ME	48	54.2	0	57	88	106	
ASGROW	A567	8	68	1884	121	M/ML	53	50.3	0	55	90	108	
DEKALB	DKS 54-00	7	70	1927	HD	ML	52	68.5	0	51	84	102	
DEKALB	DKS 53-11	9	70	1927	HD	ML	54	53.4	0	52	76	91	
(Check)	399 X 2737	7	70	1927	HD	ML	47	47.6	0	51	73	87	
ASGROW	A571	7	82	2138	SD	ML	53	54.6	0	48	64	77	
Average		7	69	1896	HD	ML	51	55.4	0	53	83		
LSD 0.20											6.7		

\1 Planted June 14; Harvested: November 7, 2006.

Yields are corrected to 14.0% seed moisture content.

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.

Table 7.--Summary: Irrigated Grain Sorghum Hybrid Performance Tests at Walsh, 2004-2006.

Brand	Hybrid	Grain Yield					Yield as % of Test Average				
		2004	2005	2006	2-Year Avg	3-Year Avg	2004	2005	2006	2-Year Avg	3-Year Avg
		-----bu/a-----					-----%-----				
ASGROW	A 567	117	117	90	104	108	105	103	108	106	105
ASGROW	A 571	107	117	64	91	96	96	103	77	90	92
DEKALB	DKS 54-00	107	128	84	106	106	96	112	102	107	103
DEKALB	DKS 53-11	119	113	76	95	103	107	100	91	96	99
(Check)	399 X 2737	109	102	73	88	95	98	90	87	89	92
Average		111	115	83	99	103					

Grain Yields were corrected to 14.0% seed moisture content.

Limited Sprinkler Irrigated Grain Sorghum Hybrid Performance Trial at Walsh, 2006

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

PURPOSE: To identify high yielding hybrids under limited sprinkler irrigated conditions with 3100 sorghum heat units in a Silty Loam soil.

PLOT: Four rows with 30" row spacing, at least 1000' long. SEEDING DENSITY: 58,000 seed/a. PLANTED: May 30. HARVESTED: November 3.

EMERGENCE DATE: 9 days after planting. SOIL TEMP: 65 F.

IRRIGATION: Sprinkler irrigated with 12.0 a-in./a, applied with eight rotations.

PEST CONTROL: Preemergence Herbicides: Glyphosate 24 oz/a, 2,4-D 0.5 lb/a, Atrazine 1.0 lb/a. Post Emergence Herbicides: Banvel 8 oz/a. CULTIVATION: Once. 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-----		
May	0.01	38	0	0	2
June	1.37	780	21	4	32
July	4.09	874	23	3	63
August	4.04	765	13	3	94
September	0.96	431	1	0	124
October	1.18	208	3	0	143
Total	11.65	3096	61	10	143

\1 Growing season from May30 (planting) to October 19 (first freeze, 28 F).

\2 GDD: Growing Degree Days for sorghum.

\3 DAP: Days After Planting.

FIELD HISTORY: Last Crop: Grain sorghum. FIELD PREPARATION: Sweep plow and strip-till.

COMMENTS: Planted in marginal soil moisture. Weed control was fair. Near normal precipitation for the growing season but poorly distributed: May and June were dry and July and August were wet. Late freeze date. No greenbug infestation. Lodging was severe throughout the field. Grain yields were poor because the stands were low for half the field.

SOIL: 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	0.4	1.3	9	1.5	215	0.4	5.0
8"-24"				25				
Comment	Alka	VLo	Mod	Hi	Lo	VHi	VLo	Adeq
Manganese and Copper levels were adequate.								

Summary: Fertilization.				
Fertilizer	N	P ₂ O ₅	Zn	Fe
	-----lb/a-----			
Recommended	0	20	0	0
Applied	125	40	0	0
Yield Goal: 125 bu/a.				
Actual Yield: 52 bu/a.				

Available Soil Water

Limited Sprinkler Irrigation Grain Sorghum, Walsh, 2006

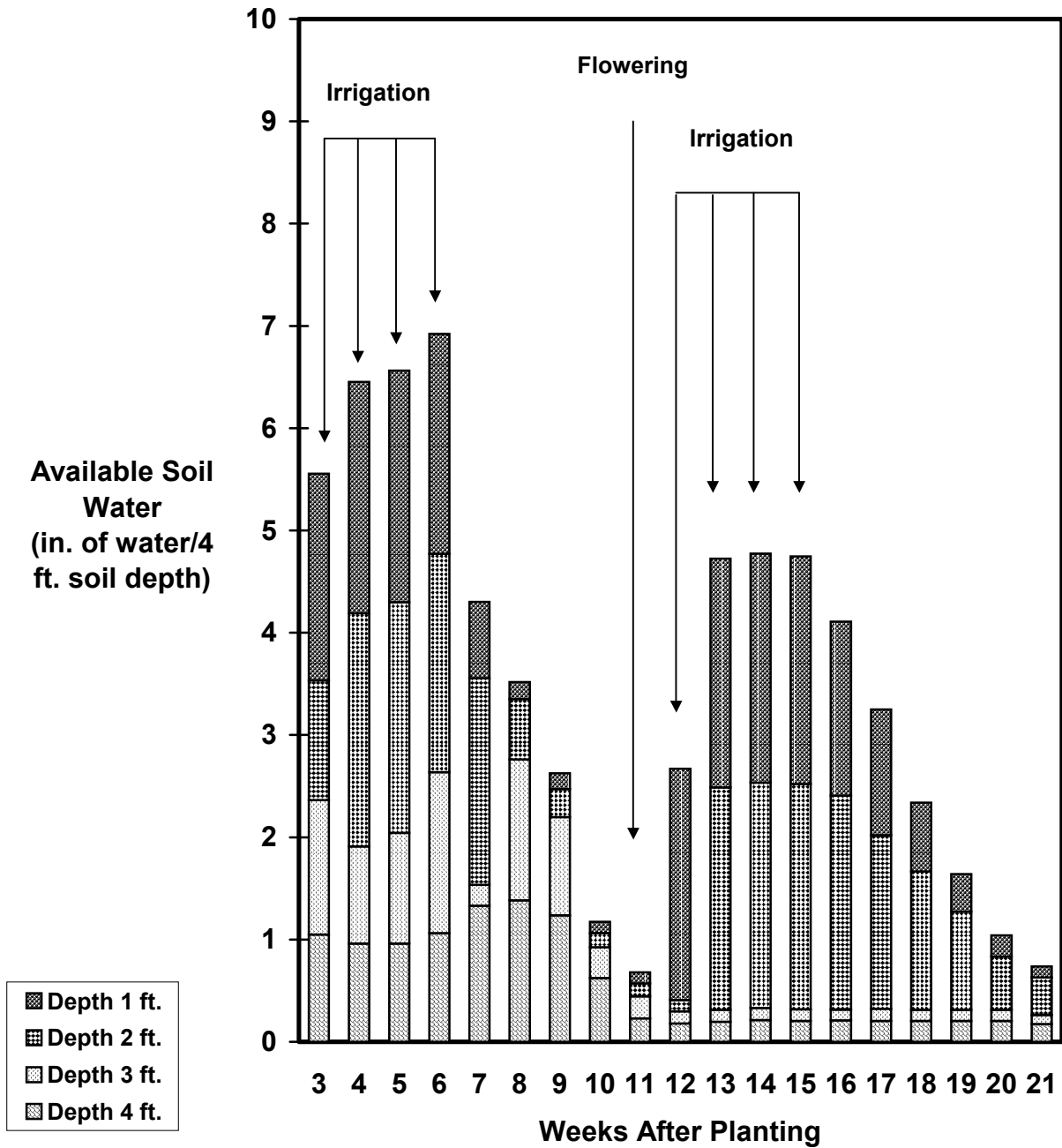


Fig. 4. Available soil water in irrigated grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze was 11.65 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

Table 8.--Limited Irrigation Sprinkler Grain Sorghum Hybrid Performance Test at Walsh, 2006. \1

Brand	Hybrid	<u>50% Bloom</u>		<u>50% Mature</u>		Plant Ht.	Harvest Density	Plants Lodged	Test Wt.	Grain Yield	Yield % of Test Average
		DAP	GDD	DAP	Group						
						in.	plants/a (1000 X)	%	lb/bu	bu/a	%
PIONEER	87G57	68	1834	114	E	45	67.3	0	57	52	100
TRIUMPH	TR 442	74	2024	119	ME	49	67.7	0	56	60	114
TRIUMPH	TR 438	72	1958	117	ME	47	63.7	0	59	57	110
TRIUMPH	TRX02783	73	1994	118	ME	49	70.1	0	57	57	110
MYCOGEN	627	74	2024	121	ME	47	74.5	0	54	54	104
FONTANELLE	GE4532	76	2087	122	ME	48	62.9	0	57	54	103
TRIUMPH	TR 459	75	2054	121	ME	46	70.9	0	54	47	89
MYCOGEN	M3838	76	2087	124	ME	44	85.7	0	55	44	85
PIONEER	85G01	77	2103	125	M	45	81.3	0	54	49	94
MYCOGEN	697	78	2125	128	M	46	61.7	0	53	48	92
Average		74	2029	121	ME	47	70.6	0	56	52	
LSD 0.20										7.6	

\1 Planted: May 30; Harvested: November 3, 2006.

Yields are corrected to 14.0% seed moisture content.

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

Seed Maturation: EM, early milk; MM, mid milk; LM, late milk; ED, early dough; SD, soft dough; HD, hard dough; mature (DA)

GDD: Growing Degree Days for sorghum.

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

Table 9.--Summary: Limited Irrigation Grain Sorghum Hybrid Performance Tests at Walsh, 2004-2006.

Brand	Hybrid	Grain Yield					Yield as % of Test Average				
		2004	2005	2006	2-Year Avg	3-Year Avg	2004	2005	2006	2-Year Avg	3-Year Avg
		-----bu/a-----					-----%-----				
FONTANELLE	GE4532	--	62	54	58	--	--	105	103	104	--
MYCOGEN	M3838	--	52	44	48	--	--	87	85	86	--
TRIUMPH	TR 442	--	73	60	67	--	--	124	114	119	--
Average		--	59	52	56	--					

Grain Yields were corrected to 14.0% seed moisture content.

Dryland Forage Sorghum Hybrid Performance Trial at Walsh, 2006

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

PURPOSE: To identify high yielding hybrids under dryland conditions with 2500 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 20. HARVESTED: October 13.

EMERGENCE DATE: 12 days after planting. SOIL TEMP: 72 F.

PEST CONTROL: Preemergence Herbicides: Glyphosate 24 oz/a, 2,4-D 0.5 lb/a. Post Emergence Herbicides: Atrazine 1.0 lb/a, Banvel 4 oz/a, COC 32 oz/a. CULTIVATION: Once. INSECTICIDES: None.

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

COMMENTS: Planted in marginal soil moisture. Weed control was good. Near normal precipitation for the growing season but poorly distributed: May and June were dry and July and August were wet. No greenbug infestation. Lodging was mild. Forage yields were poor because of the dry conditions.

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

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	0.62	268	6	2	10
July	4.09	874	23	3	41
August	4.04	765	13	3	72
September	0.96	431	1	0	102
October	1.08	162	3	0	115
Total	10.79	2500	46	8	115

\1 Growing season from June 20 (planting) to October 13 (harvest).

\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"	7.5	0.5	1.8	22	5.3	439	1.0	5.8
8"-24"				29				
Comment	Alka	VLo	Hi	VHi	Lo	VHi	Lo	Adeq

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: 10 ton/a.

Actual Yield: 5.5 ton/a @ 70% MC.

Available Soil Water
Dryland Forage Sorghum, Walsh, 2006

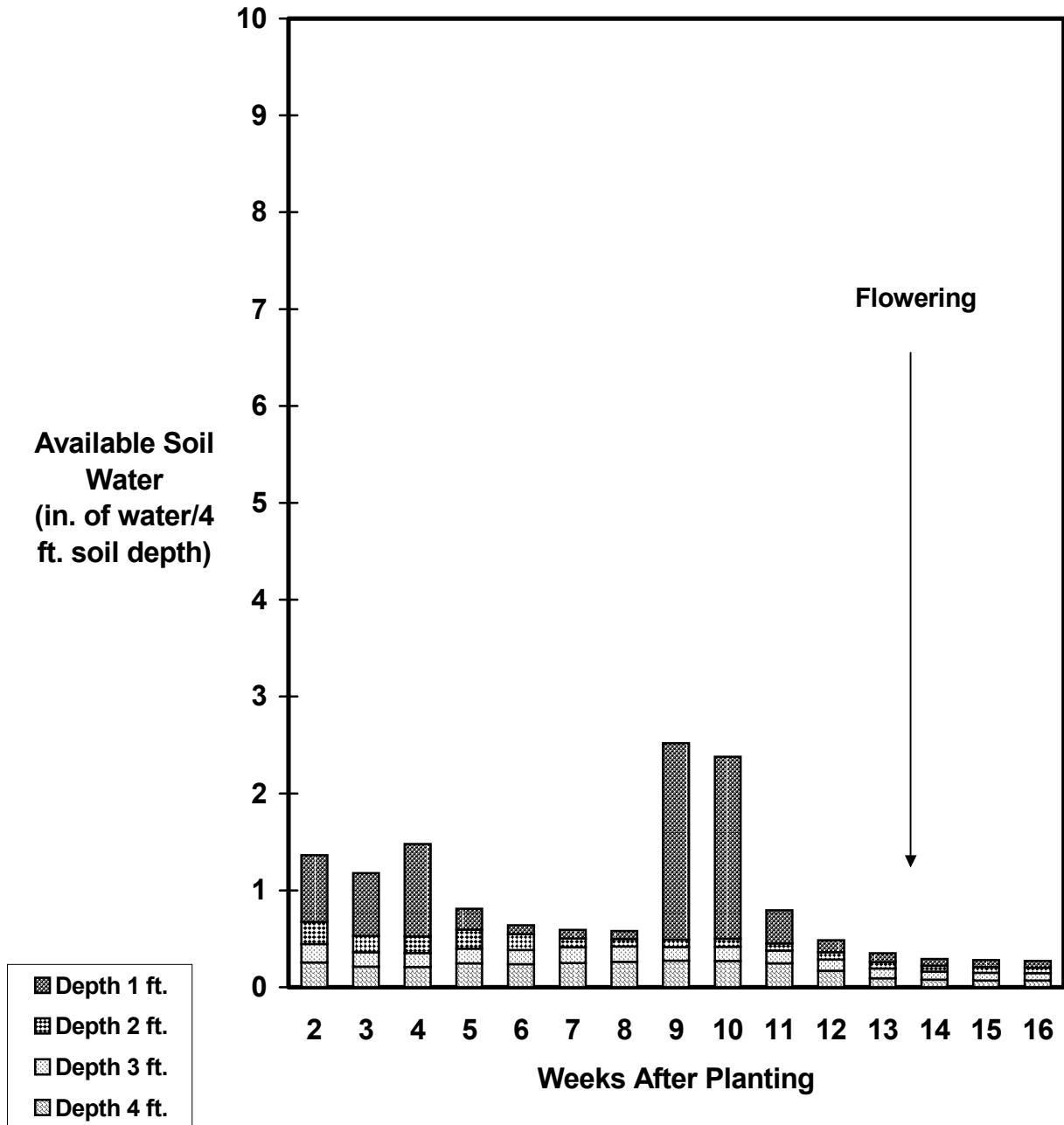


Fig. 5. Available soil water in dryland forage sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to harvest was 10.79 in. Any increase in available soil water between weeks is from rain.

Table 10.--Dryland Forage Sorghum Hybrid Performance Test at Walsh, 2006. \1

Brand	Hybrid	Forage Type \2	Days		Harvest Density	Stage \3			Plants Lodged	Forage Yield	Yield % of Test Average
			Days to Emerge	to 50% Bloom		Plant Ht.	at Harvest	Stem Sugar			
					plants/a (1000 X)	in.		%	%	tons/a	%
SORGHUM PARTNERS (Check)	HIKANE II	FS	8	94	41.0	56	PM	18	15	6.5	118
	NB 305F	FS	9	96	25.6	62	PM	19	12	4.7	85
SORGHUM PARTNERS	NK300	FS	7	110	41.4	30	FL	18	0	4.4	80
SORGHUM PARTNERS	Sordan 79	SS	7	87	36.0	69	EM	13	2	7.3	133
GARST	8247 YG1	Corn	6	81	24.0	80	LM	14	3	4.5	82
Sorghum Average		FS	7	94	33.6	59	PM	16	6	5.5	
LSD 0.20										0.90	

\1 Planted: June 20; Harvested: October 13.

\2 Forage Type: FS, Forage Sorghum; SS, Sorghum Sudangrass.

\3 Seed Maturation: PM, premilk; EM, early milk; MM, midmilk; LM, late milk; ED, early dough; SD, soft dough; HD, hard dough; MT, mature.

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

Table 11.--Summary: Dryland Forage Sorghum Hybrid Performance Tests at Walsh, 2003-2006.

Brand	Hybrid	Forage Yield					Yield as % of Test Average				
		2003	2004	2006	2-Year Avg	3-Year Avg	2003	2004	2006	2-Year Avg	3-Year Avg
		-----tons/a-----					-----%-----				
AERC	AERC SSH 35	4.9	3.1	--	4.0	--	102	32	--	67	--
BUFFALO BRAND	Canex	5.5	8.5	--	7.0	--	115	88	--	102	--
BUFFALO BRAND	Canex BMR 208	4.8	8.7	--	6.8	--	99	90	--	95	--
BUFFALO BRAND	Canex BMR 310	5.5	6.3	--	5.9	--	115	65	--	90	--
BUFFALO BRAND	Canex BMR 248	5.1	9.2	--	7.2	--	107	95	--	101	--
BUFFALO BRAND	Grazex BMR 727	3.9	10.1	--	7.0	--	80	104	--	92	--
SORGHUM PARTNERS	NK 300	4.2	12.1	4.4	8.3	6.9	87	125	80	103	97
SORGHUM PARTNERS	SS 405	6.0	8.9	--	7.5	--	124	92	--	108	--
SORGHUM PARTNERS	1990	3.3	12.4	--	7.9	--	48	128	--	88	--
SORGHUM PARTNERS	Sordan 79	3.9	9.6	7.3	8.5	6.9	81	99	133	116	104
SORGHUM PARTNERS	Sordan Headless	4.3	13.4	--	8.9	--	89	138	--	114	--
SORGHUM PARTNERS	Trudan 8	4.2	11.7	--	8.0	--	87	120	--	104	--
(Check)	NB 305F	5.0	9.5	4.7	7.1	6.4	104	98	85	92	96
(Check)	Corn	3.1	8.5	4.5	6.5	5.4	64	87	82	85	78
Average		4.8	9.7	5.5	7.6	6.7					

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

There was no dryland forage sorghum trial in 2005.

Table 12.--Dryland Forage Sorghum Hybrid Dry Matter Analysis at Walsh, 2006.

Brand	Hybrid	Forage Type \1	Days Boot to Plant		CP	ADF	NDF	NDFD	TDN	RFV	<u>Net Energy</u>		
			Boot	Ht							Main.	Gain	Lact.
			in.	-----%-----						-----MCal/lb-----			
SORGHUM PARTNERS	NK300	FS	95	29	10.7	34.6	54.3	68	63.2	106	0.64	0.38	0.65
SORGHUM PARTNERS	HIKANE II	FS	81	63	10.4	31.6	55.1	63	66.5	108	0.69	0.42	0.69
(Check)	NB 305F	FS	85	67	13.7	32.7	53.9	71	65.3	109	0.67	0.41	0.67
SORGHUM PARTNERS	Sordan 79	SS	77	68	12.9	35.1	55.2	68	62.6	104	0.63	0.37	0.64
GARST	8247 YG1	Corn	75	69	12.2	29.9	50.0	71	68.5	122	0.72	0.45	0.71
Sorghum Average		FS	83	59	12.0	32.8	53.7	68	65.2	110	0.67	0.41	0.67

\1 Forage Type: FS, Forage Sorghum; SS, Sorghum Sudangrass.

Infrared analysis performed by Ward Laboratories, Inc. on whole plant samples taken at boot.

CP, Crude Protein; ADF, Acid Detergent Fiber; NDF, Neutral Detergent Fiber; TDN, Total Digestible Nutrients; NDFD, Digestibility of NDF; RFQ, Relative Forage Value; Net Energy: Maintenance, Gain, Lactation..

Irrigated Forage Sorghum Hybrid Performance Trial at Walsh, 2006

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

PURPOSE: To identify high yielding hybrids under irrigated conditions with 2500 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 20. **HARVESTED:** October 12.

EMERGENCE DATE: 9 days after planting. **SOIL TEMP:** 66 F.

IRRIGATION: Three furrow irrigations: June 29, August 18, and September 1, total applied 17 a-in./a.

PEST CONTROL: Preemergence Herbicides: Glyphosate 24 oz/a, 2,4-D 0.5 lb/a. Post Emergence Herbicides: Atrazine 1.0 lb/a, Banvel 4 oz/a, COC 32 oz/a. **CULTIVATION:** Once. **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	0.62	268	6	2	10
July	4.09	874	23	3	41
August	4.04	765	13	3	72
September	0.96	431	1	0	102
October	1.08	159	3	0	114
Total	10.79	2497	41	8	114

\1 Growing season from June 20 (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 marginal soil moisture. Weed control was good. Near normal precipitation for the growing season but poorly distributed: May and June were dry and July and August were wet. No greenbug infestation. Six hybrids had 30% or more lodging. Forage yields were good.

SOIL: 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"	7.5	0.5	1.8	22	5.3	439	1.0	5.8
8"-24"				29				
Comment	Alka	VLo	Hi	VHi	Lo	VHi	Lo	Adeq
Manganese and Copper levels were adequate.								

Summary: Fertilization.				
Fertilizer	N	P ₂ O ₅	Zn	Fe
	-----lb/a-----			
Recommended	0	20	0	0
Applied	150	20	0	0
Yield Goal: 18 ton/a. Actual Yield: 15.5 ton/a @ 70% MC.				

Available Soil Water Irrigated Forage Sorghum, Walsh, 2006

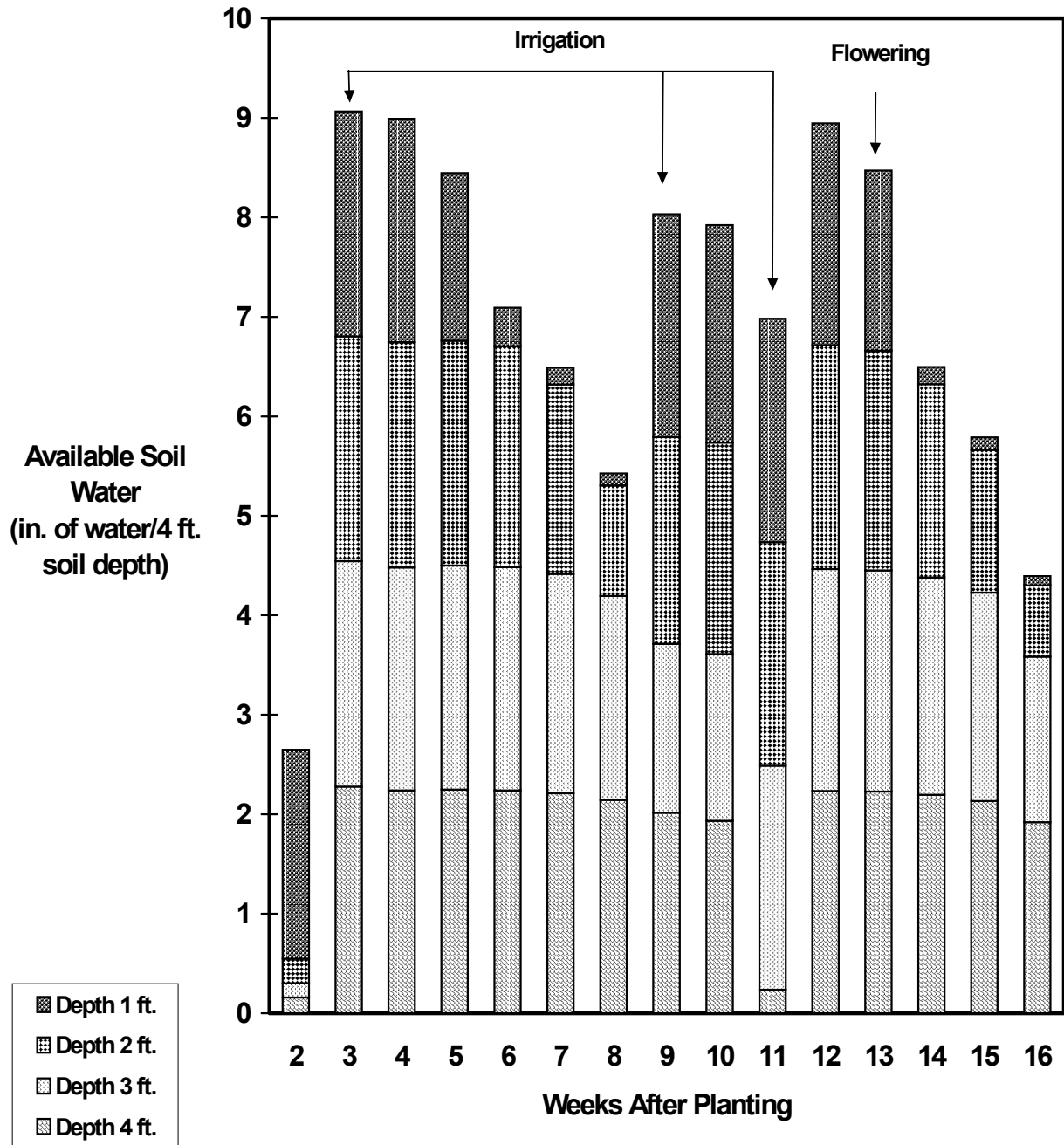


Fig. 6. Available soil water in irrigated forage sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to harvest was 10.79 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

Table 13.--Irrigated Forage Sorghum Hybrid Performance Test at Walsh, 2006. \1

Brand	Hybrid	Forage Type \2	Days	Days	Harvest Density	Plant Ht.	Stage \3			Forage Yield	Yield % of Test Avg.
			to Emerg	to 50% Bloom			at Harvest	Stem Sugar %	Plant Lodg %		
					plants/a (1000 X)	in.					
DEKALB	FS-5	FS	7	90	62.7	97	EM	14	15	20.1	130
SORGHUM PARTNERS	NK300	FS	6	95	74.7	71	PM	17	15	19.3	125
RICHARDSON SEEDS	Silo 700D	FS	6	98	73.2	71	PM	16	8	17.4	112
DEKALB	FS-25E	FS	7	108	53.1	92	FL	12	45	13.9	89
DEKALB	DKS 59-09	FS	7	87	53.4	73	MM	14	30	13.6	88
RICHARDSON SEEDS	Dairy Master BMR	FS	7	93	53.1	87	PM	16	60	13.5	87
SORGHUM PARTNERS	HIKANE II	FS	7	86	70.9	86	EM	16	70	12.8	82
(Check)	NB 305F	FS	8	92	51.9	88	PM	17	35	10.2	66
SORGHUM PARTNERS	Sordan 79	SS	6	78	51.1	113	LM	10	18	18.8	121
RICHARDSON SEEDS	Sweeter 'N Honey II	SS	6	101	68.5	106	PM	14	1	16.6	107
RICHARDSON SEEDS	Sweeter 'N Honey BMR	SS	6	87	47.6	94	MM	12	55	13.5	87
GARST	8247 YG1	Corn	5	70	34.9	99	ED	11	0	16.5	107
Sorghum Average		FS	7	90	57.9	90	EM	14	29	15.5	
LSD 0.20										2.87	

\1 Planted: June 20; Harvested: October 12.

\2 Forage Type: FS, Forage Sorghum; SS, Sorghum Sudangrass.

\3 Seed Maturation: PM, premilk; EM, early milk; MM, midmilk; LM, late milk; ED, early dough; SD, soft dough; HD, hard dough; MT, mature.

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

Table 14.--Summary: Irrigated Forage Sorghum Hybrid Performance Tests at Walsh, 2004-2006.

Brand	Hybrid	Forage Yield					Yield as % of Test Average				
		2004	2005	2006	2-Year Avg	3-Year Avg	2004	2005	2006	2-Year Avg	3-Year Avg
		-----tons/a-----					-----%-----				
DEKALB	FS-5	21.0	21.5	20.1	20.8	20.9	137	123	130	127	130
DEKALB	FS-25E	13.3	22.0	13.9	18.0	16.4	87	125	89	107	100
DEKALB	DKS 59-09	20.7	17.8	13.6	15.7	17.4	136	102	88	95	109
RICHARDSON SEEDS	Dairy Master BMR	--	17.9	13.5	15.7	--	--	102	87	95	--
RICHARDSON SEEDS	Sweeter 'N Honey II	--	18.3	16.6	17.5	--	--	104	107	106	--
RICHARDSON SEEDS	Sweeter 'N Honey BMR	--	16.0	13.5	14.8	--	--	91	87	89	--
SORGHUM PARTNERS	NK 300	16.2	--	19.3	17.8	--	106	--	125	116	--
(Check)	NB 305F	17.2	15.9	10.2	21.8	14.4	112	91	66	79	90
(Check)	Corn	18.7	21.9	16.5	19.2	19.0	122	125	107	116	118
Average		15.3	17.5	15.5	16.5	16.1					

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

Table 15.--Irrigated Forage Sorghum Hybrid Dry Matter Analysis at Walsh, 2006.

Brand	Hybrid	Forage Type \1	Days Boot		CP	ADF	NDF	NDFD	TDN	RFV	Net Energy		
			to Boot	Plant Ht							Main.	Gain	Lact.
			in.	-----%-----						-----MCal/lb-----			
SORGHUM PARTNERS	HIKANE II	FS	75	72	17.4	31.1	51.2	67	67.0	117	0.70	0.43	0.69
DEKALB	FS-25E	FS	97	84	12.9	32.7	56.3	66	65.2	105	0.67	0.41	0.67
DEKALB	DKS 59-09	FS	77	59	14.5	35.2	54.8	71	62.4	104	0.63	0.37	0.64
SORGHUM PARTNERS	NK300	FS	85	59	14.9	35.0	55.1	66	62.7	104	0.64	0.37	0.64
RICHARDSON SEEDS	Silo 700D	FS	88	59	13.5	35.3	55.5	63	62.3	103	0.63	0.37	0.64
(Check)	NB 305F	FS	81	77	14.5	35.7	56.5	65	61.8	101	0.62	0.36	0.63
DEKALB	FS-5	FS	79	75	14.1	35.7	57.0	62	61.9	100	0.62	0.36	0.63
RICHARDSON SEEDS	Dairy Master BMR	FS	80	80	12.1	36.5	58.2	65	61.0	97	0.61	0.35	0.62
RICHARDSON SEEDS	Sweeter 'N Honey BMR	SS	77	73	16.9	31.8	52.9	71	66.2	113	0.69	0.42	0.68
RICHARDSON SEEDS	Sweeter 'N Honey II	SS	92	97	13.6	33.1	53.4	62	64.8	110	0.67	0.40	0.67
SORGHUM PARTNERS	Sordan 79	SS	67	82	14.0	35.5	57.3	63	62.0	99	0.63	0.36	0.64
GARST	8247 YG1	Corn	65	78	14.2	32.2	54.7	65	65.9	109	0.68	0.41	0.68
Sorghum Average		FS	80	75	14.4	34.2	55.2	66	63.6	105	0.65	0.38	0.65

\1 Forage Type: FS, Forage Sorghum; SS, Sorghum Sudangrass.

Infrared analysis performed by Ward Laboratory, Inc. on whole plant samples taken at boot.

CP, Crude Protein; ADF, Acid Detergent Fiber; NDF, Neutral Detergent Fiber; TDN, Total Digestible Nutrients; NDFD, Digestibility of NDF; RFQ, Relative Forage Value; Net Energy: Maintenance, Gain, Lactation..

Irrigated Forage Sorghum Hybrid Performance Trial at Rocky Ford, 2006

COOPERATOR: Abdel Berrada, Research Scientist Arkansas Valley Research Center, Rocky Ford, Colorado.

PURPOSE: To identify high yielding hybrids under irrigated conditions in a Silty Clay Loam soil.

PLOT: Two rows with 30" row spacing, 32' long. SEEDING DENSITY: 99,700 seed/a. PLANTED: May 17. HARVESTED: August 29.

IRRIGATION: Six furrow irrigations: May 3, June 5, July 1, July 13, July 30, and August 16.

PEST CONTROL: Preemergence Herbicides: Glyphosate 1.0 lb ai/acre, Dual II Magnum 1.43 lb ai/acre. Postemergence Herbicide: None. Insecticide: None.

SOIL: Silty Clay Loam, 1 - 1.5% O.M., pH-ca. 7.8. FERTILIZER: 200 lb/acre of 11-52-0 on 10/5/05 and 300 lb/acre of 46-0-0 on 1/17/06.

COMMENTS: Planted in good soil moisture. Weed control was good. The growing season was nearly normal, except July was hot and July and August was wetter than average. There was only minor and variable lodging. The forage crop was not stressed because of abundant irrigation water. Forage yields were very good.

Summary: Growing Season Precipitation and Temperature \1
Arkansas Valley Research Center, Rocky Ford, Otero County.

Month	Rainfall	GDD \2	>90 F	>100 F	DAP \3
	In		-----no. of days-----		
May	1.58	347	9	1	14
June	0.28	780	21	4	44
July	3.25	874	23	3	75
August	3.81	726	13	3	104
Total	8.92	2727	66	11	104

\1 Growing season from May 17 (planting) to August 29 (harvest).

\2 GDD: Growing Degree Days for sorghum.

\3 DAP: Days After Planting.

Table 16.--Irrigated Forage Sorghum Hybrid Performance Test at Rocky Ford, 2006. \1

Brand	Hybrid	Forage Type \2	Plant Density	Plant Ht.	Stage \3			Forage Yield	Yield % of Test Avg.
					at Harvest	Stem Sugar	Harvest Moisture		
			plants/a (1000 X)	in.		%	%	tons/a	%
SORGHUM PARTNERS (Check)	HIKANE II	FS	20.5	109	HD	13	73	29.3	100
	NB 305F	FS	17.4	113	LM	16	76	25.1	86
SORGHUM PARTNERS	NK300	FS	21.0	79	HD	4	71	25.1	86
SORGHUM PARTNERS	Sordan 79	SS	25.8	123	SD	5	70	37.6	128
Sorghum Average		FS	21.2	106	LM	10	72.4	29.3	
LSD 0.30				5		3	1.7	2.8	

\1 Planted: May 17; Harvested: August 29.

\2 Forage Type: FS, Forage Sorghum; SS, Sorghum Sudangrass.

\3 Seed Maturation: PM, premilk; EM, early milk; MM, midmilk; LM, late milk; ED, early dough; SD, soft dough; HD, hard dough; MT, mature.

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