

## SORGHUM HYBRID PERFORMANCE TESTS IN COLORADO, 2002

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SORGHUM HYBRID PERFORMANCE TESTS IN COLORADO, 2002  
K.J. Larson, F.C. Schweissing, and D.L. Thompson \1

The 2002 Colorado grain sorghum crop was estimated at 4.5 million bushels, 52% lower than in 2001. For Colorado, the 4.5 million bushels is the lowest grain sorghum production since 1956. The decrease in sorghum production was due mainly to a decrease in harvested acres, and secondarily to a decrease in per acre yield. There was a large, 32%, decrease in acreage from 220,000 in 2001 to 150,000 harvested acres in 2002. In 2002 the average yield was 30 Bu/A, whereas, in 2001 the average yield was 43 Bu/A. The yield of 30 Bu/A is 11 Bu/A less than the 10-year average. Sorghum silage production in 2001 was 240,000 tons, up 25% from 2000. Sorghum silage production for 2001 was the highest recorded over the past five years. The increase in silage production was because of higher yields, 20 Tons/A from 12,000 acres in 2001, and 16 Tons/A from 12,000 in 2000 (Colorado Agricultural Statistic Service, 2002).

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 tests were located at four sites in Southeastern Colorado: dryland grain sorghum trials were conducted at Vilas and Walsh; irrigated grain sorghum trials at Hartman (abandoned because of drought) and Walsh; irrigated forage sorghum trials at Rocky Ford and Walsh; and a dryland 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 tests should write to Kevin Larson, Plainsman Research Center, Box 477, Walsh, Colorado 81090, or phone (719) 324-5643, or email [Kevin.Larson@colostate.edu](mailto:Kevin.Larson@colostate.edu) for further details. Names and addresses of firms submitting entries in 2002 are shown in Table 1. Each firm 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. A closed-pedigree corn hybrid was 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, 2002), 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;  
Superintendent, Arkansas Valley Research Center, Rocky Ford;  
Technician III, Plainsman Research Center, Walsh.

Table 1.--Entrants in the 2002 Colorado Sorghum Performance Tests.

Brand	Entered by
ASGROW	Monsanto, RR 3, Box 119, Plainview, TX 79072
BUFFALO BRAND	Sharp Brothers Seed Co., P.O. Box 140, Healy, KS 67850
CAL/WEST SEEDS	CAL/WEST Seeds, Rt.1, Box 70, West Salem, WI 54669
DEKALB	Monsanto, RR 3, Box 119, Plainview, TX 79072
GOLDEN HARVEST	Golden Harvest Seeds/The J.C. Robinson Seed Company, P.O. Box A, Waterloo, NE 68069
NC+	NC+ Hybrids, P.O. Box 4408, Lincoln, NE 68504
NK	Sorghum Partners, Inc., 403 S. Monroe, P.O. Box 189, New Deal, TX 79350
PIONEER BRAND	Pioneer Hi-Bred International, Inc., 390 Union Blvd., Suite 500A, Lakewood, CO 80228
RICHARDSON SEEDS	Richardson Seeds, Inc., P.O. Box 60, Vega, TX 79092
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 hybrids, MYCOGEN 2715 and GOLDEN HARVEST H-9235 Bt/RR.

Growing Degree Days for sorghum were calculated using maximum (111°F) and minimum (50°F) threshold temperatures between which sorghum growth occurs (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 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 a trial and allows easy comparisons among years,

Forage Yield. Forage yield in tons per acre was corrected 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.

### Acknowledgments

We are sincerely grateful to the grower-cooperators for their assistance in the off-station trials: Fred Williams, Hartman; and Terrill Swanson, Vilas, Colorado. We are also grateful to the NOAA weather observer, William Davis, Holly, Colorado for collecting the weather data utilized at Hartman.

## References

Colorado Agricultural Statistics Service. November, 2002. Ag Update, vol. 23, no. 22. CASS, CDA, USDA. 4p.

Colorado Agricultural Statistics Service. 2002. Annual report , fiscal year 2001-2002. CASS, CDA, USDA. 157p.

NOAA, May-October, 2002. Climatological Data, Colorado. vol. 107, no. 5-10. NOAA, 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 Test at Walsh, 2002

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 (July 1), under drip-irrigated conditions with 2450 sorghum heat units in Silty Loam soil.

PLOT: Four rows with 30" row spacing, 50' long. SEEDING DENSITY: 87,100 Seed/A. PLANTED: July 1. HARVESTED: November 12.

EMERGENCE DATE: 8 days after planting. SOIL TEMP: 80 F.

IRRIGATION: Furrow irrigated for stand establishment with about 6 A-in./A. Drip irrigated for 10 weeks with 13.3 A-in./A.

PEST CONTROL: Preemergence Herbicides: Roundup 16 Oz/A. Post Emergence Herbicides Clarity 4 Oz/A, Atrazine 1.0 Lb/A, COC 32 Oz/A. CULTIVATION: Once. INSECTICIDES: None.

FIELD HISTORY: Last Crop: Sunflower. FIELD PREPARATION: No-Till.

COMMENTS: Planted in dry soil and furrow irrigated up. Weed control was good. Near normal precipitation for the growing season with a very dry spring and a wet August (late). No greenbug infestation. None of the hybrids lodged. Average freeze date. Yields and test weights were good for late planting.

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-----		
July	1.67	912	24	12	31
August	5.59	831	19	4	62
September	1.74	541	5	0	92
October	0.40	155	0	0	107
Total	9.40	2439	48	16	107

\1 Growing season from July 1 (planting) to October 15 (first freeze, 27 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"	7.9	0.7	1.6	27	1.3	451	0.6	4.8
8"-24"				14				
Comment	Alka	VLo	Hi	Hi	VLo	VHi	Lo	Marg

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P <sub>2</sub> O <sub>5</sub>	Zn	Fe
	-----Lb/A-----			
Recommended	0	40	0	0
Applied	180	20	0.3	0

Yield Goal: 100 Bu/A.

Actual Yield: 64 Bu/A.

**Available Soil Water**  
Irrigated Grain Sorghum, Early Maturing, Walsh, 2002

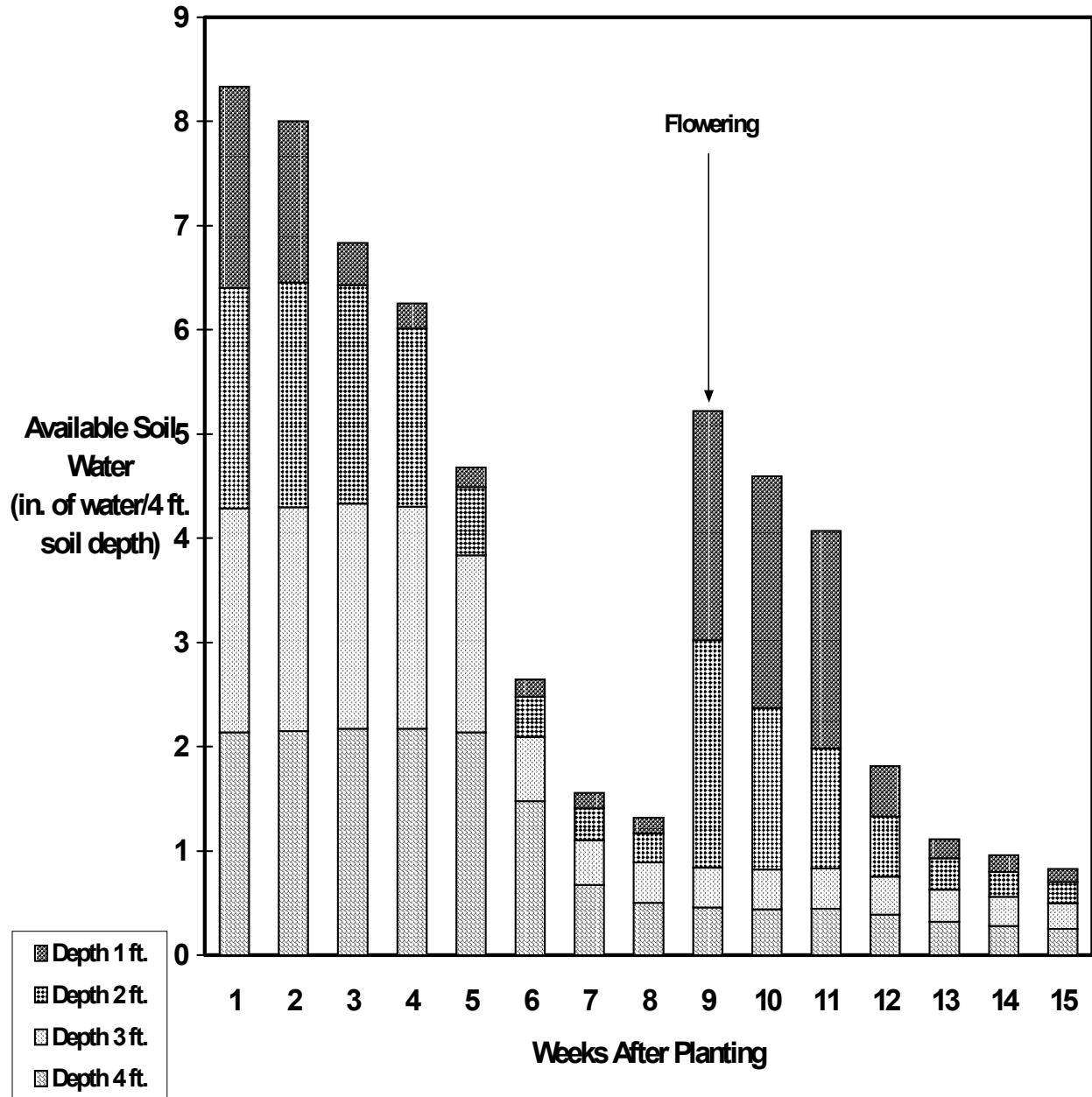


Fig. 1. Available soil water in drip irrigated grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze was 9.40 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.



Table 2.--Irrigated Grain Sorghum Early Maturing Hybrid Performance Test at Walsh, 2002. \1

Brand	Hybrid	Days to Emerge	50% Bloom		50% Mature		Plant Ht.	Harvest Density	Lodged Plants	Test Wt.	Grain Yield	Yield %					
			DAP	GDD	DAP	Group						of Test Average					
												In	Plants/A	%	Lb/Bu	Bu/A	%
												(1000 X)					
DEKALB	DK-28E	8	56	1603	100	E	42	50.5	0	54	88	138					
NK	NK 251	8	57	1628	99	E	39	39.7	0	56	77	120					
ASGROW	Reward	8	59	1678	104	E	41	50.2	0	58	76	119					
DEKALB	DKS 29-28	7	61	1721	107	E	38	40.1	0	53	74	115					
PIONEER	87G57	7	60	1702	102	E	43	45.3	0	54	72	112					
NK	NK KS 310	8	64	1795	HD	ME	45	44.3	0	50	69	108					
PIONEER	86G71	7	65	1819	HD	ME/E	44	50.9	0	51	63	99					
NK	NK K35-Y5	9	64	1795	HD	ME	42	41.1	0	50	60	94					
NK	NK KS 585	7	72	1993	MM	M	51	51.6	0	43	40	63					
(Check)	399 X 2737	7	75	2032	EM	ML	44	46.0	0	42	21	33					
Average		8	63	1777	HD	ME	43	46.0	0	51	64						
LSD 0.2											5.8						

\1 Planted: July 1; Harvested: November 12.

Yields are corrected to 14.0% seed moisture content.

DAP: Days After Planting or maturation of seed at first freeze (27 F, October 15).

Seed Maturation: PM, pre-milk; EM, early milk; MM, mid-milk; LM, late milk; ED, early dough; SD, soft dough; HD, hard dough; DAP, mature.

GDD: Growing Degree Days for sorghum.

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

Table 3.--Summary: Grain Sorghum Early Maturing Hybrid Performance Tests, 2000-2002.

Brand	Hybrid	Grain Yield					Yield as % of Test Average				
		2000	2001	2002	2-Year Avg	3-Year Avg	2000	2001	2002	2-Year Avg	3-Year Avg
		-----Bu/A-----					-----%-----				
ASGROW	Reward	--	59	76	68	--	--	109	119	114	--
DEKALB	DK-28E	51	62	88	75	67	115	115	138	127	123
NK	NK KS 310	--	49	69	59	--	--	91	108	100	--
NK	NK K35-Y5	--	53	60	57	--	--	98	94	96	--
PIONEER	87G57	52	69	69	69	63	149	128	128	128	135
(Check)	399 X 2737	4	39	21	30	21	11	72	33	53	39
Average		35	54	64	59	51					

Grain Yields were corrected to 14.0 % seed moisture content.

Irrigated at Walsh for 2000; Dryland at Vilas for 2001; Irrigated at Walsh for 2002.

Dryland Grain Sorghum Hybrid Performance Test at Vilas, 2002

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

PURPOSE: To identify high yielding hybrids under dryland conditions with 3400 sorghum heat units in a Sandy Loam soil.

PLOT: Four rows with 30" row spacing, 50' long. SEEDING DENSITY: 39,200 Seed/A. PLANTED: May 28. HARVESTED: November 7.

EMERGENCE DATE: 9 days after planting. SOIL TEMP: 61 F.

PEST CONTROL: Preemergence Herbicides: None. Post Emergence Herbicides: Clarity 3 Oz/A, Atrazine 0.75 Lb A/A, COC 1 Qt/A, Buctril 16 Oz/A. CULTIVATION: Once. INSECTICIDE: None.

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

COMMENTS: Planted in good soil moisture. Weed control was fair. Near normal precipitation for the growing season with a very dry spring and a wet August (late). Seed set was poor because it was very hot and dry at flowering. No greenbug infestation. None of the hybrids lodged. Grain yields were poor.

SOIL: Sandy Loam for 0-8" and Sandy Clay 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-----		
May	0.14	72	2	0	4
June	1.17	857	24	9	34
July	1.67	912	24	12	65
August	5.59	831	19	4	96
September	1.74	541	5	0	126
October	0.40	155	0	0	141
Total	10.71	3368	74	25	141

\1 Growing season from May 28 (planting) to October 15 (first freeze, 27 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"	7.1	0.3	1.3	16	6.1	390	0.6	7.7
8"-24"				6				
Comment	Alka	VLo	Mod	Mod	Lo	VHi	Lo	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.				
Fertilizer	N	P <sub>2</sub> O <sub>5</sub>	Zn	Fe
	-----Lb/A-----			
Recommended	0	20	0	0
Applied	50	20	0	0

Yield Goal: 60 Bu/A.  
Actual Yield: 7 Bu/A.

**Available Soil Water**  
**Dryland Grain Sorghum, Vilas, 2002**

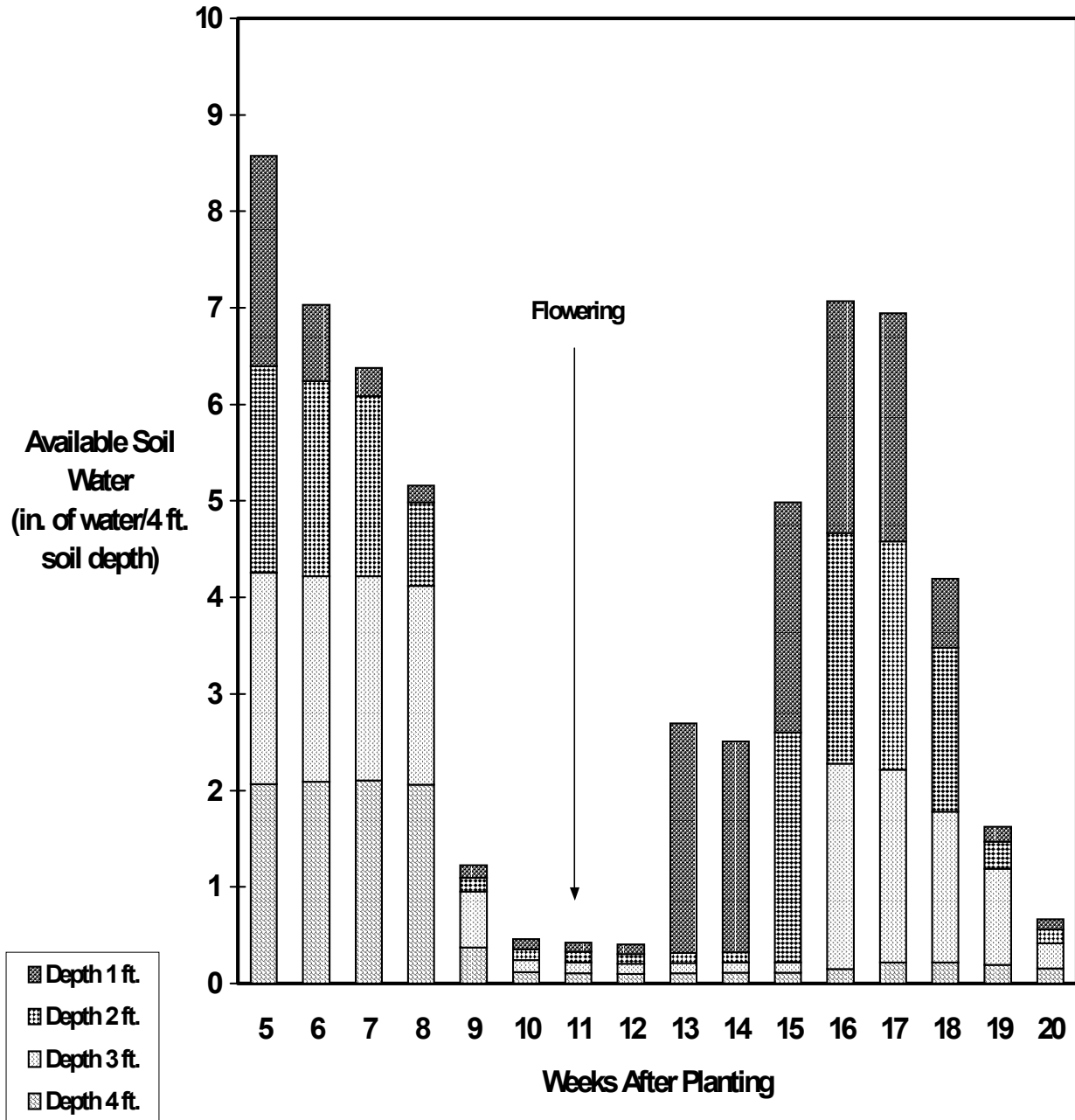


Fig. 2. Available soil water in dryland grain sorghum at Vilas. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze was 10.71 in. Any increase in available soil water between weeks is from rain.

Table 4.--Dryland Grain Sorghum Hybrid Performance Test at Vilas, 2002. \1

Brand	Hybrid	Days to Emerge	50% Bloom		50% Mature		Plant Ht.	Harvest Density	Tiller Maturity	Test Wt.	Grain Yield	Yield %				
			DAP	GDD	DAP	Group						of Test Average				
												In	Plants/A	Lb/Bu	Bu/A	%
												(1000 X)				
TRIUMPH	TR 438	8	64	1841	103	E/ME	35	16.6	MM	42	8	105				
NK	NK KS 310	8	62	1781	102	E/ME	36	17.8	EM	34	7	99				
NK	NK 251	11	54	1534	90	E	32	15.9	EM	36	6	76				
NK	NK K35-Y5	10	64	1841	105	E/ME	35	14.0	EM	36	6	76				
ASGROW	Pulsar	9	63	1812	104	E/ME	33	20.5	EM	34	6	74				
DEKALB	DKS 36-00	9	63	1812	104	E/ME	31	18.2	LM	46	5	64				
NK	NK KS 560Y	9	69	1988	110	ME	32	15.5	EM	34	9	120				
PIONEER	8505	8	68	1958	113	ME/M	38	20.1	EM	32	8	109				
PIONEER	85G85	8	69	1992	109	ME/M	35	20.1	EM	35	8	103				
ASGROW	Seneca	8	73	2116	113	ME	37	19.4	EM	36	7	93				
DEKALB	DK-44	8	73	2116	114	ME/M	39	23.2	EM	36	7	88				
PIONEER	85Y34	8	65	1873	106	ME	37	17.0	EM	39	5	69				
NK	NK K59-Y2	9	81	2324	121	M	37	15.5	MM	42	11	153				
NK	NK X633	8	74	2143	114	M/ML	37	22.5	EM	34	10	128				
NK	NK 8828	11	81	2324	119	M/ML	38	20.1	MM	41	7	95				
NK	NK KS 585	8	87	2480	125	ML/M	36	23.2	EM	34	10	134				
NK	NK K73-J6	8	83	2372	122	ML	39	18.6	MM	42	10	132				
(Check)	399 X 2737	8	91	2585	131	ML	38	16.6	EM	35	9	119				
NK	NK X654	9	91	2585	132	ML	37	19.0	EM	32	6	78				
TRIUMPH	TR 465	9	90	2557	131	ML/M	40	15.1	EM	34	6	78				
Average		9	73	2102	113	ME	36	18.4	EM	37	7					
LSD 0.2											2.4					

\1 Planted: May 28; Harvested: November 7.

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 Vilas, 2000-2002.

Brand	Hybrid	Grain Yield					Yield as % of Test Average				
		2000	2001	2002	2-Year Avg	3-Year Avg	2000	2001	2002	2-Year Avg	3-Year Avg
		-----Bu/A-----					-----%-----				
ASGROW	Seneca	40	87	7	47	45	118	105	93	99	105
DEKALB	DK-44	40	82	7	45	43	118	98	88	93	101
NK	NK KS 585	--	92	10	51	--	--	110	134	122	--
NK	NK K59-Y2	--	90	11	51	--	--	109	153	131	--
PIONEER	8505	35	85	8	47	43	103	103	109	106	105
PIONEER	85Y34	38	82	5	44	42	112	99	69	84	93
PIONEER	85G85	39	87	8	48	--	115	105	103	104	--
TRIUMPH	TR 438	34	72	8	40	--	100	82	105	94	--
TRIUMPH	TR 465	--	87	6	47	--	--	104	78	91	--
(Check)	399 X 2737	25	82	9	46	39	74	99	119	109	97
Average		34	83	7	45	41					

Grain Yields were corrected to 14.0 % seed moisture content.

## Dryland Grain Sorghum Hybrid Performance Test at Walsh, 2002

**COOPERATORS:** Plainsman Agri-Search Foundation, and Kevin Larson, Superintendent, 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:** 39,200 Seed/A. **PLANTED:** June 3. **HARVESTED:** November 11.

**EMERGENCE DATE:** 8 days after planting. **SOIL TEMP:** 72 F.

**IRRIGATION:** Furrow irrigated with about 8 A-in./A of water for stand establishment.

**PEST CONTROL:** Preemergence Herbicides: None. Post Emergence Herbicides: Clarity 4.0 Oz/A, Atrazine 1.0 Lb/A, COC 1 Qt/A. **CULTIVATION:** Once. **INSECTICIDES:** None.

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

**COMMENTS:** Planted in dry soil and furrow irrigated up. Weed control was fair. Near normal precipitation for the growing season with a very dry spring and a wet August (late). No greenbug infestation. None of the hybrids lodged. Grain yields were good.

**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	1.17	750	22	7	27
July	1.67	912	24	12	58
August	5.59	831	19	4	89
September	1.74	541	5	0	119
October	0.40	155	0	0	134
Total	10.57	3189	70	23	134

\1 Growing season from June 3 (planting) to October 15 (first freeze, 27 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"	7.8	0.6	1.8	13	1.1	469	0.8	5.3
8"-24"				5				
Comment	Alka	Vlo	Hi	Mod	VLo	VHi	Lo	Adeq
Manganese and Copper levels were adequate.								

Summary: Fertilization.				
Fertilizer	N	P <sub>2</sub> O <sub>5</sub>	Zn	Fe
	-----Lb/A-----			
Recommended	0	40	0	0
Applied	0	20	0	0
Yield Goal: 45 Bu/A. Actual Yield: 51 Bu/A.				

**Available Soil Water**  
**Dryland Grain Sorghum, Walsh, 2002**

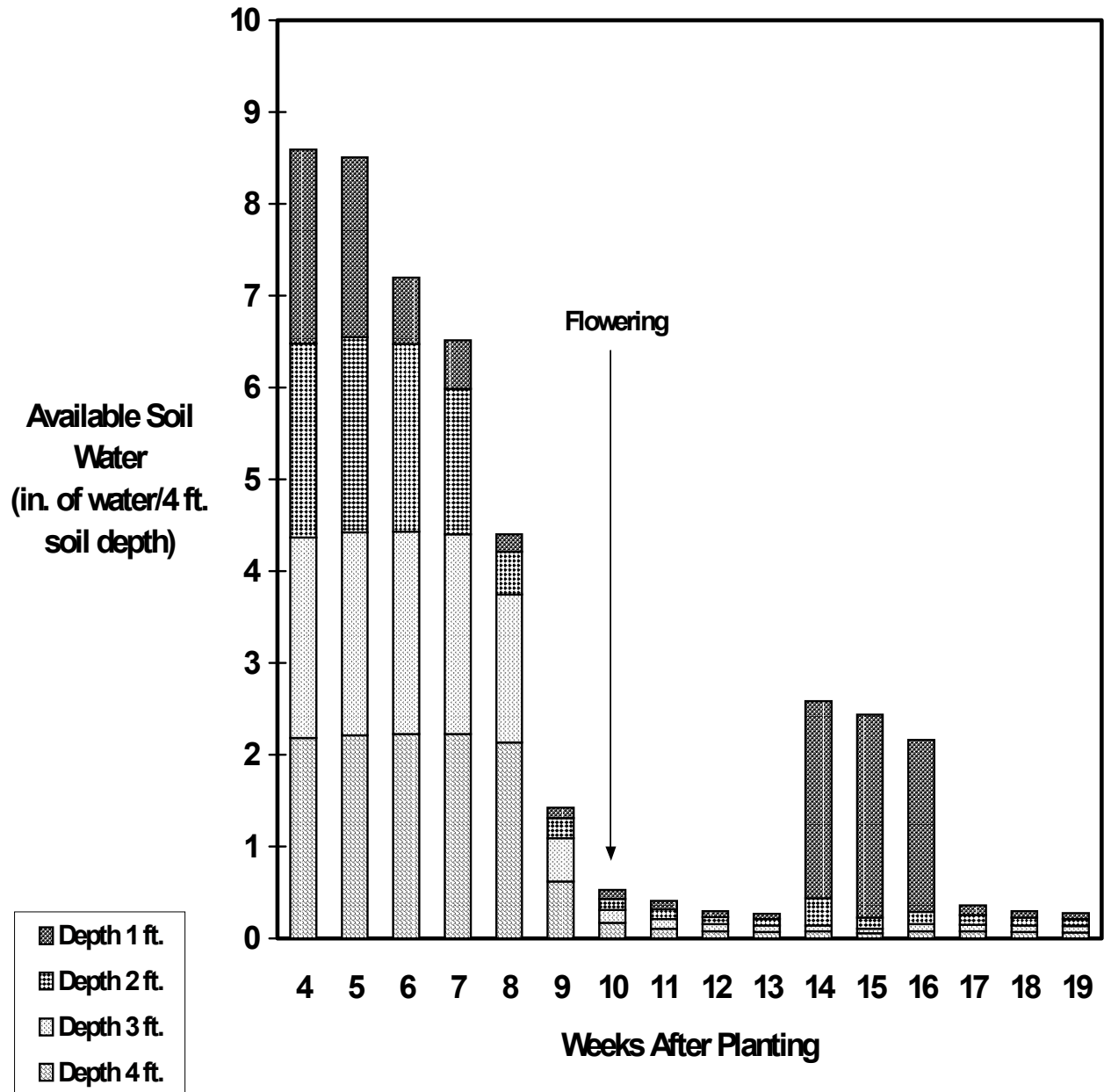


Fig. 3. Available soil water in dryland grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze was 10.57 in. This study was pre-irrigated with about 8 A-in./A of water. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.





Table 7.--Summary: Dryland Grain Sorghum Hybrid Performance Tests at Walsh, 2000-2002.

Brand	Hybrid	Grain Yield					Yield as % of Test Average				
		2000	2001	2002	2-Year Avg	3-Year Avg	2000	2001	2002	2-Year Avg	3-Year Avg
		-----Bu/A-----					-----%-----				
ASGROW	Seneca	50	51	52	52	51	100	116	102	109	106
DEKALB	DK-40y	44	48	--	46	31	88	110	--	99	66
DEKALB	DK-44	55	35	56	46	49	110	80	109	95	100
NC+	6B50	49	37	50	44	--	98	85	96	91	--
NC+	5B74E	40	52	47	50	46	80	118	91	105	96
NK	NK KS 310	48	--	42	45	--	96	--	81	89	--
NK	NK KS 585	55	31	60	46	49	110	70	117	94	99
NK	NK K59-Y2	--	37	55	46	--	--	83	107	95	--
PIONEER	85G85	49	55	61	58	--	98	125	119	122	--
PIONEER	8505	50	61	54	58	55	100	138	105	122	114
PIONEER	85Y34	56	54	57	56	56	112	122	110	116	115
TRIUMPH	TR 438	54	48	59	54	54	108	109	115	112	111
(Check)	399 X 2737	38	31	41	36	37	76	71	79	75	75
Average		50	44	51	48	48					

Grain Yields were corrected to 14.0 % seed moisture content.

## Irrigated Grain Sorghum Hybrid Performance Test at Walsh, 2002

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

**PURPOSE:** To identify high yielding hybrids under irrigated conditions with 3150 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 6. **HARVESTED:** November 12.

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

**IRRIGATION:** Furrow irrigated with about 6 A-in./A of water for stand establishment. Drip irrigated for 12 weeks with 15.96 A-in./A.

**PEST CONTROL:** Preemergence Herbicides: None. Post Emergence Herbicides: Clarity 4 Oz/A, Atrazine 1.0 Lb/A, COC 1 Qt/A. **CULTIVATION:** Once. **INSECTICIDES:** None.

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

**COMMENTS:** Planted in dry soil and furrow irrigated up. Weed control was good. Near normal precipitation for the growing season with a very dry spring and a wet August (late). 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: Growing Season Precipitation and Temperature \1 Walsh, Baca County.					
Month	Rainfall	GDD \2	>90 F	>100 F	DAP \3
	In		-----No. of Days-----		
June	0.52	700	21	6	24
July	1.67	912	24	12	55
August	5.59	831	19	4	86
September	1.74	541	5	0	116
October	0.40	155	0	0	131
Total	9.92	3140	69	22	131

\1 Growing season from June 6 (planting) to October 15 (first freeze, 27 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"	7.9	0.7	1.6	27	1.3	451	0.6	4.8
8"-24"				14				
Comment	Alka	VLo	Hi	Hi	VLo	VHi	Lo	Marg
Manganese and Copper levels were adequate.								

Summary: Fertilization.				
Fertilizer	N	P <sub>2</sub> O <sub>5</sub>	Zn	Fe
	-----Lb/A-----			
Recommended	0	40	0	0
Applied	180	20	0.3	0
Yield Goal: 125 Bu/A. Actual Yield: 76 Bu/A.				

### Available Soil Water Irrigated Grain Sorghum, Walsh, 2002

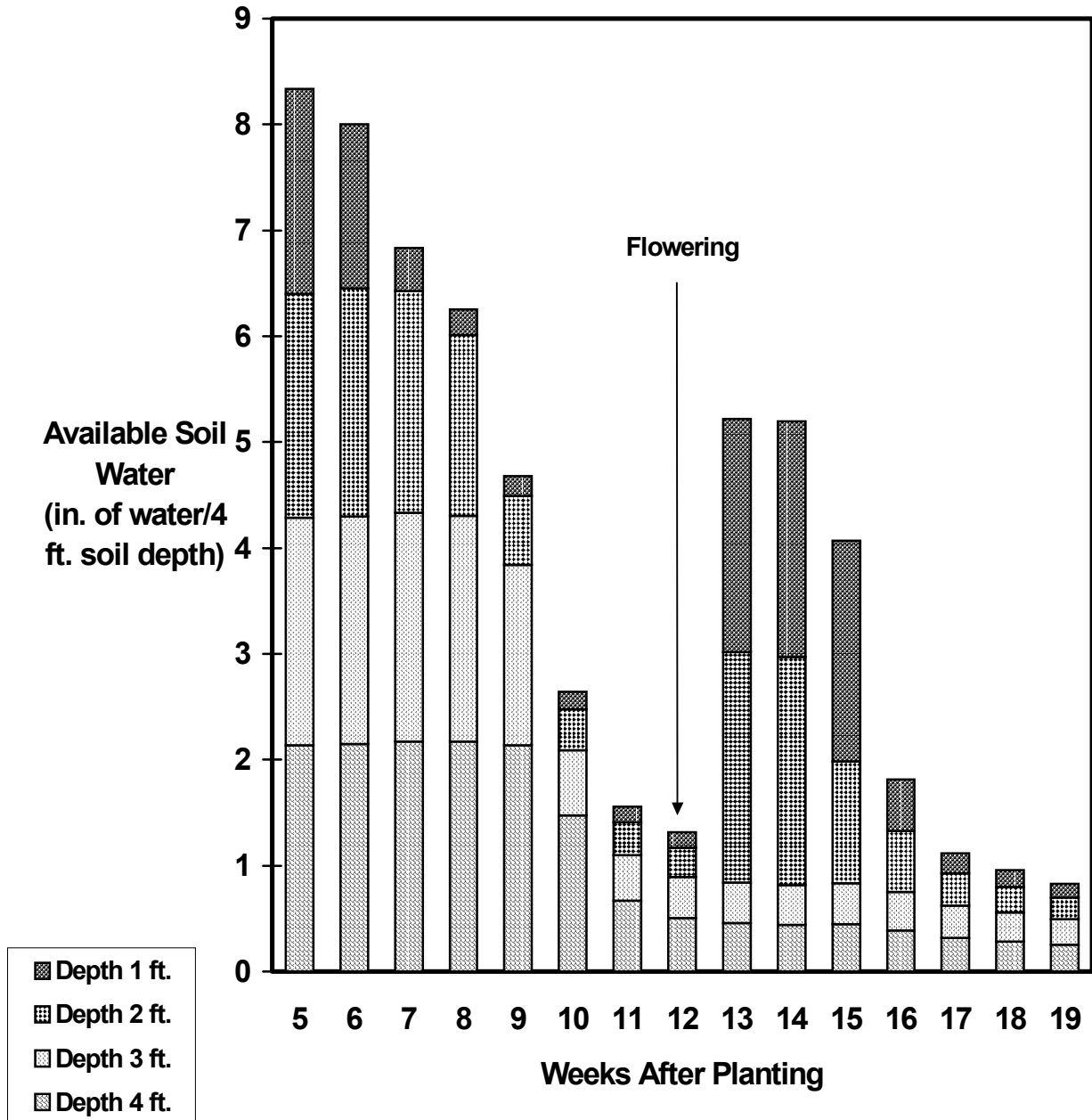


Fig. 4. Available soil water in irrigated grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze was 9.92 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

Table 8.--Irrigated Grain Sorghum Hybrid Performance Test at Walsh, 2002. \1

Brand	Hybrid	Days to Emerge	50% Bloom		50% Mature		Plant Ht.	Harvest Density	Lodged Plants	Test Wt.	Grain Yield	Yield %	
			DAP	GDD	DAP	Group						of Test Average	
								In	Plants/A	%	Lb/Bu	Bu/A	%
								(1000 X)					
NK	NK KS 310	6	67	1941	114	E/ME	42	33.1	0	59	70	93	
NK	NK 251	6	61	1763	104	E	36	41.5	0	59	57	76	
NC+	NC+ 6B50	6	79	2251	127	ME	46	38.7	0	55	92	121	
NK	NK KS 560Y	7	75	2143	124	ME/M	37	27.2	0	58	78	103	
NK	NK K35-Y5	8	70	2011	117	ME	40	32.4	0	59	75	98	
PIONEER	84G62	7	83	2356	130	WML	46	57.8	0	58	99	130	
NK	NK KS 585	6	82	2328	129	M	42	54.4	0	59	90	118	
NK	NK X633	7	81	2302	128	WML	46	45.0	0	56	87	115	
NK	NK K59-Y2	6	83	2356	131	M	51	50.9	0	54	78	102	
DEKALB	DKS 54-00	8	83	2356	131	WML	56	33.1	0	54	76	100	
ASGROW	A 459	6	83	2356	130	WME	50	47.0	0	55	71	94	
NC+	NC+ 7R83	6	86	2421	HD	ML/M	49	47.7	0	53	78	103	
(Check)	399 X 2737	7	85	2401	131	ML	45	54.7	0	56	76	100	
NK	NK K73-J6	8	87	2442	HD	ML	47	42.5	0	51	74	98	
NK	NK X654	8	86	2421	HD	ML	44	36.6	0	50	70	92	
TRIUMPH	TR 465	7	84	2378	HD	ML/M	44	36.1	0	52	66	86	
NK	NK 8828	8	87	2442	HD	ML	47	34.2	0	52	57	75	
Average		7	80	2275	88	M	45	41.9	0	55	76		
LSD 0.2												6.3	

\1 Planted June 6; Harvested: November 12.

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 9.--Summary: Irrigated Grain Sorghum Hybrid Performance Tests at Walsh, 2000-2002.

Brand	Hybrid	Grain Yield					Yield as % of Test Average				
		2000	2001	2002	2-Year Avg	3-Year Avg	2000	2001	2002	2-Year Avg	3-Year Avg
		-----Bu/A-----					-----%-----				
ASGROW	A459	127	151	71	111	116	96	99	94	97	96
DEKALB	DK-47	137	152	--	145	--	104	100	--	102	--
DEKALB	DK-53	125	141	--	133	--	95	93	--	94	--
NC+	6B70	132	--	92	112	--	100	--	121	111	--
NC+	NC+ 7R83	--	171	78	125	--	--	113	103	108	--
NK	NK KS 585	130	--	90	110	--	98	--	118	108	--
NK	NK KS 73-J6	--	161	74	118	--	--	106	98	102	--
NK	NK 8828	--	156	57	107	--	--	103	75	89	--
PIONEER	84G62	146	171	99	135	139	111	113	130	122	118
TRIUMPH	TR 465	--	163	66	115	--	--	107	86	97	--
(Check)	399 X 2737	132	147	76	112	118	100	97	100	99	99
Average		132	152	76	114	120					

Grain Yields were corrected to 14.0 % seed moisture content.

## Dryland Forage Sorghum Hybrid Performance Test at Walsh, 2002

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

**PURPOSE:** To identify high yielding hybrids under dryland conditions with 3150 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 3. **HARVESTED:** October 11.

**EMERGENCE DATE:** 7 days after planting. **SOIL TEMP:** 72 F.

**IRRIGATION:** Furrow irrigated with about 8 A-in./A for stand establishment.

**PEST CONTROL:** Preemergence Herbicides: None. Post Emergence Herbicides: Atrazine 1.0 Lb/A, Clarity 4 Oz/A, COC 1Qt/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	1.17	750	22	7	27
July	1.67	912	24	12	58
August	5.59	831	19	4	89
September	1.74	541	5	0	119
October	0.40	120	0	0	130
Total	10.57	3154	70	23	130

\1 Growing season from June 3 (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 and furrow irrigated up. Weed control was fair. Near normal precipitation for the growing season with a very dry spring and a wet August (late). No greenbug infestation. 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"	7.9	0.7	1.6	29	2.5	449	0.7	5.2
8"-24"				18				
Comment	Alka	VLo	Hi	Hi	VLo	VHi	Lo	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P <sub>2</sub> O <sub>5</sub>	Zn	Fe
	-----Lb/A-----			
Recommended	0	40	0	0
Applied	0	20	0	0

Yield Goal: 10 Ton/A.

Actual Yield: 10.9 Ton/A @ 70% MC.

### Available Soil Water Dryland Forage Sorghum, Walsh, 2002

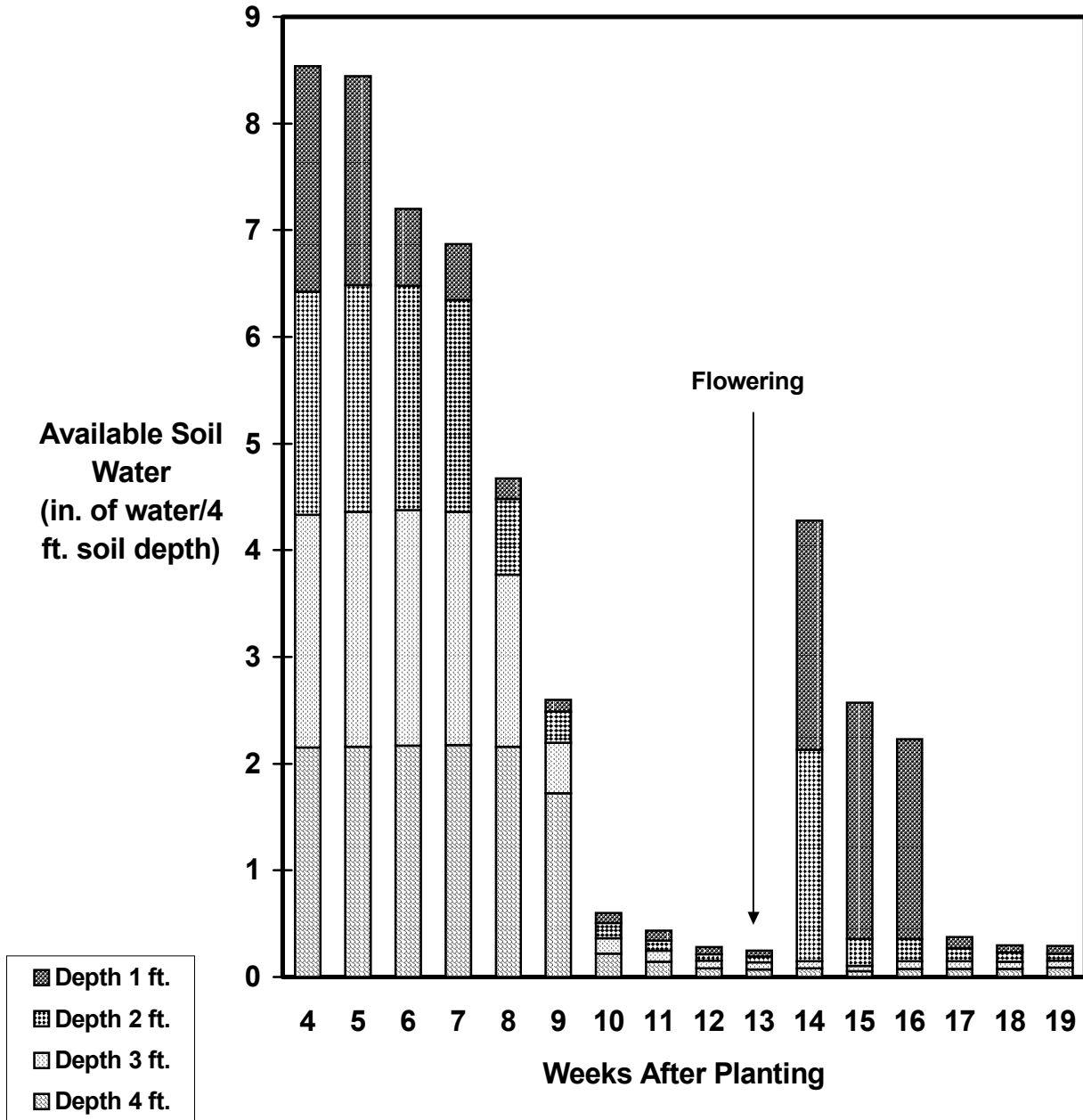


Fig. 5. Available soil water in dryland forage sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to harvest was 10.57 in. Any increase in available soil water between weeks is from rain.



Table 10.--Dryland Forage Sorghum Hybrid Performance Test at Walsh, 2002. \1

Brand	Hybrid	Forage Type \2	Days			Harvest Density	Stage \3			Yield % of Test Average
			Days to Emerge	to 50% Bloom	Harvest		Plant Ht.	at Harvest	Stem Sugar %	
					Plants/A (1000 X)	In.		%	Tons/A	%
NK	NK SS 405	FS	8	108	29.5	79	PM	18	16.0	147
BUFFALO BRAND	Canex	FS	8	81	32.8	57	MT	21	13.5	124
NK	NK 1990	FS	7	Veg	35.9	57	Veg	15	12.9	118
(Check)	NB 305F	FS	8	92	34.8	63	SD	17	12.8	117
NK	NK 300	FS	7	99	35.5	41	LM	18	11.9	109
BUFFALO BRAND	Canex II	FS	8	83	35.5	60	MT	19	11.7	107
NK	NK HiKane II	FS	8	82	38.3	56	MT	17	11.5	105
BUFFALO BRAND	Canex BMR 208	FS	7	90	35.5	41	SD	19	9.5	87
BUFFALO BRAND	Canex BMR 310	FS	8	89	38.0	53	SD	17	8.8	81
NK	NK Headless Sordan	SS	8	Veg	34.8	60	Veg	17	12.5	115
NK	Sordan 79	SS	8	77	31.4	74	MT	14	12.2	112
GOLDEN HARVEST	Re-Gro H-22B	SS	7	74	34.5	65	MT	15	12.0	110
BUFFALO BRAND	Buffalo Brand	SS	7	75	33.5	74	MT	15	12.0	110
NK	NK Trudan 8	SS	8	68	32.4	66	MT	18	11.8	108
BUFFALO BRAND	Grazex II	SS	7	73	29.3	71	MT	15	10.5	96
GOLDEN HARVEST	Re-Gro H-33	SS	7	79	30.3	61	MT	11	10.2	93
BUFFALO BRAND	Grazex II W	SS	7	71	34.5	72	MT	13	9.7	89
NK	NK Headless Trudan	SS	8	Veg	36.6	64	Veg	15	9.6	88
NC+	NC+ Sweetleaf II	SS	8	70	33.8	74	MT	16	9.3	85
BUFFALO BRAND	Grazex BMR 727	SS	7	81	31.1	67	MT	18	8.5	78
BUFFALO BRAND	Grazex BMR 720	SS	7	73	36.6	61	MT	19	7.4	68
GOLDEN HARVEST	H-9235 B/RR	Corn	6	71	23.0	57	MT	15	5.7	52
Average		SS	7	88	33.5	62	MT	16	10.9	
LSD 0.2									1.78	

\1 Planted: June 3; Harvested: October 11.

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

This dryland site was irrigated up with about 8 acre-in/A of furrow water.

Table 11.--Summary: Dryland Forage Sorghum Hybrid Performance Tests at Walsh, 2000-2002.

Brand	Hybrid	Forage Yield					Yield as % of Test Average				
		2000	2001	2002	2-Year Avg	3-Year Avg	2000	2001	2002	2-Year Avg	3-Year Avg
		-----Tons/A-----					-----%-----				
BUFFALO BRAND	Canex	12.1	10.8	13.5	12.2	12.1	110	122	124	123	119
BUFFALO BRAND	Canex II	11.7	10.9	11.7	11.3	11.4	106	124	107	116	112
BUFFALO BRAND	Canex BMR 208	12.2	8.1	9.5	8.8	9.9	111	92	87	90	97
BUFFALO BRAND	Canex BMR 310	--	7.3	8.8	8.1	--	--	83	81	82	--
BUFFALO BRAND	Buffalo Brand	12.1	8.4	12.0	10.2	10.8	110	96	110	103	105
BUFFALO BRAND	Grazex II	11.8	8.6	10.5	9.6	10.3	107	97	96	97	100
BUFFALO BRAND	Grazex II W	10.6	6.0	9.7	7.9	8.8	96	69	89	79	85
BUFFALO BRAND	Grazex BMR 727	9.2	11.2	8.5	9.9	9.6	84	128	78	103	97
BUFFALO BRAND	Grazex BMR 720	--	8.4	7.4	7.9	--	--	95	68	82	--
BUFFALO BRAND	Grazex BMR 116	10.3	8.9	--	9.6	--	94	102	--	98	--
GOLDEN HARVEST	Re-Gro H-22B	--	8.4	12.0	10.2	--	--	96	110	103	--
GOLDEN HARVEST	Re-Gro H-33	--	9.0	10.2	9.6	--	--	102	93	98	--
NK	NK 300	--	9.6	11.9	10.8	--	--	109	109	109	--
NK	NK HiKane II	--	9.7	11.5	10.6	--	--	111	105	108	--
(Check)	NB 305F	15.1	10.2	12.8	11.0	12.7	100	116	117	117	111
(Check)	Corn	10.2	5.9	5.7	7.6	7.3	69	69	52	61	63
Average		11.0	8.8	10.9	9.9	10.2					

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

Table 12.--Dryland Forage Sorghum Hybrid Dry Matter Analysis at Walsh, 2002.

Brand	Hybrid	Forage Type \1	Days to Boot	Plant Height at Boot	CP	ADF	NDF	TDN	P	Ca	RFV	Net Energy		
												Main.	Gain	Lact.
				In	-----%-----							----MCal/lb-----		
NK	NK 1990	FS	Veg	57	11.9	33.7	57.9	64.8	0.21	0.48	100.8	0.67	0.40	0.67
BUFFALO BRAND	Canex BMR 310	FS	82	39	10.5	32.2	54.8	66.5	0.21	0.65	108.4	0.69	0.42	0.69
BUFFALO BRAND	Canex II	FS	72	48	10.2	33.6	54.8	64.9	0.20	0.41	106.5	0.67	0.40	0.67
NK	Hi Kane II	FS	71	40	10.1	32.9	53.5	65.7	0.21	0.39	110.0	0.68	0.41	0.68
NK	NK 300	FS	114	33	9.3	34.0	55.5	64.4	0.20	0.36	104.6	0.66	0.39	0.66
(Check)	NB 305F	FS	82	46	9.1	36.9	61.6	61.2	0.25	0.20	90.8	0.61	0.35	0.63
NK	NK SS 405	FS	123	58	9.0	36.2	59.7	62.0	0.20	0.58	94.6	0.63	0.36	0.64
BUFFALO BRAND	Canex	FS	71	50	8.7	36.4	61.1	61.8	0.25	0.32	92.2	0.62	0.36	0.63
BUFFALO BRAND	Canex BMR 208	FS	81	38	8.5	34.4	60.2	64.1	0.22	0.24	95.9	0.66	0.39	0.66
BUFFALO BRAND	Grazex BMR 720	SS	65	53	13.3	34.5	59.0	63.9	0.32	0.31	97.8	0.65	0.39	0.66
GOLDEN HARVEST	Re-Gro H-22B	SS	64	59	11.8	36.8	59.4	61.4	0.25	0.28	94.4	0.62	0.35	0.63
GOLDEN HARVEST	Re-Gro H-33	SS	71	42	11.7	33.0	55.2	65.6	0.23	0.39	106.5	0.68	0.41	0.68
NK	NK Sordan 79	SS	66	51	11.5	34.8	55.9	63.5	0.24	0.35	102.8	0.65	0.38	0.65
NK	NK Headless Sordan	SS	145	66	11.3	33.7	57.5	64.8	0.19	0.53	101.3	0.67	0.40	0.67
NK	NK Trudan 8	SS	61	50	11.2	35.1	57.2	63.3	0.24	0.33	100.2	0.64	0.38	0.65
BUFFALO BRAND	Grazex II	SS	65	56	10.9	37.2	58.3	60.9	0.24	0.30	95.7	0.61	0.35	0.62
NK	NK Headless Trudan	SS	Veg	64	10.8	33.2	54.9	65.4	0.18	0.68	106.9	0.67	0.41	0.67
BUFFALO BRAND	Buffalo Brand	SS	68	52	9.7	35.1	58.5	63.3	0.21	0.47	97.9	0.64	0.38	0.65
BUFFALO BRAND	Grazex II W	SS	63	54	9.5	38.4	58.5	59.6	0.22	0.36	93.8	0.59	0.33	0.61
NC+	NC+ Sweetleaf II	SS	63	53	9.4	38.1	59.3	59.9	0.21	0.36	93.0	0.59	0.33	0.61
BUFFALO BRAND	Grazex BMR 727	SS	72	46	8.3	36.6	60.8	61.6	0.21	0.23	92.4	0.62	0.36	0.63
GOLDEN HARVEST	H-9235 Bt/RR	Corn	66	57	12.5	37.4	58.3	60.7	0.26	0.43	95.5	0.61	0.34	0.62
Average		SS	82	51	10.4	35.2	55.1	63.2	0.23	0.39	99.2	0.64	0.38	0.65

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

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;

P, Phosphorus; Ca, Calcium; RFV, Relative Feed Value.

Net Energy: Maintenance, Gain, Lactation.

## Irrigated Forage Sorghum Hybrid Performance Test at Walsh, 2002

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

**PURPOSE:** To identify high yielding hybrids under irrigated conditions with 3150 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 3. **HARVESTED:** October 10 and 11.

**EMERGENCE DATE:** 7 days after planting. **SOIL TEMP:** 72 F.

**IRRIGATION:** Two furrow irrigations: an irrigation for stand establishment on June 4, and an in-season irrigation on July 31, total applied 14 A-in./A.

**PEST CONTROL:** Preemergence Herbicides: None. Post Emergence Herbicides: Clarity 4 Oz/A, Atrazine 1.0 Lb/A, COC 1 Qt/A. **CULTIVATION:** Once. **INSECTICIDES:** None.

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

**COMMENTS:** Planted in dry soil and irrigated up. Weed control was fair. Near normal precipitation for the growing season with a very dry spring and a wet August (late). No greenbug infestation. Forage yields were good.

**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	1.17	750	22	7	27
July	1.67	912	24	12	58
August	5.59	831	19	4	89
September	1.74	541	5	0	119
October	0.40	108	0	0	129
Total	10.57	3142	70	23	129

\1 Growing season from June 3 (planting) to October 10 & 11 (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"	7.9	0.7	1.6	29	2.5	449	0.7	5.2
8"-24"				18				
Comment	Alka	VLo	Hi	Hi	VLo	VHi	Lo	Adeq

Manganese and Copper levels were adequate.

Summary: Fertilization.

Fertilizer	N	P <sub>2</sub> O <sub>5</sub>	Zn	Fe
	-----Lb/A-----			
Recommended	30	40	0	0
Applied	80	20	0.3	0

Yield Goal: 18 Ton/A.

Actual Yield: 17.8 Ton/A @ 70% MC.

**Available Soil Water**  
Irrigated Forage Sorghum, Walsh, 2002

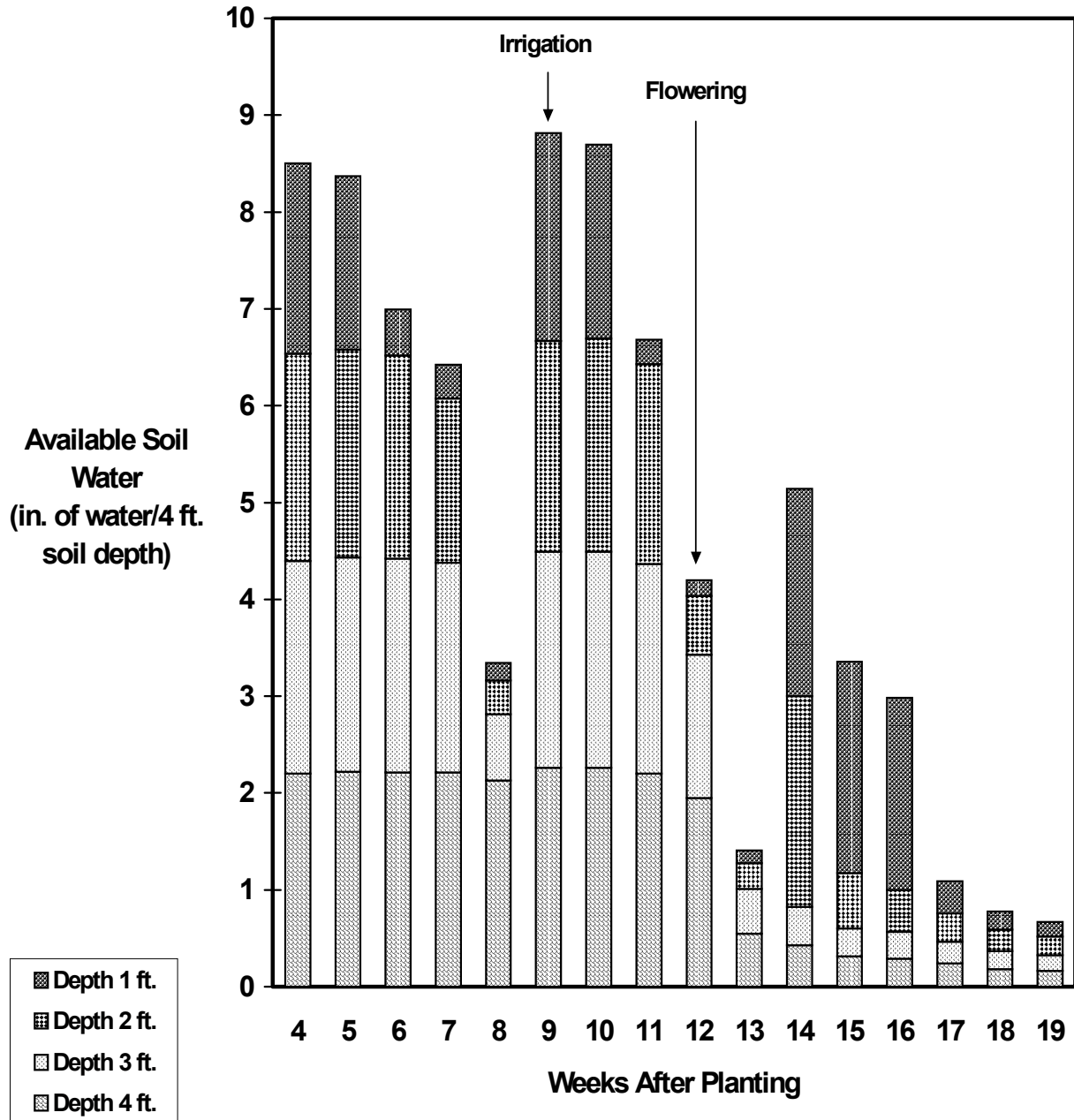


Fig. 6. Available soil water in irrigated forage sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to harvest was 10.57 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

Table 13.--Irrigated Forage Sorghum Hybrid Performance Test at Walsh, 2002. \1

Brand	Hybrid	Forage Type \2	Days			Harvest Density	Plant Ht.	Stage \3		Yield %	
			Days to Emerge	to 50% Bloom	Harvest			at Harvest	Stem Sugar %	Forage Yield Tons/A	of Test Average %
						Plants/A (1000 X)	In.		%	Tons/A	%
GOLDEN HARVEST	Si-Gro H-45	FS	7	88	60.3	64	SD	9	21.1	118	
NC+	NC+ Nutri-Cane II	FS	8	81	56.1	89	MT	19	20.7	116	
NK	NK 300	FS	7	87	48.8	62	SD	10	20.5	115	
NK	NK SS 405	FS	7	95	55.4	110	MM	14	20.2	113	
(Check)	NB 305F	FS	8	83	43.6	81	HD	13	20.0	112	
BUFFALO BRAND	Canex	FS	8	80	48.4	81	MT	20	19.9	112	
BUFFALO BRAND	Canex BMR 208	FS	7	78	52.3	74	MT	17	19.8	111	
NC+	NC+ Nutri-Ton II	FS	7	96	58.2	91	MM	14	19.3	108	
BUFFALO BRAND	Canex II	FS	8	81	51.6	81	MT	21	19.0	107	
GOLDEN HARVEST	Si-Gro H-47	SS	7	82	58.9	79	HD	9	19.0	107	
NK	NK HiKane II	FS	8	72	48.1	83	MT	16	18.6	105	
NK	NK 1990	FS	7	Veg	57.2	93	Veg	13	18.6	104	
BUFFALO BRAND	Canex BMR 310	FS	8	80	45.0	83	MT	17	17.9	101	
NK	NK Headless Sordan	SS	7	125	48.1	109	PM	11	20.6	116	
RICHARDSON SEEDS	Sw eeter 'N Honey Too	SS	8	91	49.5	109	ED	13	20.1	113	
CAL/WEST SEEDS	CW 1-61-1	SS	7	76	45.0	86	MT	13	20.1	113	
RICHARDSON SEEDS	Sw eeter 'N Honey BMR	SS	8	79	47.7	86	MT	11	20.0	112	
CAL/WEST SEEDS	CW 1-63-1	SS	7	75	52.3	85	MT	8	18.0	101	
BUFFALO BRAND	Grazex BMR 727	SS	7	72	52.3	84	MT	8	17.9	101	
BUFFALO BRAND	Buffalo Brand	SS	7	73	48.8	101	MT	14	17.8	100	
CAL/WEST SEEDS	CW 1-61-10	SS	7	75	55.1	93	MT	9	17.1	96	
CAL/WEST SEEDS	CW 1-61-9	SS	7	76	42.5	86	MT	12	16.9	95	
NK	NK Sordan 79	SS	8	74	53.3	103	MT	9	16.6	93	
RICHARDSON SEEDS	Honey Graze BMR	SS	7	76	58.5	84	MT	8	15.9	89	
NK	NK Headless Trudan	SS	7	129	53.0	102	PM	11	15.9	89	
BUFFALO BRAND	Grazex II	SS	7	73	45.3	101	MT	11	15.7	88	
NC+	NC+ Sw eetleaf II	SS	7	68	48.4	100	MT	18	15.5	87	
CAL/WEST SEEDS	CW 1-63-9	SS	7	75	46.0	84	MT	11	14.9	83	
CAL/WEST SEEDS	CW 1-63-10	SS	7	75	47.0	84	MT	12	14.6	82	
NK	NK Trudan 8	SS	8	68	53.7	103	MT	14	14.5	81	
BUFFALO BRAND	Grazex BMR 720	SS	7	71	41.8	91	MT	10	13.5	76	
BUFFALO BRAND	Grazex II W	SS	7	71	59.9	94	MT	15	13.5	76	
GOLDEN HARVEST	H-9235 B/RR	Corn	6	69	28.6	80	HD	11	13.9	78	
Average		SS	7	83	50.3	89	MT	13	17.8		
LSD 0.2									2.24		

\1 Planted June 3; Harvested: October 10 and 11.

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

Table 14.--Summary: Irrigated Forage Sorghum Hybrid Performance Tests at Walsh, 2000-2002.

Brand	Hybrid	Forage Yield					Yield as % of Test Average				
		2000	2001	2002	2-Year Avg	3-Year Avg	2000	2001	2002	2-Year Avg	3-Year Avg
		-----Tons/A-----					-----%-----				
BUFFALO BRAND	Canex	24.5	22.5	19.9	21.2	22.3	113	114	112	113	113
BUFFALO BRAND	Canex II	24.0	22.1	19.0	20.6	21.7	111	112	107	110	110
BUFFALO BRAND	Canex BMR 208	20.5	21.5	19.8	20.7	20.6	95	109	111	110	105
BUFFALO BRAND	Canex BMR 310	--	20.5	17.9	19.2	--	--	104	101	103	--
BUFFALO BRAND	Buffalo Brand	17.8	16.5	17.8	17.2	17.4	82	84	100	92	89
BUFFALO BRAND	Grazex II	20.6	19.3	15.7	17.5	18.5	95	98	88	93	94
BUFFALO BRAND	Grazex II W	17.4	17.1	13.5	15.3	16.0	81	87	76	82	81
BUFFALO BRAND	Grazex BMR 727	21.0	18.1	17.9	18.0	19.0	97	92	101	97	97
BUFFALO BRAND	Grazex BMR 720	--	17.0	13.5	15.3	--	--	86	76	81	--
BUFFALO BRAND	Grazex BMR 116	20.6	18.4	--	19.5	--	95	93	--	94	--
GOLDEN HARVEST	Si-Gro H-45	25.7	20.3	20.3	21.1	22.1	119	103	118	111	113
GOLDEN HARVEST	Si-Gro EX-47	19.0	19.1	19.0	19.1	19.0	88	97	107	102	97
GOLDEN HARVEST	Re-Gro H-33	23.9	20.6	--	22.3	--	111	105	--	108	--
GOLDEN HARVEST	Re-Gro H-22B	25.6	16.0	--	20.8	--	119	81	--	100	--
NK	NK 300	--	24.0	20.5	22.3	--	--	122	115	119	--
NK	NK HiKane II	--	20.2	18.6	19.4	--	--	102	105	104	--
RICHARDSON SEED	Dairy Master BMR	22.0	21.7	--	21.9	--	102	110	--	106	--
RICHARDSON SEED	Honey Graze BMR	--	19.5	15.9	17.7	--	--	99	89	94	--
RICHARDSON SEED	Sweeter N Honey BMR	--	20.8	20.0	20.4	--	--	105	112	109	--
(Check)	NB 305F	22.9	17.8	20.0	18.9	20.2	106	90	112	101	103
(Check)	Corn	17.4	22.4	13.9	18.2	17.9	81	114	78	96	91
Average		21.6	19.7	17.8	18.8	19.7					

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

Table 15.--Irrigated Forage Sorghum Hybrid Dry Matter Analysis at Walsh, 2002.

Brand	Hybrid	Forage Type	Days Plant		CP	ADF	NDF	TDN	P	Ca	RFV	Net Energy			
			\1 Boot	at Boot								Height	Main.	Gain	Lact.
			In	-----%-----							-----MCal/lb-----				
GOLDEN HARVEST	Si-Gro H-45	FS	79	48	14.7	36.0	58.2	62.2	0.28	0.52	97.2	0.63	0.37	0.64	
BUFFALO BRAND	Canex BMR 208	FS	69	61	13.8	32.4	55.2	66.3	0.28	0.41	107.2	0.69	0.42	0.68	
(Check)	NB 305F	FS	73	63	13.4	36.1	57.4	62.1	0.27	0.37	98.5	0.63	0.36	0.64	
NC+	NC+ Nutri-Cane II	FS	71	72	11.9	40.8	63.9	56.9	0.29	0.26	83.2	0.55	0.29	0.58	
BUFFALO BRAND	Canex II	FS	71	72	11.7	39.1	61.8	58.8	0.26	0.28	88.0	0.58	0.32	0.60	
NK	NK SS 405	FS	85	85	11.7	35.8	58.3	62.4	0.22	0.52	97.4	0.63	0.37	0.64	
NK	Hi Kane II	FS	64	64	11.5	37.9	58.2	60.1	0.24	0.38	94.9	0.60	0.34	0.61	
BUFFALO BRAND	Canex BMR 310	FS	71	65	10.8	37.0	60.7	61.2	0.26	0.29	92.1	0.61	0.35	0.63	
NK	NK 300	FS	80	48	10.5	40.4	63.0	57.4	0.25	0.38	84.8	0.56	0.30	0.58	
NK	NK 1990	FS	Veg	93	10.3	36.1	56.9	62.1	0.18	0.41	99.4	0.63	0.36	0.64	
BUFFALO BRAND	Canex	FS	70	66	9.8	39.3	60.8	58.6	0.23	0.29	89.2	0.57	0.32	0.60	
GOLDEN HARVEST	Si-Gro H-47	FS	72	56	9.6	38.0	60.5	60.0	0.23	0.33	91.2	0.59	0.33	0.61	
NC+	NC+ Nutri-Ton II	FS	87	66	9.3	39.6	61.9	58.2	0.19	0.36	87.2	0.57	0.31	0.59	
RICHARDSON SEED	Sw eeter N Honey BMR	SS	70	57	15.4	36.0	57.1	62.3	0.32	0.46	99.2	0.63	0.37	0.64	
RICHARDSON SEED	Sw eeter N Honey Too	SS	83	74	14.7	32.3	56.4	66.4	0.25	0.57	105.1	0.69	0.42	0.68	
CAL/WEST SEEDS	CW 1-63-9	SS	66	56	14.3	36.4	57.3	61.8	0.31	0.33	98.3	0.62	0.36	0.63	
CAL/WEST SEEDS	CW 1-63-1	SS	67	60	14.2	37.7	59.4	60.4	0.32	0.24	93.3	0.60	0.34	0.62	
NK	NK Sordan 79	SS	64	79	13.5	37.5	59.3	60.5	0.25	0.39	93.5	0.60	0.34	0.62	
CAL/WEST SEEDS	CW 1-61-9	SS	67	61	12.7	37.9	57.2	60.1	0.25	0.48	96.6	0.60	0.34	0.61	
CAL/WEST SEEDS	CW 1-61-10	SS	67	58	12.6	39.8	62.3	58.0	0.32	0.22	86.5	0.56	0.31	0.59	
CAL/WEST SEEDS	CW 1-63-10	SS	66	55	12.1	39.0	61.7	58.9	0.30	0.29	88.1	0.58	0.32	0.60	
NK	NK Headless Sordan	SS	141	108	11.8	34.7	57.5	63.7	0.18	0.51	100.1	0.65	0.39	0.66	
CAL/WEST SEEDS	CW 1-61-1	SS	67	55	11.5	40.7	60.7	57.1	0.24	0.29	87.7	0.55	0.29	0.58	
BUFFALO BRAND	Buffalo Brand	SS	63	75	11.4	40.8	62.6	56.9	0.22	0.41	84.9	0.55	0.29	0.58	
BUFFALO BRAND	Grazex BMR 727	SS	65	60	11.3	41.1	64.7	56.6	0.28	0.15	81.8	0.54	0.29	0.58	
RICHARDSON SEED	Honey Graze BMR	SS	67	59	11.0	41.3	62.5	56.3	0.28	0.22	84.4	0.54	0.28	0.57	
BUFFALO BRAND	Grazex BMR 720	SS	63	58	10.9	37.6	58.6	60.5	0.22	0.37	94.6	0.60	0.34	0.62	
BUFFALO BRAND	Grazex II W	SS	63	57	10.6	36.5	57.0	61.7	0.20	0.38	98.6	0.62	0.36	0.63	
NK	NK Trudan 8	SS	61	62	10.4	39.0	60.1	58.9	0.23	0.40	90.5	0.58	0.32	0.60	
BUFFALO BRAND	Grazex II	SS	64	67	10.3	41.3	61.9	56.3	0.21	0.24	85.2	0.54	0.28	0.57	
NC+	NC+ Sweetleaf II	SS	62	66	10.3	42.6	66.4	54.9	0.24	0.28	78.1	0.52	0.26	0.56	
NK	NK Headless Trudan	SS	148	102	8.1	42.5	64.5	55.0	0.16	0.27	80.4	0.52	0.26	0.56	
GOLDEN HARVEST	H-9235 B/RR	Corn	63	70	14.8	34.8	55.0	63.5	0.26	0.57	104.4	0.65	0.38	0.65	
Average			SS	77	67	11.8	38.1	60.0	59.9	0.25	0.36	92.2	0.59	0.33	0.61

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

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;

P, Phosphorus; Ca, Calcium; RFV, Relative Feed Value; Net Energy: Maintenance, Gain, Lactation..



## Irrigated Forage Sorghum Hybrid Performance Test at Rocky Ford, 2002

COOPERATORS: Frank C. Schweissing, Superintendent, 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: 96,800 Seed/A. PLANTED: June 13. HARVESTED: September 12.

EMERGENCE DATE: ca. 10 to 15 days after planting<sup>1</sup>. SOIL TEMP: 69°F.

IRRIGATION<sup>2</sup>: Four furrow irrigations: June 15, July 10, July 29, August 31, total applied 12 acre-in/A.

PEST CONTROL: Preemergence Herbicides: Bifenox 2 lbs. AI/A. Postemergence Herbicide: Clarity 0.25 lb AI/A Insecticide: none.

CULTURAL PRACTICES: Previous crop: corn. Field Preparation: plow, disc, roller-pack, float. Cultivation: 1X.

SOIL: Silty Clay Loam, 1 - 1.5 % O.M., pH-ca. 7.8. FERTILIZER: 75 lbs. P<sub>2</sub>O<sub>5</sub> and 196 lbs. N/A.

COMMENTS: Excessively dry and hot. Late planting in dry soil. Forage yields below average.

<sup>1</sup>Emergence very uneven due to inability of water to sub out in dry powdery soil.

<sup>2</sup>No irrigation water in August until the very last day. The last two irrigation runs were very short (2 to 3 hrs.) and rainfall from April through September was 2.1 inches compared to the long term average of 9 inches.

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-----		
June	0.04	433	16	6	17
July	0.06	801	29	13	48
August	0.49	733	27	4	79
September	0.43	254	9	0	91
Total	3.39	2112	79	17	92

\1 Growing season from June 13 (planting) to September 12 (harvest).

\2 GDD: Growing Degree Days for sorghum.

\3 DAP: Days After Planting.

Table 16.-Irrigated Forage Sorghum Hybrid Performance Test at Rocky Ford, 2002. \1

Brand	Hybrid	Forage Type \2	Days	Plant	Stage \3	Stem	Dry	Forage	Yield %
			to 50% Bloom	Height	at Harvest	Sugar	Matter	Yield	of Test Average
				In.		%	%	Tons/A	%
NK	NK SS 405	FS	88	109	MM	7	23	27.5	121
NK	NK Sordan 79	SS	71	112	ED	8	24	27.5	121
NK	NK Headless Sordan	SS	Veg	106	Veg	6	19	25.4	111
NK	NK 1900	FS	Veg	100	Veg	6	18	23.3	102
NK	NK 300	FS	83	77	ED	9	22	23.0	101
NK	NK HiKane II	FS	71	98	ED	11	23	21.8	95
NK	NK Trudan 8	SS	65	98	ED	9	29	21.8	95
(Check)	NB 305F	FS	83	101	SD	10	21	20.8	91
MYCOGEN	2715	Corn	64	68	ED	9	24	19.6	86
NK	NK Headless Trudan	SS	Veg	92	Veg	6	18	17.5	77
Average		FS	81	96		8	22	22.8	
LSD 0.2								4.01	
CV%								18.89	

\1 Planted June 13, 2002; Harvested: September 12, 2002.

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

\4 Seed Maturation: PM, premilk; EM, early milk; MM, midmilk; LM, late milk; ED, early dough; SD, soft dough; HD, hard dough.

Yields adjusted to 70% moisture based on oven-dried samples.

## Zn Fertilization of Irrigated Grain Sorghum in Southeastern Colorado Kevin Larson and Calvin Thompson

Soil test recommendations for Southeastern Colorado typically recommend banding 2 Lb Zn/A to both dryland and irrigated grain sorghum. From our previous studies, we reported yield increases with Zn fertilization for dryland corn but only once did dryland grain sorghum respond positively to applied Zn (Larson, Schweissing, Thompson, 2001). The one time dryland grain sorghum yields did increase with Zn fertilization was an exceptionally high rainfall, high yielding year. We conducted this study to determine the optimum Zn rate for irrigated grain sorghum under high moisture, high yielding conditions.

### Materials and Methods

We used five Zn rates at Vilas: 0, 0.25, 0.5, 0.75 and 1.0 Lb Zn/A as Zn chelate in a 1 X 3 in. band (1 in. below and 3 in. to the side of the seed) applied after planting. At Walsh we used six Zn rates: 0, 0.2, 0.4, 0.6, 0.8, and 1.0 Lb Zn/A as Zn chelate seedrow applied at planting. The Vilas site was sprinkler irrigated with 14 A-in./A of water. The Walsh site was furrow irrigated with about 6 A-in./A for stand establishment and subsurface drip irrigated thereafter with 13.3 A-in./A. The grain sorghum hybrid used at Walsh was MYCOGEN 627 planted on June 16 at 87,100 Seeds/A. The grain sorghum hybrid used at Vilas was PIONEER 84G62 planted on June 17 at 70,000 Seeds/A. The grower applied 110 Lb N/A and 20 Lb P<sub>2</sub>O<sub>5</sub>/A to the Vilas site. We applied 180 Lb N/A and 20 Lb P<sub>2</sub>O<sub>5</sub>/A to the Walsh site. At both sites we used a post emergence broad-spectrum weed herbicide mixture (Atrazine 0.5 to 1.0 Lb/A and COC 1Qt/A, and at Walsh, Clarity 4 Oz/A was added) for weed control. Both sites were cultivated once. The 10 ft. X 650 ft. plots at Walsh and the 20 ft. X 1378 ft. (minimum) plots at Vilas were harvested with self-propelled combines and weighed in a digital weigh cart.

### Results and Discussion

The higher grain sorghum production site at Vilas responded to applied Zn with an optimum rate around 0.6 Lb Zn/A, yielding 98 Bu/A (Fig. 7). The lower production site at Walsh with its highest yield of 60 Bu/A did not respond to Zn fertilizer (Fig. 8). We were not surprised that only the higher production site increased yields with Zn, because from previous dryland grain sorghum Zn studies, we found that only higher production studies responded to Zn, whereas lower production studies did not respond to Zn (Larson, Schweissing, Thompson, 2001).

Grain sorghum production was low and displayed N deficiency at the Walsh site even with abundant fertilizer and irrigation. The N fertilizer was surface applied and dry condition prevented the movement of N to the roots. With our subsurface drip irrigation lines buried at 12 in., the soil surface does not get wet, and under dry conditions roots did not grow near the soil surface where the N fertilizer remained.

This is the first year of a multi-year irrigated grain sorghum Zn study. The Zn response we obtained this year suggests that Zn fertilizer is required for high production, high yielding sites, but Zn is not needed in low production sites.

Literature Cited

Larson, K.J., F.C. Schweissing, D.L. Thompson. 2001. Sorghum hybrid performance tests in Colorado, 2000. Technical Report TR01-2. AES, Dept. of Soil and Crop Sciences, CSU, 53p.

**Zn on Sprinkler Irrigated Grain Sorghum  
Brooks Farm, Vilas, 2002**

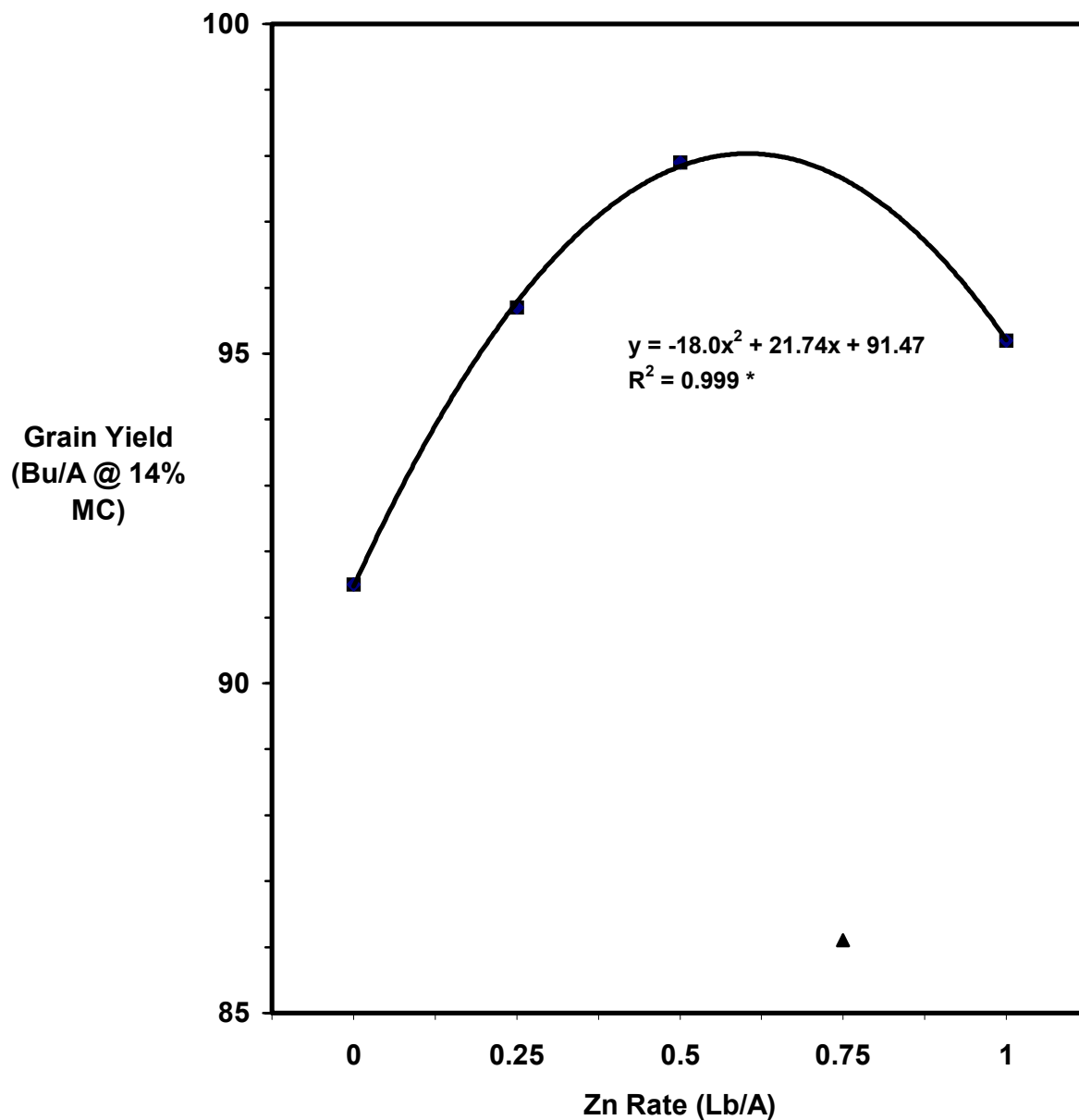


Fig. 7. Sidedress Zn rates in 1 in. by 3 in. band (1 X 3) on sprinkler irrigated grain sorghum at Vilas. The Zn rates were 0, 0.25, 0.5, 0.75 and 1.0 Lb Zn/A as Zn chelate applied after planting. The grain sorghum hybrid was PIONEER 84G62, planted at 70,000 Seeds/A. The yield from 0.75 Lb Zn/A was treated as an outlier and not used in the regression analysis.

### Seedrow Zn on Drip Irrigated Grain Sorghum Walsh, 2002

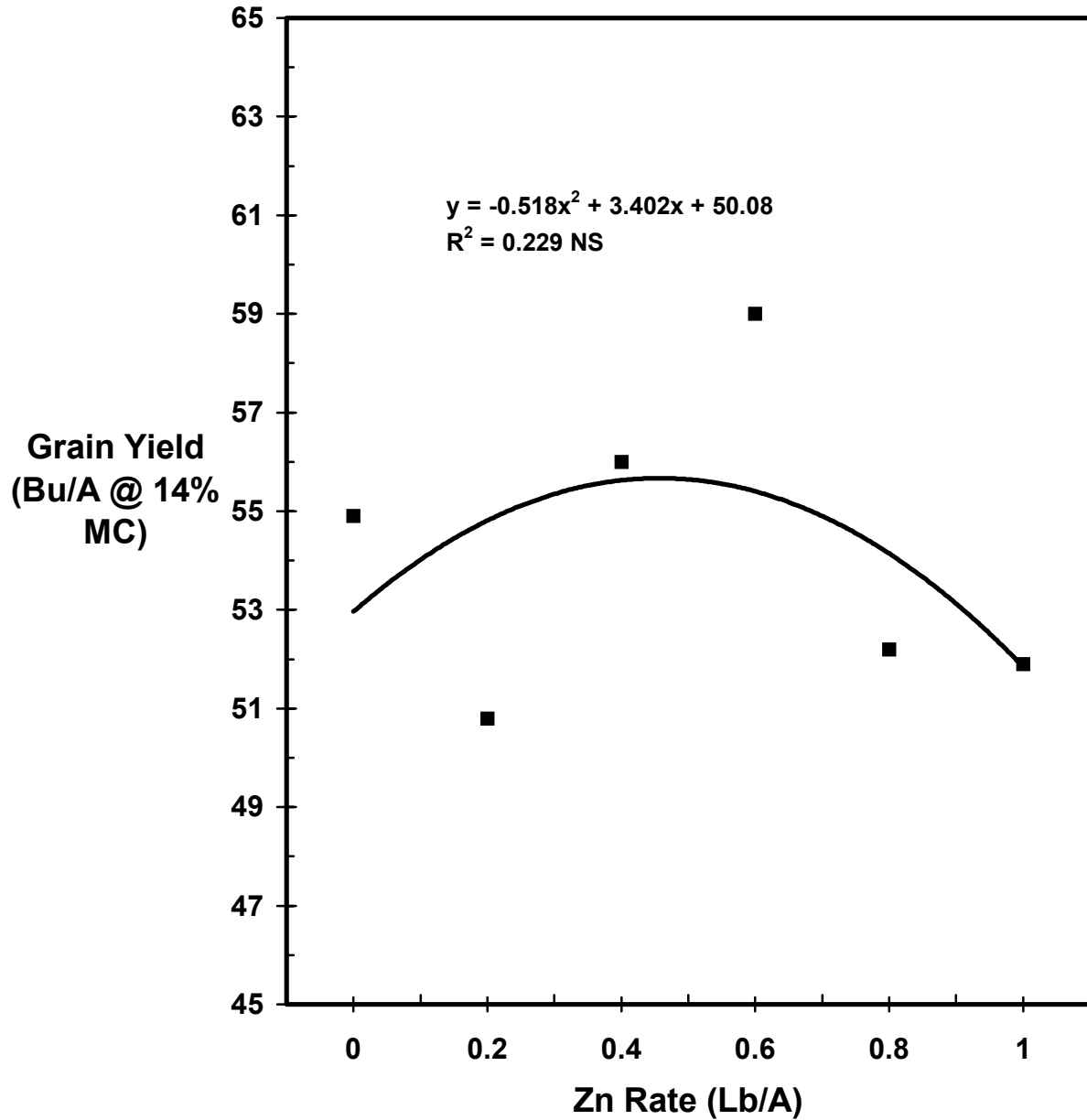


Fig. 8. Seedrow Zn rate on subsurface drip irrigated grain sorghum at Walsh. The Zn rates were 0, 0.2, 0.4, 0.6, 0.8 and 1.0 Lb Zn/A as Zn chelate. The grain sorghum hybrid was MYCOGEN 627 planted at 87,100 Seeds/A.

Chemical Control of Greenbugs on Sorghum, 2002  
Arkansas Valley Research Center  
Colorado State University  
Rocky Ford, Colorado

Frank C. Schweissing

Weather for the 2002 growing season at Rock Ford was hot and dry. Precipitation from April through September was 2.1 inches compared to the long-term average of 9 inches. Accumulated growing degree days (50°F – 86°F) from May 1 to September 20 was 3165, higher than any of the previous 20 growing seasons and substantially above the 21-year average of 2852. Irrigation water was in short supply in July and was not available in August.

Greenbug populations were generally low in the plots but did allow for differential counts between treatments. Two years ago biotype identification (2000), by Gerald Wilde, Kansas State University, showed biotype I to be about 80% of the sample and biotype K 20%. Insecticide resistance, in that year, varied from 11 to 18% in the samples. We cannot be sure what biotype changes have occurred, but due to very little insecticide use, because of low greenbug populations the past two years, insecticide resistance probably remained the same or lower.

Methods and Materials: Supporting information to the test plots is given on page 39.

Four row plots, 36 ft. long were planted with various treated and untreated seed (Pioneer 8500) and each treatment was replicated four times. Four feet wide alleys were cut between blocks reducing the plots lengths to 32 ft.

Syngenta applied the various insecticide seed treatments (Table 17) on May 22, 2002 and Counter CR was banded over the row at planting. Concep III (herbicide protection) and Apron, Allegiance, Captan, Maxim (disease protection) were all applied by Syngenta, as indicated in Table 17, on May 22, 2002.

Greenbug counts were taken from whole plant samples, two per plot at each counting date, August 13, 20 and 27. This totaled eight plants per treatment from four replications per date in each test.

Results and Discussion: This trial was performed under adverse conditions described previously and greenbug populations were relatively low when compared to previous trials. Leaf damage was limited and grain loss to birds was high so grain harvest was not done. The different treatments probably would not have resulted in yield differences compared to the untreated plots.

However, it appeared, that after two months Gaucho provided as good or better control of greenbugs than the other insecticide seed treatments and Counter CR.

Chemical Control of Greenbugs on Sorghum, 2002

Arkansas Valley Research Center  
Test Plot Information

Purpose: To evaluate the effectiveness of various seed treatment insecticides for the control of greenbug, *Schizaphis graminum* (Rondani), on sorghum. The greenbugs were probably biotype I with very little insecticide resistance.

Data: Aphid populations

Plots: Treated, 43.56 ft. X 4 rows (5 ft.) wide (435.6 ft<sup>2</sup>, 0.01 acres)

Design: Randomized block, 4 replications

Hybrid: Pioneer 8500

Fertilizer: 75 lbs P<sub>2</sub>O<sub>5</sub>/acre and 16 lbs N/acre as 11-50-00 and 11-7-01; 196 lbs N/acre as NH<sub>3</sub>; chisel and roll on December 3, 2001

Herbicide: Clarity 0.25 lbs. AI/acre on July 1 and July 9

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

Plant: June 13, 2002, 79,805 seeds/acre

Irrigate: June 15, July 10, July 30 and August 31

Treated: Seed on May 22, 2002 (Syngenta)  
Counter CR on June 13, 2002 (over the row at planting)

Harvest: none



Table 17.-Sorghum seed treatment trial to control greenbugs. Aphid counts.  
Arkansas Valley Research Center, C.S.U., Rocky Ford, Colorado.

Treatment <sup>1</sup>		A <sup>2</sup>	Greenbug Counts <sup>3</sup>		
			8/13	8/20	8/27
1) Concep III	8EC	40.0	365	608	571
1) Maxim	4FS	2.5			
1) Apron XL	3LS	7.5			
2) Concep III	8EC	40.0	20	42	79
2) Captan 400	FS	90.0			
2) Alegiance-FL	FS	4.0			
2) Gaucho 480	FS	250.0			
3) Concep III	8EC	40.0	107	166	148
3) Maxim	4FS	2.5			
3) Apron XL	3LS	7.5			
3) Crusier	5FS	200.0			
4) Concep III	8EC	40.0	85	332	213
4) Maxim	4FS	2.5			
4) Apron XL	3LS	7.5			
4) A9765	FS	50.0			
5) Concep III	8EC	40.0	63	146	178
5) Maxim	4FS	2.5			
5) Apron XL	3LS	7.5			
5) A9765	FS	100.0			
6) Concep III	8EC	40.0	190	473	366
6) Maxim	4FS	2.5			
6) Apron XL	3LS	7.5			
6) Counter CR	20G	6.0			

1 - Seed treated on May 22, 2002; Planted Pioneer 8500 on June 13, 2002.

Counter CR banded over row at planting.

2 - GA/100 Kg seed except Counter CR 6 oz/1000 ft. row.

3 - Average number of aphids counted on 2 plants per plot, 4 replications per treatment.