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**2022 Sorghum Hybrid Performance
Trials in Eastern Colorado**

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

S. M. Jones-Diamond, Crop Testing Program Director and Extension Specialist,
Dept. of Soil and Crop Sciences

K. J. Tanabe, Farm Manager and Research Associate III, Arkansas Valley Research
Center

B. T. Pettinger, Research Associate III, Plainsman Research Center

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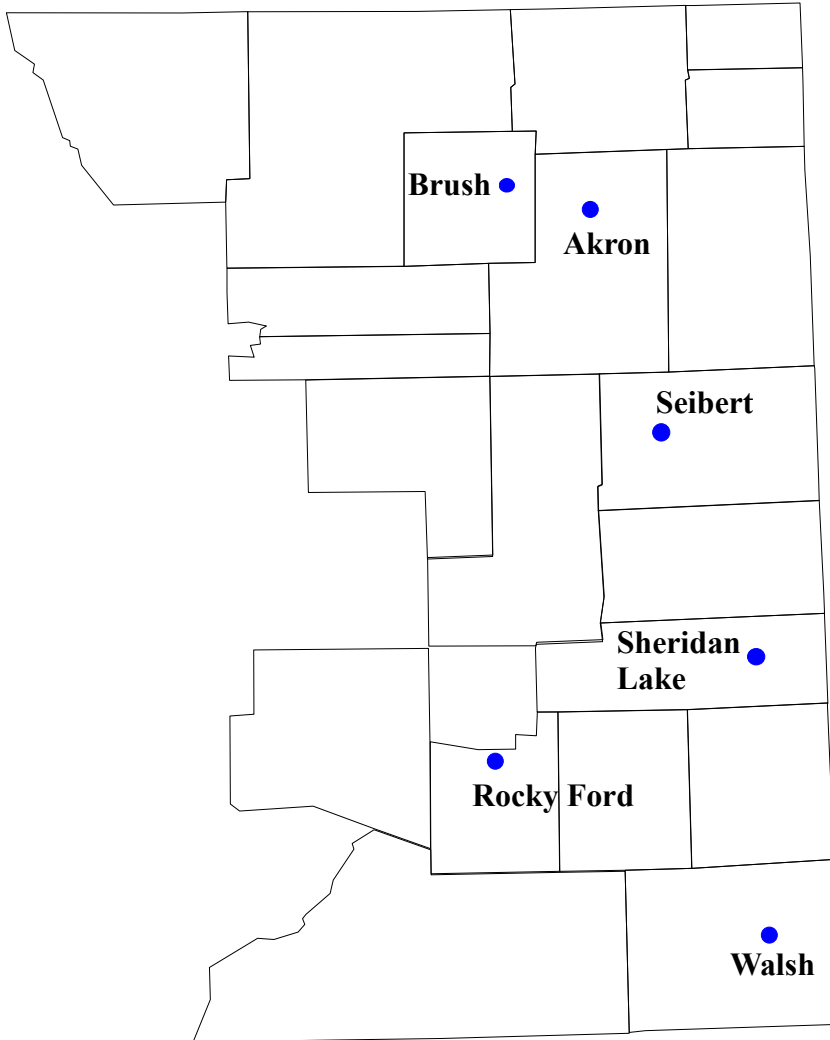
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2022 SORGHUM HYBRID PERFORMANCE TRIALS IN EASTERN COLORADO

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2022 Sorghum Trial Testing Locations in Eastern Colorado



SORGHUM HYBRID PERFORMANCE TRIALS IN EASTERN COLORADO, 2022
K.J. Larson, S.M. Jones-Diamond, K.J. Tanabe, and B.T. Pettinger

This publication is a progress report of the sorghum hybrid performance trials conducted by the Department of Soil and Crop Sciences at Colorado State University, Colorado Agricultural Experiment Station (AES), and Colorado State University Extension. The grain sorghum trials were conducted at six sites in eastern Colorado: Akron, Brush, Rock Ford, Seibert, Sheridan Lake and Walsh. Forage sorghum trials were conducted at Rocky Ford (irrigated) and at Walsh (dryland).

The 2022 Colorado grain sorghum crop is estimated at 9.9 million bushels, down 4.9 million bushels from the 2021 sorghum crop of 14.8 million bushels. The 2022 sorghum crop is the fourth largest crop in the last 10 years due to the highest harvested acres, 450,000 acres, in the last decade. This year, the grain yield is estimated at 22.0 bu/acre, which is the second lowest average in the last 10 years. Sorghum silage statistics are not published during the current year; however, Colorado sorghum silage statistics are available for the previous year. In 2021, 456,000 tons of sorghum silage was produced, which is the highest sorghum silage production in a decade. The average yield was 14.0 tons/acre from 39,000 harvested acres. (USDA, National Agricultural Statistics Service, Mountain Region, Colorado Field Office, 2022).

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 Sally Jones-Diamond, phone (970) 214-4611, email Sally.Jones@colostate.edu; or Kevin Larson, phone (719) 324-5643, email Kevin.Larson@colostate.edu or visit our website <https://csucrops.com/sorghum> for entry forms and further details. Names and addresses of sorghum seed companies submitting entries in 2022 are shown in Table 1. Each firm selected entries for testing and furnished seed for the trials. AES researchers selected closed-pedigree hybrids as standards of comparison.

Summary tables for weather data (NOAA and CoAgMet, 2022), soil analysis (Soil, Plant and Water Testing Laboratory, Colorado State University), fertilization, and available soil water graphs derived from gypsum block readings are provided for certain trial locations. Other information, where available, was included: site description, irrigation, pest control, field history, and pertinent comments.

Table 1.--Entrants in the 2022 Colorado Sorghum Performance Trials.

Brand	Entered by
ALTA SEEDS	Advanta US, 2001 E. 1 st St., P.O. Box 2420 Hereford, TX 79045
BROWNING SEED, INC	Browning Seed, Inc., 3101 S. IH 27, Plainview, TX 79072
CHANNEL SEED, DEKALB	Bayer Crop Science, 800 N. Lindbergh Blvd., Creve Coeur, MO 63141
DYNA-GRO SEED	Loveland Products, Inc., 3005 Rocky Mountain Ave, Loveland, CO 80538
GOLDEN ACRES, KWS	AgReliant Genetics, 1122 East 169 th St., Westfield, IN 46074
HOEGEMEYER HYBRIDS	Corteva Agriscience, P.O. Box 1000, Johnston, IA 50131
MOJO SEED	Mojo Seed, P.O. Box 1716, Hereford, TX 79045
SORGHUM PARTNERS	S&W Seed, 2101 Ken Pratt Blvd, Suite 201 Longmont, CO 80501-6085
WARNER SEEDS	Warner Seeds, Inc., 120 South Lawton St., P.O. Box 1877, Hereford, TX 79045

Growing Degree Days for sorghum were calculated from planting through 50% bloom date 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 at Walsh were planted with a four-row cone planter and harvested with a modified Gleaner F3 combine equipped with a HarvestMaster H2 weighing system and a four-row row-crop head to enhance harvest of lodged tillers. Trials at Akron, Seibert, and Sheridan Lake were planted with a four-row Seed Research Equipment Solutions precision planter and harvested with a four-row Case 1620 combine modified as a multiple crop plot combine equipped with a HarvestMaster H2 weighing system. Forage sorghum was chopped using a two-row, self-propelled, New Holland 1880 silage chopper at Walsh, and a two-row, pull-type, New Holland 880 at Rocky Ford. Both silage choppers were equipped with electronic automated weighing systems.

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

50% Bloom. Number of days after planting until half of the main heads had pollinating florets halfway down the panicle. Number of days to half bloom provided 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 became 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 stems leaning more than a 45-degree angle were considered lodged. Since both combines were equipped with row crop heads, most of the leaning tillers were harvested.

Emerged Plant Population. Emerged plant population in plants per acre was measured after seedling emergence and final stand establishment. Only main plants, and not tillers, were counted from two rows of the harvest plot length.

Harvest Population. Harvest population was the total number of grain-producing main heads and tillers at harvest from two rows of the harvest plot length in heads per acre.

Tillering. The ratio of harvest population (mature, harvestable heads) divided by the emerged plant population and subtracting one from the ratio for the main plant culm.

Test Weight. Test weight was recorded by Harvest Master measuring systems at all sites. A low test weight may indicate that a hybrid did not fully mature prior to the first freeze or that it suffered environmental stress, such as a water deficiency. Given moderate test weights, a low test weight may indicate a genetic difference.

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

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

Forage Yield. Forage yield in tons per acre was adjusted to 65% 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 65% moisture content.

Brix. The sugar content, expressed as a percent, in the stalk of forage sorghums at harvest was measured with a hand refractometer.

Available Soil Water

Available soil water from wilting point to field capacity was measured by placing gypsum blocks at 6, 18, 30, and 42 inches below the soil surface. Electrical resistance readings were made weekly or biweekly. Resistance readings varied with the amount of soil water present. With readings below 50% of available water, plant stress was possible. Using resistance readings, available soil water was determined by extrapolating from soil water depletion curves for each soil type.

Statistical Method

Trials 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 5%, 20%, and 30%. Analysis of variance and regression were performed and with CoStat Statistical Software, a product of Cohort Software, Berkeley, California, and with SAS, SAS Institute, Cary, North Carolina.

Acknowledgements

We are appreciative to the staffs at the Central Great Plains Research Station at Akron, Arkansas Valley Research Center at Rocky Ford, and Plainsman Research Center at Walsh for their assistance in conducting these trials. We would like to extend a special thank you to our grower-cooperators for their assistance with the trials: Tim Stahlecker (Seibert), RM Bar Farms/Rex May (Brush), and Burl Scherler (Sheridan Lake).

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2022 Dryland Grain Sorghum Hybrid Performance Trial at Akron

Brand	Hybrid	Grain	2-Year		Test	Moisture	Emerg	50% Bloom	Maturity	Grain
		Yield ^a	Average	Yield			Plant			
		bu/ac	% of test average	bu/ac	lb/bu	percent	plants/ac	days after planting	Group ^b	Color
Sorghum Partners	SP 25C10	34.8	128%	45	54	9	30,700	66	E	Cream
Dekalb	DKS28-05	34.5	127%	50	53	8	24,500	66	E	Bronze
Dekalb	DKS28-07	33.9	125%	-	53	9	28,400	67	E	Bronze
Channel	5B27	32.4	119%	51	54	9	27,800	64	ME	Bronze
Dyna-Gro Seed	GX22923	31.8	117%	-	55	9	29,600	72	E	Cream
Hoegemeyer Seed	H6041	31.8	117%	-	57	10	19,600	68	ME	Cream
Sorghum Partners	251	30.3	112%	43	55	9	25,700	66	E	Red
Dyna-Gro Seed	M59GB57	30.0	110%	50	52	8	30,600	68	E	Bronze
Hoegemeyer Seed	H6037	29.7	109%	-	56	11	20,500	70	ME	Red
Alta Seed	AG1201	29.1	107%	48	55	10	32,100	73	E	Red
Golden Acres	GA 2620C	29.1	107%	50	54	10	24,000	70	ME	Cream
Dyna-Gro Seed	M59GB94	28.2	104%	48	55	10	33,600	71	E	Bronze
Channel	5R45	28.2	104%	-	55	9	24,600	76	ME	Red
Hoegemeyer Seed	H6020	27.9	103%	50	55	11	20,200	70	ME	Red
Dyna-Gro Seed	M57GC29	27.9	103%	-	55	10	22,200	71	E	Cream
Dyna-Gro Seed	M54GR24	27.6	102%	43	55	11	21,600	70	E	Red
Dekalb	DKS29-28	27.6	102%	50	54	9	32,100	67	E	Bronze
Sorghum Partners	SP 43M80	26.1	96%	44	56	11	33,300	70	ME	Bronze
Golden Acres	GA 2730B	25.2	93%	50	55	10	26,000	71	ME	Bronze
Dekalb	DKS29-95	24.0	88%	45	55	10	25,700	72	E	Dark Red
Sorghum Partners	SP 30A30 DT	23.7	87%	-	55	13	27,700	72	ME	Bronze
Golden Acres	GA 1510C	23.4	86%	44	56	10	21,000	72	E	Cream
Sorghum Partners	SP 31A15	22.8	84%	47	53	9	27,200	72	ME	Bronze
Sorghum Partners	SP 45A45 DT	20.7	76%	-	54	11	25,100	73	ME	Bronze
Dyna-Gro Seed	M60GB31	16.5	61%	37	56	11	22,800	82	ME	Bronze
Alta Seed	ADV G1120IG	9.0	33%	34	51	11	26,700	90	ME	Red
Average		27.2	100%	46	55	10	26,300	71		
		^c LSD (.30)	4							
		^c LSD (.05)	8							

^aYields adjusted to 14% moisture and hybrids ranked by yield. Yields in bold are in the top LSD group (.30) and are not significantly different from one another.

^bMaturity group: E=early; ME=medium-early. Maturity groups are provided by the company and may not align with the observed flowering dates in the trial due to the latitude and relatively high elevation of the trial site (4,659 feet).

^cFarmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD are considered the same.

Site Information

Collaborator: USDA-ARS Central Great Plains Research Center
 Planting Date: June 10, 2022
 Harvest Date: October 30, 2022
 Fertilizer: Pre-emerge: N at 50 lb/ac
 Herbicide: Pre-emerge: Lumax at 1.75 pt/ac, Buccanneer plus at 1 qt/ac; Post-emerge (hooded sprayer): Starane at 0.4 pt/ac, 2,4-D amine at 1 pt/ac on Aug. 2; Sterling blue at 6 oz/ac and 2,4-D amine at 0.75 pt/ac on Aug. 17th.
 Previous Crop: Triticale
 Soil Type: Keith-Kuma complex
 GPS Coordinates: 40.161784, -103.143933
 Trial Comments: Planted June 10th into excellent moisture. Average stands and emergence, triticale stubble in field. Most hybrids were flowering by week of Aug. 22nd. Plants were showing significant drought stress by mid-August which lasted through the grain-fill period (hence low test weights). Good weed control throughout the season. No lodging noted at harvest. Weather station estimates showed the trial received about 6 inches of rain from planting to harvest, and 11.2 inches since January 1st, which is 76% of the ten-year average (year-to-date).

2022 Dryland Grain Sorghum Hybrid Performance Trial at Seibert

Brand	Hybrid	Grain	2-Year		Test	Emerged		Maturity	Grain	
		Yield ^a	Yield	Average	Yield	Weight	Moisture	Plant		Group ^b
		bu/ac	% of test average	bu/ac	lb/bu	percent	plants/ac	50% Bloom	Color	
								days after planting		
Hoegemeyer Seed	H6041	48.9	121%	-	60	13	36,900	67	ME	Cream
Hoegemeyer Seed	H6037	48.6	120%	-	59	12	32,200	68	ME	Red
Dekalb	DKS29-95	45.6	113%	53	59	12	38,300	71	E	Dark Red
Hoegemeyer Seed	H6020	44.1	109%	55	59	11	32,200	68	ME	Red
Golden Acres	GA 2730B	43.8	108%	53	58	15	34,100	73	ME	Bronze
Golden Acres	GA 1510C	43.5	108%	50	59	12	36,000	69	E	Cream
Golden Acres	GA 2620C	42.6	106%	51	59	14	39,500	68	ME	Cream
Sorghum Partners	SP 43M80	41.4	103%	50	60	13	39,000	68	ME	Bronze
Dyna-Gro Seed	M54GR24	41.1	102%	48	59	15	33,200	67	E	Red
Dyna-Gro Seed	M59GB57	40.8	101%	50	58	11	30,600	64	E	Bronze
Dyna-Gro Seed	GX22923	40.2	100%	-	59	12	35,700	70	E	Cream
Dekalb	DKS28-07	39.9	99%	-	59	14	40,900	70	E	Bronze
Dyna-Gro Seed	M60GB31	39.9	99%	51	59	19	36,700	76	ME	Bronze
Dyna-Gro Seed	M57GC29	39.0	97%	-	58	12	28,700	73	E	Cream
Dekalb	DKS29-28	38.7	96%	55	59	14	40,400	69	E	Bronze
Sorghum Partners	SP 31A15	37.8	94%	48	58	13	38,700	72	ME	Bronze
Sorghum Partners	SP 45A45 DT	37.5	93%	-	59	16	30,900	73	ME	Bronze
Dyna-Gro Seed	M59GB94	36.6	91%	53	59	17	36,000	70	E	Bronze
Dekalb	DKS28-05	36.0	89%	45	58	14	42,200	69	E	Bronze
Sorghum Partners	SP 30A30 DT	35.1	87%	-	60	14	30,100	70	ME	Bronze
Sorghum Partners	SP 25C10	34.2	85%	42	59	14	35,000	64	E	Cream
Sorghum Partners	251	33.0	82%	40	58	12	29,200	61	E	Red
Average		40.4	100%	50	59	14	35,300	69		
		^c LSD (.30)	4							
		^c LSD (.05)	8							

^aYields adjusted to 14% moisture and hybrids ranked by yield. Yields in bold are in the top LSD group (.30) and are not significantly different from one another.

^bMaturity group: E=early; ME=medium-early. Maturity groups are provided by the company and may not align with the observed flowering dates in the trial due to the latitude and relatively high elevation of the trial site (4,708 feet).

^cFarmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD value are considered the same.

Site Information

Collaborator: Tim Stahlecker
 Planting Date: May 28, 2022
 Harvest Date: October 20, 2022
 Previous Crop: Winter wheat
 Soil Type: Ascalon sandy loam
 GPS Coordinates: 39.27024, -102.81746
 Trial Comments: Planted into good moisture and wheat residue. Very good stands and emergence. Some herbicide injury noted on plants in mid-June, but plants grew out of it by mid-July. Showed drought stress in mid-August and most plots flowered by week of Aug. 15th. Weather station estimates showed the trial received about 11 inches of rain from planting to harvest, and 17 inches since January 1st, which is 91% of the ten-year average (year-to-date).

2022 Dryland Grain Sorghum Hybrid Performance Trial at Sheridan Lake

Brand	Hybrid	Grain	Yield	3-Year			Emerg	Harvest		50% Bloom	Maturity Group ^d	Grain Color
		Yield ^a		Average Yield	Test Weight	Moisture	Plant Population	Population ^b	Tillering ^c			
		bu/ac	% of test average	bu/ac	lb/bu	percent	plants/ac	heads/ac	tillers/plant	days after planting		
Dyna-Gro Seed	GX22916	66.0	136%	-	56	22	39,300	43,100	0.1	71	ME	Bronze
Dekalb	DKS29-95	59.7	123%	55	58	17	40,000	47,500	0.2	68	E	Dark Red
Dyna-Gro Seed	GX22923	58.5	120%	-	55	21	40,100	51,000	0.3	70	E	Cream
Dyna-Gro Seed	M60GB88	54.3	112%	56	58	18	40,700	45,100	0.1	70	ME	Bronze
Dyna-Gro Seed	M59GB94	53.7	110%	59	56	21	40,700	45,700	0.1	66	E	Bronze
Dekalb	DKS38-16	52.8	109%	-	58	21	40,500	49,900	0.2	68	ME	Bronze
Dekalb	DKS36-07	51.9	107%	-	56	22	43,800	44,900	0.0	70	ME	Bronze
Dyna-Gro Seed	M63GB78	51.9	107%	-	57	23	39,400	47,200	0.2	74	ME	Bronze
Sorghum Partners	SP 31A15	51.9	107%	54	57	16	42,300	45,000	0.1	67	ME	Bronze
Hoegemeyer Seed	H6037	51.0	105%	57	59	16	44,700	51,000	0.1	65	ME	Red
Sorghum Partners	SP 43M80	50.7	104%	56	58	20	45,000	45,200	0.0	67	ME	Bronze
Dyna-Gro Seed	M57GC29	50.1	103%	-	57	19	40,600	46,800	0.1	66	E	Cream
Dyna-Gro Seed	GX21991	49.5	102%	-	55	21	41,300	39,400	0.0	65	ME	Bronze
Hoegemeyer Seed	H6020	49.5	102%	61	58	20	37,500	42,900	0.1	63	ME	Red
Dyna-Gro Seed	M54GR24	48.6	100%	57	59	18	39,400	43,000	0.1	65	E	Red
Dyna-Gro Seed	M60GB31	48.6	100%	53	56	25	39,100	34,300	0.0	75	ME	Bronze
Sorghum Partners	SP 30A30 DT	48.6	100%	-	56	22	38,200	46,900	0.2	67	ME	Bronze
Dekalb	DKS28-05	48.0	99%	57	58	18	44,000	58,400	0.3	59	E	Bronze
Dekalb	DKS28-07	47.7	98%	-	57	18	44,300	51,400	0.2	63	E	Bronze
Dekalb	DKS29-28	45.6	94%	53	58	19	45,100	50,400	0.1	64	E	Bronze
Hoegemeyer Seed	H6041	45.6	94%	57	58	16	39,400	52,500	0.3	65	ME	Cream
Golden Acres	GA 2620C	45.3	93%	56	58	18	42,900	52,300	0.2	66	ME	Cream
Alta Seed	AG1201	44.7	92%	-	57	20	40,400	43,800	0.1	69	E	Red
Sorghum Partners	SP 45A45 DT	43.5	89%	-	57	22	42,800	56,500	0.3	67	ME	Bronze
Golden Acres	GA 2730B	42.9	88%	54	57	20	41,200	55,600	0.4	65	ME	Bronze
Dyna-Gro Seed	M59GB57	42.3	87%	53	57	19	41,000	46,400	0.1	62	E	Bronze
Golden Acres	GA 1510C	38.7	80%	53	56	23	41,000	46,300	0.1	69	E	Cream
Alta Seed	ADV G1120IG	20.7	43%	-	52	27	38,500	19,000	0.0	96	ME	Red
Average		48.7	100%	56	57	20	41,200	46,500	0.2	68		
		^c LSD (.30)	5									
		^c LSD (.05)	10									

^aYields adjusted to 14% moisture and hybrids ranked by yield. Yields in bold are in the top LSD group (.30) and are not significantly different from one another.

^bHarvest population is the total number of grain-producing heads/panicles counted at harvest that were mature, including tillers.

^cAverage number of productive (grain containing and mature) tiller heads per plant. Does not include main plant head.

^dMaturity group: E=early; ME=medium-early. Maturity groups are provided by the company and may not align with the observed flowering dates in the trial due to the latitude and relatively high elevation of the trial site (3,990 feet).

^eFarmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD value are considered the same.

Site Information

Collaborator: Scherler Farms
 Planting Date: May 31, 2022
 Harvest Date: October 12, 2022
 Fertilizer: Pre-plant: N at 50 lb/ac
 Herbicide: Pre-plant (spring): s-metolachlor at 22 oz/ac and 2,4-D at labeled rate
 Previous Crop: Failed winter wheat
 Soil Type: Fort Collins sandy loam
 GPS Coordinates: 38.53702, -102.43399
 Trial Comments: Planted into good moisture and heavy wheat residue. Very good stands and emergence. Most plots flowered by the week of August 15th. Sandbur in the trial was sprayed on July 14th with a hooded sprayer. Moderate to heavy sandbur pressure was still present within crop rows, and especially in plots where plants did not canopy well. Hail damage caused minor leaf shredding in July. Trial was harvested before fall freeze, so grain moisture was higher than what is typical. Weather station estimates showed the trial received about 11 inches of rain from planting to harvest, and 14.3 inches since January 1st, which is 96% of the ten-year average (year-to-date).

2022 Dryland Grain Sorghum Hybrid Performance Trial at Walsh

Brand	Hybrid	Grain	2-Year		Test	Plant	Emerg		Plant	50%	50%	Maturity	Grain
		Yield ^a	Yield	Average	Yield	Weight	Lodging	Plant	Plant	Bloom	GDD ^b	Mature	
		bu/ac	% of test average	bu/ac	lb/bu	percent	plants/ac	in	days after planting	days after planting			
Dekalb	DKS36-07	93.4	117	73	61	10	28,700	48	76	2199	124	ME	Bronze
Dyna-Gro Seed	GX21991	90.1	112	--	61	1	24,000	45	81	2302	129	M/ME	Bronze
Dyna-Gro Seed	M63GB78	87.8	110	61	60	4	25,600	48	82	2321	130	M/ME	Bronze
Dyna-Gro Seed	GX22923	87.7	109	--	61	7	21,700	46	77	2217	127	ME/E	Cream
Dekalb	DKS38-16	83.7	104	--	62	4	24,800	48	76	2199	124	ME	Bronze
Sorghum Partners	SPSD352	81.4	102	--	62	4	24,400	46	78	2240	127	ME/M	Bronze
Dyna-Gro Seed	GX22916	81.2	101	--	60	14	20,500	47	83	2342	134	M/ME	Bronze
Dyna-Gro Seed	M59GB94	80.8	101	68	61	7	25,600	47	77	2217	128	ME/E	Bronze
Dyna-Gro Seed	M54GR24	80.2	100	58	61	2	25,200	47	76	2199	125	ME/E	Red
Dekalb	DKS28-07	80.0	100	--	61	2	20,900	44	72	2078	123	E	Bronze
Sorghum Partners	SP 43M80	79.8	100	65	62	3	28,700	48	75	2175	124	ME	Bronze
Dyna-Gro Seed	M60GB88	78.5	98	60	61	4	30,800	48	75	2175	124	ME	Bronze
Dyna-Gro Seed	M60GB31	78.3	98	57	61	6	20,900	47	83	2342	129	M/ME	Bronze
Dyna-Gro Seed	M57GC29	78.3	98	--	61	0	21,700	40	72	2078	121	E	Cream
Dekalb	DKS29-95	78.3	98	59	61	1	21,700	43	71	2048	119	E	Dark Red
Sorghum Partners	SP 68M57	77.0	96	--	61	4	22,500	47	76	2199	125	ME/M	Bronze
Dekalb	DKS29-05	76.3	95	58	61	10	22,500	46	71	2048	120	E	Bronze
Dekalb	DKS29-28	74.8	93	58	61	1	27,100	41	69	1995	119	E	Bronze
Sorghum Partners	SPSD353	67.6	84	--	61	1	19,800	47	82	2321	130	M	Bronze
Dyna-Gro Seed	M59GB57	67.3	84	54	62	4	25,600	41	71	2048	120	E	Bronze
Average		80.1		61	61	4	24,100	46	76	2187	125	ME	
^d LSD (P<.020)		10.5					2						
^d LSD (P<.005)		20.2											

^aYields adjusted to 14% moisture and hybrids ranked by yield. Yields in bold are in the top LSD (.20) group and are not significantly different from one another.

^bGDD: Sorghum growing degree days to 50% bloom date.

^cMaturity Group: E=early; ME=medium-early; M=medium; ML=medium late; L=late. Maturity groupings with two classes are trial observation/seed company description.

^dFarmers selecting a hybrid based on yield should use the LSD (.20) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD value are considered the same.

Site Information

Collaborator: Plainsman Research Center (Kevin Larson & Brett Pettinger)
 Planting Date: June 2, 2022 at 43,500 seeds/ac, planting depth 1.5 in.
 Harvest Date: November 16, 2022 with a harvest area of 10 ft. by 44 ft. per plot.
 Previous Crop: Wheat
 Herbicide: Preemergence: Flumioxazin at 3.0 oz/ac, Atrazine at 1.0 lb/ac, Mesotrione at 6.4 oz/ac, and Metolachlor at 1.33 pts/ac; Post emergence: Huskie at 15 oz/ac, Atrazine at 0.5 lb/ac, and AMS at 1.0 lb/ac.
 Fertilizer: Anhydrous N at 60 lb/ac and 10-34-0 at 5 gal/ac (20 lb P2O5/ac, 6 lb N/ac) was strip till applied.
 Soil Type: Richfield silt loam
 Comments: Planted into strip tilled wheat stubble. Slow emergence and adequate stands. Total rainfall for the growing season was nearly average. August was wet with 4.40 in. (4.36 in. in one rain event). September and October were dry. Weed control was good. Some, mostly minor, lodging noted at harvest.

**Available Soil Water
Dryland Grain Sorghum, Walsh, 2022**

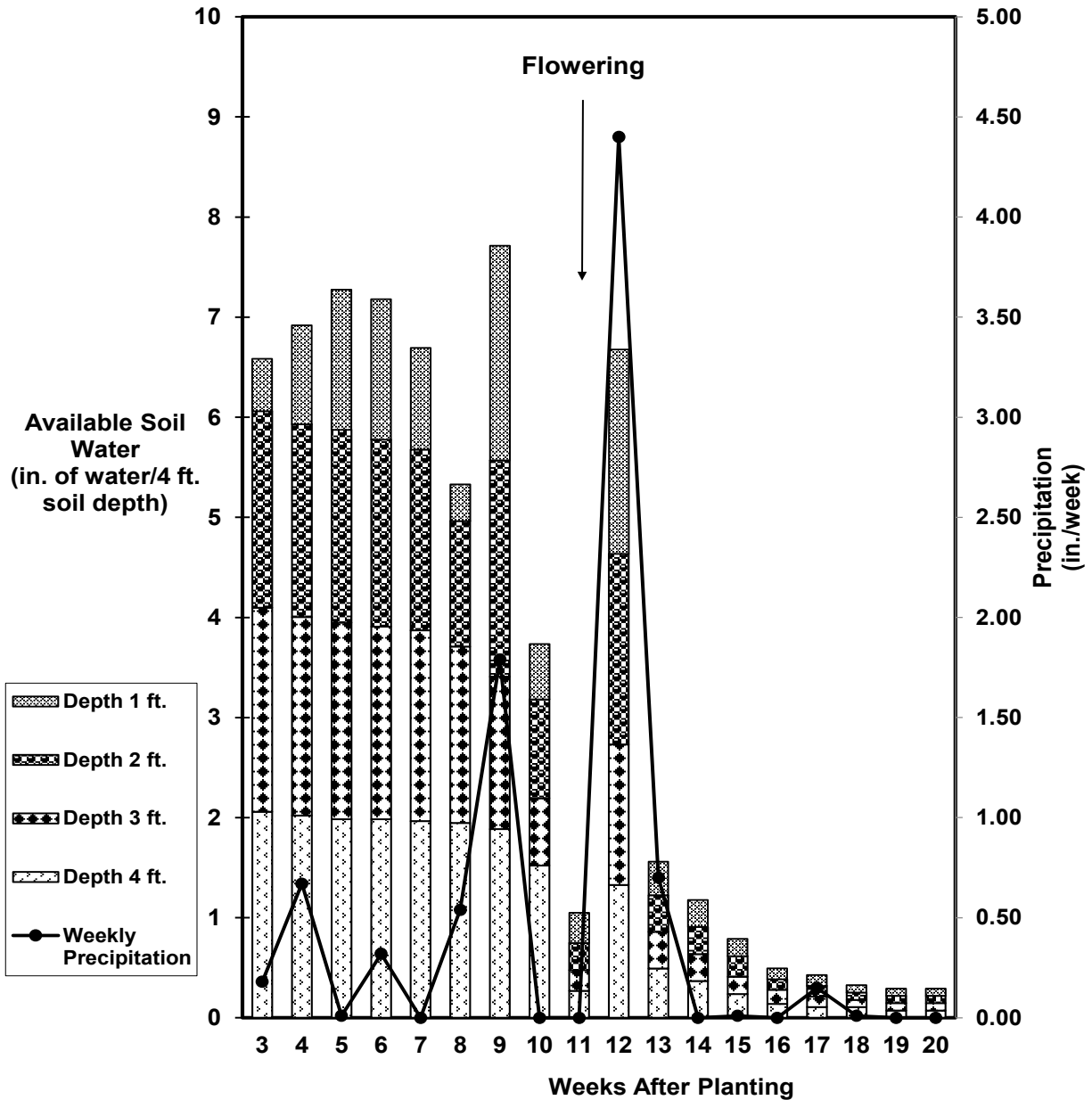


Fig. 1. Available soil water in dryland grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze (October 18) was 9.86 in. Any increase in available soil water between weeks is from rain.

2022 Irrigated Grain Sorghum Hybrid Performance Trial at Brush

Brand	Hybrid	Grain	Yield	Test	Moisture	Emerged	50% Maturity	Maturity	Grain
		Yield ^a		Weight		Plant			
		bu/ac	% of test average	lb/bu	percent	plants/ac	days after planting		
Dyna-Gro Seed	M59GB94	148.2	132%	61	14	53,100	115	E	Bronze
Channel	6B02	130.2	116%	60	14	63,500	116	ME	Bronze
Alta Seed	ADV G1120IG	125.1	111%	59	16	34,000	119	ME	Red
Dyna-Gro Seed	M60GB31	123.0	109%	60	15	58,800	117	ME	Bronze
Alta Seed	AG1201	120.0	107%	58	13	54,700	109	E	Red
Dyna-Gro Seed	GX22923	120.0	107%	59	13	59,900	114	E	Cream
Channel	5R45	119.7	106%	59	14	40,700	112	ME	Red
Sorghum Partners	SP 30A30 DT	115.8	103%	60	15	43,300	117	ME	Bronze
Sorghum Partners	SP 45A45 DT	115.8	103%	60	15	46,300	118	ME	Bronze
Dekalb	DKS29-95	114.9	102%	60	13	53,300	111	E	Dark Red
Dyna-Gro Seed	M59GB57	113.1	101%	59	13	58,800	109	E	Bronze
Sorghum Partners	SP 43M80	111.0	99%	61	15	55,900	115	ME	Bronze
Alta Seed	ADV G1329	108.0	96%	59	12	51,500	111	E	Cream
Dyna-Gro Seed	M54GR24	107.1	95%	59	14	54,200	108	E	Red
Sorghum Partners	SP 31A15	104.1	93%	59	12	55,500	111	ME	Bronze
Dyna-Gro Seed	M57GC29	103.8	92%	59	12	46,000	109	E	Cream
Sorghum Partners	SP 25C10	98.4	87%	59	11	56,000	107	E	Cream
Sorghum Partners	251	81.0	72%	58	11	50,000	104	E	Red
Alta Seed	ADV XG272	77.7	69%	59	17	36,800	119	ME	Bronze
Average		112.5	100%	59	14	51,200	113		
°LSD (.30)		10							
°LSD (.05)		19							

^aYields adjusted to 14% moisture and hybrids ranked by yield. Yields in bold are in the top LSD group (.30) and are not significantly different from one another.

^bMaturity group: E=early; ME=medium-early. Maturity groups are provided by the company and may not align with the observed flowering dates in the trial due to the latitude and relatively high elevation of the trial site (3,990 feet).

^cFarmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD value are considered the same.

Site Information

Collaborator: RM Bar Farms
 Planting Date: May 16, 2022
 Harvest Date: October 14, 2022
 Herbicide: Pre-Plant: Roundup Power Max at 18 oz/ac, Visor S-Moc at 1.3 pt/ac, atrazine at 1.1 lb/ac, and Staredown at 5 oz/ac.
 Post-Emerge: Stave at 5 oz/ac, Brox 2EC at 3.6 oz/ac, atrazine at 0.55 lb/ac, Maestro 2EC at 0.6 pt/ac applied June 29th.
 Previous Crop: Winter wheat
 Soil Type: Heldt clay
 GPS Coordinates: 40.31427, -103.57654
 Trial Comments: Trial planted into irrigated wheat stubble. Excellent emergence and stands. Leaf shredding from hail received in July prior to the boot stage. Excellent weed control throughout the season. Some early maturity hybrids reached black-layer (maturity) the week of August 29th. Weather station estimates showed the trial received about 9 inches of rain from planting to harvest (in addition to full irrigation) and 11.5 inches since January 1st, which is 74% of the ten-year average (year-to-date).

2022 Irrigated Grain Sorghum Hybrid Performance Trial at Rocky Ford

Brand	Hybrid	Grain	Yield	Test	Moisture	Maturity	Grain Color
		Yield ^a	% of test avg.	Weight	percent	Group ^b	
		bu/ac		lb/bu			
Dekalb	DKS38-16	134.4	117%	60	19	ME	Bronze
Dyna-Gro Seed	M63GB78	130.2	114%	58	26	ME	Bronze
Dekalb	DKS36-07	127.8	112%	57	25	ME	Bronze
Dyna-Gro Seed	M60GB31	125.4	110%	59	25	ME	Bronze
Alta Seed	AG1201	125.1	109%	58	18	E	Red
Dekalb	DKS29-95	123.6	108%	59	17	E	Dark Red
Dekalb	DKS28-07	123.0	107%	58	19	E	Bronze
Dekalb	DKS28-05	122.7	107%	60	15	E	Bronze
Dyna-Gro Seed	M59GB94	118.5	104%	56	26	E	Bronze
Dekalb	DKS29-28	117.6	103%	59	18	E	Bronze
Dyna-Gro Seed	M60GB88	115.5	101%	59	18	ME	Bronze
Dyna-Gro Seed	GX22923	115.2	101%	55	26	E	Cream
Alta Seed	ADV G1329	106.2	93%	58	19	E	Cream
Alta Seed	ADV XG272	104.7	91%	56	30	ME	Bronze
Dyna-Gro Seed	M59GB57	103.5	90%	58	18	E	Bronze
Dyna-Gro Seed	M54GR24	102.3	89%	59	18	E	Red
Dyna-Gro Seed	M57GC29	101.4	89%	58	20	E	Cream
Dyna-Gro Seed	GX21991	98.4	86%	57	22	ME	Bronze
Alta Seed	ADV G1120IG	97.2	85%	57	27	ME	Red
Dyna-Gro Seed	GX22916	96.9	85%	57	24	ME	Bronze
Average		114.5	100%	58	21		
°LSD (.30)		9					
°LSD (.05)		17					

^aYields adjusted to 14% moisture and hybrids ranked by yield. Yields in bold are in the top LSD group (.30) and are not significantly different from one another.

^bMaturity group: E=early; ME=medium-early. Maturity groups are provided by the company and may not align with the observed flowering dates in the trial due to the latitude and relatively high elevation of the trial site

^cFarmers selecting a hybrid based on yield should use the LSD (.30) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD value are considered the same.

Site Information

Collaborator: Arkansas Valley Research Station (Kevin Tanabe and Lane Simmons)
 Planting Date: May 31, 2022
 Harvest Date: October 11, 2022
 Herbicide: Huskie at 16 oz/ac and Starane at 6.4 oz/ac applied on June 20th
 Fertilizer: Pre-plant: N at 111, P at 14, and K at 1.5 lb/ac
 Irrigation: Furrow irrigated
 Previous Crop: Forage sorghum
 Soil Type: Rocky Ford silty clay loam
 GPS Coordinates: 38.0382, -103.69406
 Trial Comments: Trial had excellent emergence and stands. Trial cultivated one time for weed control. Light pressure from volunteer forage sorghum in the field. Weather station estimates showed the trial received about 7 inches of rain from planting to harvest (in addition to full irrigation) and 11.7 inches since January 1st, which is 102% of the ten-year average (year-to-date).

2022 Sprinkler Irrigated Grain Sorghum Hybrid Performance Trial at Walsh

Brand	Hybrid	Emerged										Grain Color
		Grain Yield ^a	Yield	Test Weight	Plant Lodging	Plant Population ^b	Plant Height	50% Bloom	GDD ^c	50% Mature	Maturity Group ^d	
		bu/ac	% of test average	lb/bu	percent	plants/ac	in	days after planting		days after planting ^e		
Dyna-Gro Seed	M60GB31	111.2	116	63.5	0	35,300	53	79	2107	127	M/ME	Bronze
Alta Seed	AG1201	109.2	114	61.3	0	30,400	47	82	2192	129	M/E	Bronze
Sorghum Partners	SPSD353	105.1	110	62.9	0	27,200	54	85	2275	131	ML/M	Bronze
Dyna-Gro Seed	M63GB78	104.6	109	61.9	9	30,800	52	80	2141	130	M/ME	Bronze
Alta Seed	ADV XG272	102.2	107	63.0	0	22,800	54	86	2306	132	ML/ME	Bronze
Dyna-Gro Seed	M60GB88	99.8	104	62.2	0	40,500	52	74	1947	123	ME	Bronze
Sorghum Partners	SPSD352	99.2	104	64.0	0	40,000	51	77	2040	126	M	Bronze
Dyna-Gro Seed	M59GB94	94.7	99	62.8	7	26,800	50	74	1947	122	ME/E	Bronze
Sorghum Partners	SP 68M57	93.1	97	62.7	0	26,400	51	73	1916	122	ME/M	Bronze
Dyna-Gro Seed	M54GR24	91.0	95	61.9	4	33,300	47	70	1846	118	E	Red
Dyna-Gro Seed	M59GB57	89.6	94	62.2	0	33,300	47	70	1846	119	E	Bronze
Alta Seed	ADV G1329	87.8	92	60.8	0	23,200	43	72	1889	121	E	Cream
Alta Seed	ADV G1120IG	86.7	91	62.6	5	26,800	54	81	2164	128	M/ME	Red
Dyna-Gro Seed	M57GC29	81.7	85	60.8	0	26,800	43	71	1865	120	E	Cream
Sorghum Partners	SP 43M80	81.2	85	63.3	8	36,900	51	73	1916	122	ME	Bronze
Average		95.8		62.4	2	30,700	50	76	2026	125	M	
^f LSD (P<0.20)		8.9			0.8							
^f LSD (P<0.05)		14.1										

^aYields adjusted to 14% moisture and hybrids ranked by yield. Yields in bold are in the top LSD (.20) group and are not significantly different from one another.

^bPlant population taken after final stand. Main plants only, does not include tillers.

^cGDD: Sorghum growing degree days to 50% bloom date.

^dMaturity Group: E=early; ME=medium-early; M=medium; ML=medium late. Maturity groupings with two classes are trial observation/seed company description.

^eDays after planting or seed maturation.

^fFarmers selecting a hybrid based on yield should use the LSD (.20) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD value are considered the same.

Site Information

Collaborator: Plainsman Research Center (Kevin Larson & Brett Pettinger)
 Planting Date: May 20, 2022 at 50,000 seeds/ac.
 Harvest Date: November 30, 2022, harvest area was 10 ft. by 800 ft. (average).
 Previous Crop: Corn
 Herbicide: Preemergence: Flumioxazin at 3.0 oz/ac; Atrazine at 1.0 lb/ac, Mesotrione at 6.4 oz/ac; and Metolachlor at 1.33 pts/ac;
 Post emergence: Bromoxynil at 1.5 pts/ac and Fluroxypyr at 6.4 oz/ac.
 Fertilizer: Anhydrous N at 150 lb/ac and 10-34-0 at 7.5 gal/ac was strip till applied and 10-34-0 at 5 gal/ac at planting.
 Irrigation: Sprinkler irrigated with 16.0 in./ac of total applied irrigation.
 Soil Type: Wiley loam
 Comments: Planted into strip tilled corn stalks. Slow emergence caused reduced stand counts. Near normal precipitation for the growing season with a wet August (mostly from a single 4.36 in. rain event) and dry for the months of September and October. Weed control was fair and required cultivation. Five hybrids had 9% or less lodging, most hybrids had no lodging at harvest.

Available Soil Water

Limited Sprinkler Irrigation Grain Sorghum, Walsh, 2022

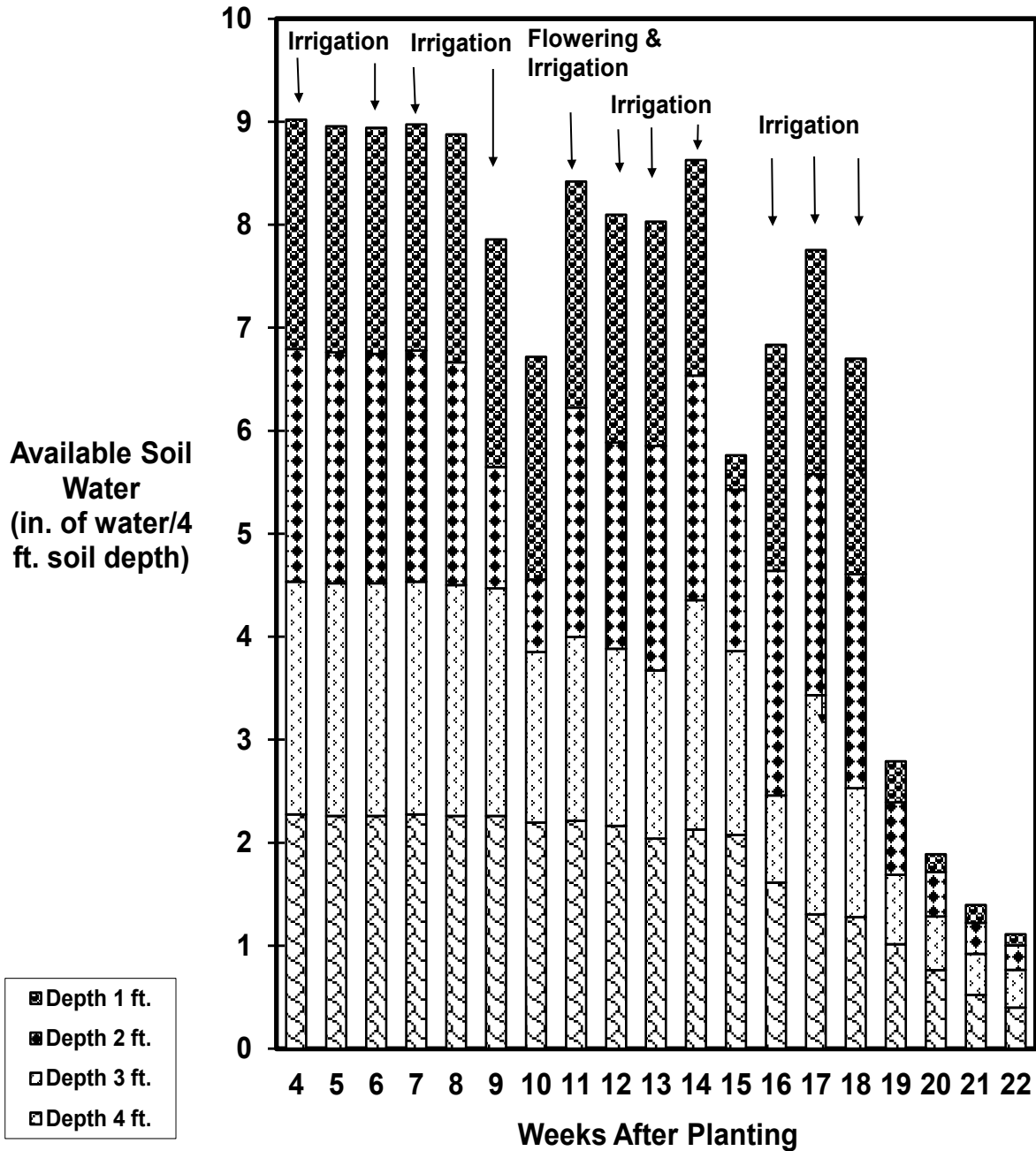


Fig. 2. Available soil water in limited sprinkler irrigation grain sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to first freeze was 9.86 in. Any increase in available soil water between weeks not attributed to applied irrigation is from rain.

2022 Dryland Hybrid Forage Sorghum Performance Trial at Walsh

Brand	Hybrid	Forage		Emerg			Lodging	Days to Flowering	Relative Maturity ^b	Forage Type ^c	Traits ^d	RFQ ^e
		Yield ^a	Yield	Brix	Plant Population	Plant Height						
		tons/ac	% of test average	%	plants/ac	in	%	days after planting				
Dyna-Gro Seed	Sweet Ton MS	19.3	138	20.5	35,200	98	0	82	E/ML	FS	SCA,MS	142
Dyna-Gro Seed	Fullgraze II BMR	18.9	135	18.8	20,500	119	0	112	ML	SS	BMR	123
Dyna-Gro Seed	Super Sile 30	17.5	125	19.2	21,500	104	0	108	ML/ME	FS	-	117
Dyna-Gro Seed	Danny Boy II BMR	16.0	115	14.8	32,500	100	0	Veg	PPS	SS	BMR	128
Dyna-Gro Seed	Super Sile 20	15.4	110	15.3	35,200	97	0	109	ML	FS	-	106
Dyna-Gro Seed	Fullgraze II	15.0	107	19.6	34,100	114	10	109	ML	SS	-	126
Dyna-Gro Seed	Dynagraze II BMR	15.0	107	16.4	23,900	88	0	83	E/ME	SS	BMR	97
Warner Seeds	2-Way AT	14.9	107	16.2	26,700	77	0	107	ML	FS	SCA	123
Dyna-Gro Seed	5FS Star	14.9	107	10.1	30,600	89	0	97	M/E	FS	-	129
Dyna-Gro Seed	Super Sweet 10	14.1	101	12.5	22,500	99	0	83	E/M	SS	-	132
Sorghum Partners	SP2774 BMR	14.0	100	13.4	27,100	97	0	84	E	FS	BMR	136
Sorghum Partners	SPBD702	14.0	100	13.6	32,900	64	0	100	M	FS	-	151
MOJO Seed	PEARL	14.0	100	6.6	22,900	82	2	96	M	FS	SCA	167
Sorghum Partners	SP1792 MS	13.9	100	10.2	35,200	84	8	96	M	FS	MS	132
Sorghum Partners	SS405	13.7	98	17.7	23,600	105	0	112	ML	FS	-	118
Dyna-Gro Seed	F72FS05	13.6	97	19.7	29,000	64	0	110	ML/ME	FS	-	152
Dyna-Gro Seed	F71FS72 BMR	13.6	97	6.3	29,400	73	0	89	ME/E	FS	BMR	109
Sorghum Partners	SPBD703	13.5	97	10.3	29,000	76	8	99	M	FS	-	136
Warner Seeds	W7706-W	13.3	95	6.5	29,000	69	0	95	M/ME	GS	SCA	169
Sorghum Partners	SP1727 MS BMR	13.3	95	15.5	29,400	90	0	96	M	FS	MS/BMR	151
Sorghum Partners	F74FS23 BMR	13.2	95	11.6	26,700	86	4	105	M	FS	BMR,BD	140
Dyna-Gro Seed	F75FS13	13.0	93	16.6	21,700	79	0	89	ME/M	FS	-	136
KWS	Freya	12.8	92	13.3	31,800	120	2	83	E/VE	SS	-	122
Dyna-Gro Seed	F72FS72 BMR	11.3	81	12.9	43,400	63	0	108	ML/M	FS	BMR	123
Dyna-Gro Seed	F72FS25 BMR	11.3	81	9.8	34,500	63	0	107	ML/M	FS	BMR	130
KWS	Kallisto	10.9	78	DS	32,900	116	4	79	E/VE	SS	-	107
Dyna-Gro Seed	Dynagraze II	10.5	75	15.0	44,500	105	0	78	E/ME	SS	-	111
Sorghum Partners	NK300	10.2	73	15.2	22,900	62	0	107	ML	FS	-	133
Average		14.0		14.0	29,593	89	1	97				130

^fLSD (P<0.20)

2.6

^fLSD (P<0.05)

4.0

^aYields are adjusted to 65% moisture content based on oven-dried samples. Yields in bold are in the top LSD (.20) group and are not significantly different from one another.

^bRelative Maturity: E=early; ME=medium-early; M=medium; ML=medium-late; L=late; PPS=photoperiod sensitive.

^cForage Type: FS=forage sorghum; S=sudangrass; SS=sorghum sudangrass.

^dTraits: BD=brachytic dwarf; BMR=brown mid-rib; MS=male sterile; SCA=Sugar Cane Aphid.

^eForage quality analyses based on oven-dried weight, RFQ=relative forage quality.

^eFarmers selecting a hybrid based on yield should use the LSD (.20) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD value are considered the same.

Site Information

Collaborator: Plainsman Research Center (Kevin Larson & Brett Pettinger)

Planting Date: June 2, 2022 at 69,700 seeds/ac, planting depth 1.5 in.

Harvest Date: October 14, 2022 with a harvest area of 5 ft. by 44 ft per plot.

Previous Crop: Wheat

Herbicide: Preemergence: Flumioxazin at 2.5 oz/ac; Atrazine at 1.0 lb/ac; and Metolachlor at 1.33 pts/ac.

Fertilizer: Anhydrous N at 60 lb/ac and 10-34-0 at 5 gal/ac (20 lb P₂O₅/ac, 6 lb N/ac) was strip till applied.

Soil Type: Richfield silt loam

Comments: Planted into strip tilled wheat stubble. Slow emergence and adequate stands. Precipitation for the growing season was nearly average. August was wet with 4.40 in. (4.36 in. came from one rain event). September and October were dry. Weed control was good. Only a few hybrids had minor lodging at harvest.

2022 Dryland Forage Sorghum Hybrid Performance Trial Feed Quality at Walsh

Brand	Hybrid	Forage Quality ^a														
		Forage Yield ^b	WSC					NDFD			NEL	Milk/Ton	Beef/Ton			
		RFQ	CP	aNDFom	Lignin	Sugar	Starch	Fat	Ash	30hr				240hr	TDN	
tons/ac	percent					Mcal/cwt			lb/ton	lb/ton						
Dyna-Gro Seed	Sweet Ton MS	19.3	142	7.8	40	3.0	14.9	18	3	7	41	60	68	71	3,218	152
Dyna-Gro Seed	Fullgraze II BMR	18.9	123	7.4	55	4.6	11.2	4	2	7	59	75	66	65	2,980	170
Dyna-Gro Seed	Super Sile 30	17.5	117	8.3	55	3.7	11.3	4	3	8	57	72	66	63	2,839	147
Dyna-Gro Seed	Danny Boy II BMR	16.0	128	8.3	55	4.3	10.1	2	2	9	62	75	66	63	2,875	165
Dyna-Gro Seed	Super Sile 20	15.4	106	8.2	54	5.2	8.4	10	2	7	51	70	65	63	2,801	121
Dyna-Gro Seed	Dynagraze II BMR	15.0	126	7.4	55	5.5	10.5	10	2	6	58	72	66	67	3,083	171
Dyna-Gro Seed	Fullgraze II	15.0	97	6.4	61	5.2	8.9	5	2	5	53	70	65	63	2,765	112
Warner Seeds	2-Way AT	14.9	123	8.1	49	3.8	12.4	9	3	7	51	70	67	66	2,988	158
Dyna-Gro Seed	5FS Star	14.9	129	7.3	48	4.2	11.1	17	2	6	51	69	67	68	3,132	167
Dyna-Gro Seed	Super Sweet 10	14.1	132	8.3	42	5.6	10.3	28	2	5	41	59	67	74	3,358	158
Sorghum Partners	SP2774 BMR	14.0	136	7.9	51	5.2	9.0	19	2	6	58	72	67	69	3,239	191
Sorghum Partners	SPBD702	14.0	151	9.0	47	4.1	9.9	25	3	6	57	68	68	71	3,349	205
MOJO Seed	PEARL	14.0	167	9.1	37	3.8	10.7	34	3	6	46	62	69	75	3,484	186
Sorghum Partners	SP1792 MS	13.9	132	7.4	45	4.1	12.6	16	3	5	47	65	67	71	3,263	172
Sorghum Partners	SS405	13.7	118	6.5	48	4.0	13.9	9	2	5	47	68	67	68	3,087	154
Dyna-Gro Seed	F71FS72 BMR	13.6	152	8.5	43	5.3	10.4	28	3	6	52	66	68	72	3,371	188
Dyna-Gro Seed	F72FS05	13.6	109	8.0	57	5.9	6.9	11	2	7	55	73	65	63	2,849	136
Sorghum Partners	SPBD703	13.5	136	7.9	50	4.5	8.4	19	2	8	58	71	66	67	3,080	169
Warner Seeds	W7706-W	13.3	169	8.8	38	4.4	10.5	35	3	5	47	64	69	76	3,591	206
Sorghum Partners	SP1727 MS BMR	13.3	151	8.2	41	4.1	13.8	16	3	5	47	64	68	73	3,389	187
Sorghum Partners	F74FS23 BMR	13.2	140	7.8	47	4.0	10.6	15	3	8	56	71	67	67	3,086	178
Dyna-Gro Seed	F75FS13	13.0	136	6.7	45	3.4	14.1	17	3	6	48	67	68	70	3,214	172
KWS	Freya	12.8	122	7.6	52	6.1	8.3	21	2	4	51	67	66	70	3,209	162
Dyna-Gro Seed	F72FS72 BMR	11.3	123	7.8	52	5.5	8.1	14	2	9	57	72	66	63	2,861	144
Dyna-Gro Seed	F72FS25 BMR	11.3	130	9.9	51	4.9	9.6	9	3	10	59	73	66	64	2,903	164
KWS	Kallisto	10.9	107	7.7	52	5.7	8.9	19	2	5	45	63	66	67	3,003	123
Dyna-Gro Seed	Dynagraze II	10.5	111	7.0	51	5.4	9.8	15	2	6	48	65	65	66	2,941	122
Sorghum Partners	NK300	10.2	133	7.1	43	3.8	13.1	17	2	8	48	66	68	69	3,157	153
	Average	14.0	130	7.9	49	4.6	10.6	16	2	7	52	68	67	68	3,111	162
	^c LSD (0.20)	2.6														
	^c LSD (0.05)	4.0														

^aAll forage quality analyses results are dry basis values. CP=crude protein; aNDFom=ash free neutral detergent fiber; NDFD=neutral detergent fiber digestibility; TDN=total digestible nutrients; NEL=net energy for lactation; Milk/ton= predicted amount of milk produced per ton of silage dry matter calculated using MILK2013.

^bYields are adjusted to 65% moisture content based on oven-dried samples. Yields in bold are in the top LSD (.20) group and are not significantly different from one another.

^cFarmers selecting a hybrid based on yield should use the LSD (.20) to protect themselves from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD value are considered the same.

**Available Soil Water
Dryland Forage Sorghum, Walsh, 2022**

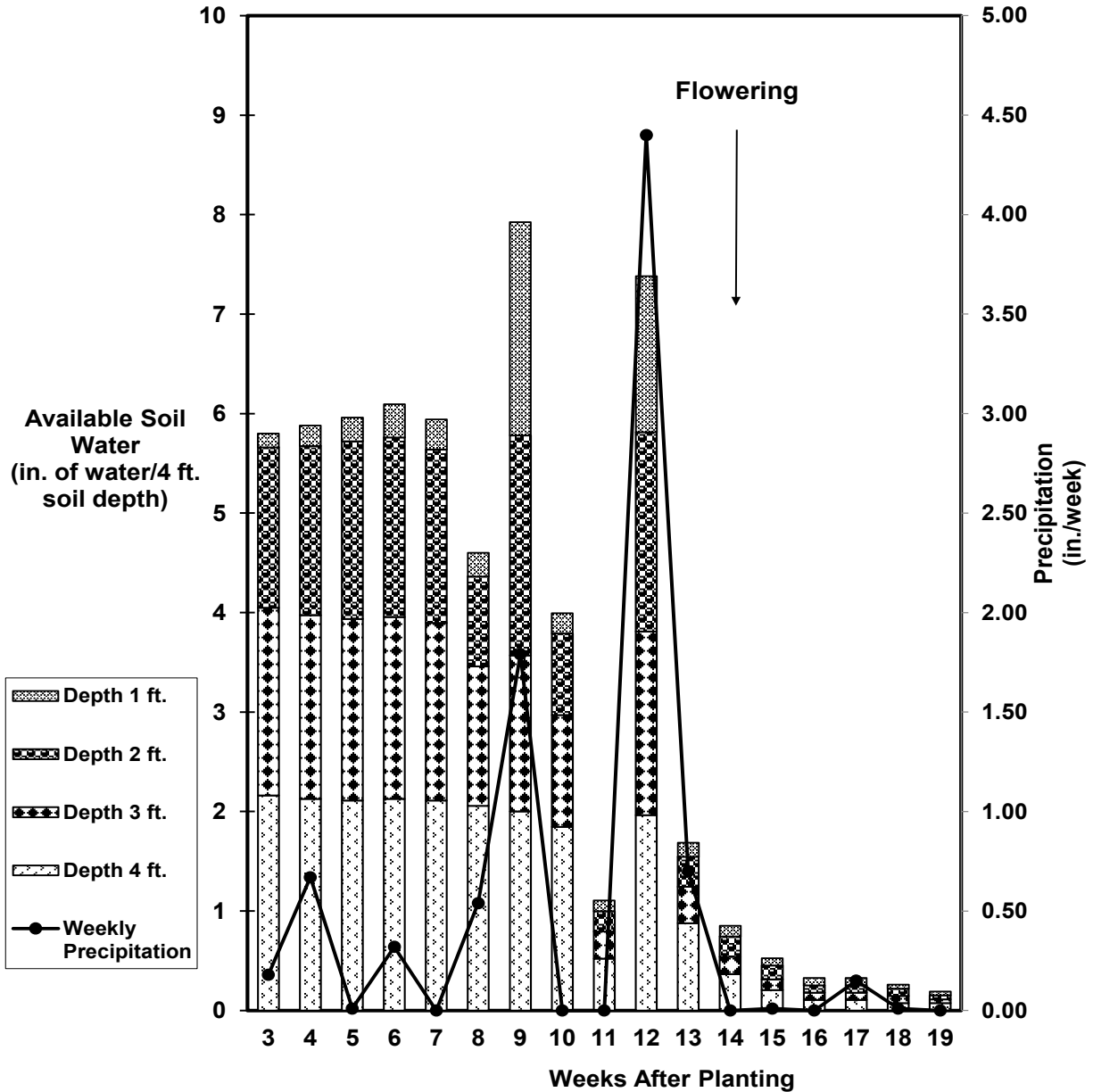


Fig. 3. Available soil water in dryland forage sorghum at Walsh. Gypsum block measurements taken to 4 ft. with 1 ft. increments. Total rainfall at Walsh from planting to harvest was 9.86 in. Any increase in available soil water between weeks is from rain.

2022 Irrigated Forage Sorghum Hybrid Performance Trial at Rocky Ford

Brand	Hybrid	Yield					Moisture	Brix	Plant Height	Forage Type ^b	Relative Maturity ^c	Traits ^d	RFQ ^e
		Dry		2-Year Avg.	Yield	%							
		Forage ^a	Matter										
tons/ac					percent	in							
Dyna-Gro Seed	Fullgraze II	34.7	12.1	136%	34.3	67	12	153	SS	ML	-	72	
Dyna-Gro Seed	Super Sile 20	34.2	12.0	134%	31.9	73	17	124	FS	ML	-	90	
Warner Seeds, Inc	2-Way AT	30.8	10.8	120%	-	70	9	102	FS	ML	SCA	106	
Dyna-Gro Seed	Danny Boy II BMR	30.5	10.7	119%	31.0	80	9	142	SS	ME	BMR	80	
Dyna-Gro Seed	5FS Star	30.1	10.5	118%	30.4	68	12	112	FS	E	-	112	
Alta Seeds	ADV F8322	29.6	10.4	116%	25.8	68	17	92	FS	M	SCA	98	
Dyna-Gro Seed	F72FS05	29.3	10.3	115%	25.9	69	6	91	FS	ME	-	113	
Dyna-Gro Seed	Super Sile 30	28.0	9.8	110%	29.5	71	15	136	FS	ME	-	90	
Dyna-Gro Seed	F75FS13	27.1	9.5	106%	-	69	15	112	FS	M	-	126	
Alta Seeds	ADV F8484IG	26.3	9.2	103%	-	73	15	87	FS	ML	IG, BD	90	
Dyna-Gro Seed	Dynagraze II BMR	26.1	9.1	102%	25.4	69	11	113	SS	ME	BMR	108	
Dyna-Gro Seed	Fullgraze II BMR	25.8	9.0	101%	27.6	72	16	143	SS	ML	BMR	92	
Dyna-Gro Seed	SweetTon MS	25.6	9.0	100%	25.4	70	21	117	GS	ML	SCA	120	
Dyna-Gro Seed	F74FS23 BMR	25.3	8.9	99%	19.1	71	16	99	FS	M	BMR, BD	131	
Dyna-Gro Seed	Dynagraze II	24.3	8.5	95%	23.7	67	7	107	SS	ME	-	100	
Mojo Seed	PEARL	23.2	8.1	91%	23.8	69	3	90	FS	M	SCA	107	
Warner Seeds, Inc	W7706-W	21.6	7.6	85%	-	68	3	80	GS	ME	SCA	124	
Alta Seeds	AF7102	21.2	7.4	83%	-	69	7	82	FS	ME	BMR	131	
Dyna-Gro Seed	F72FS25 BMR	20.5	7.2	80%	20.0	74	14	74	FS	M	BMR	141	
Dyna-Gro Seed	F71FS72 BMR	20.4	7.1	80%	19.1	71	4	84	FS	E	BMR	163	
Dyna-Gro Seed	Super Sweet 10	20.2	7.1	79%	-	72	14	103	SS	M	-	112	
Dyna-Gro Seed	F74FS72 BMR	19.6	6.9	77%	18.1	74	13	74	FS	M	BMR	120	
Mojo Seed	OPAL	19.6	6.9	77%	19.8	71	10	86	FS	M	-	86	
Alta Seeds	ADV F7232	19.5	6.8	76%	-	73	17	71	FS	M	SCA	123	
Average		25.6	8.9		25	71	12	103				110	

^fLSD (0.30)

^fLSD (0.05)

^aForage yield adjusted to 65% moisture content based on dried samples. Yields in bold are in the top LSD (.30) group and are not significantly different from one another.

^bForage Type: GS=grain sorghum; FS=forage sorghum; SS=sorghum sudangrass.

^cRelative maturities provided companies. E=early; ME=medium-early; M=medium; ML=medium-late; L=late; PPS=photoperiod sensitive.

^dTraits are provided by the companies. Dashes mean conventional (no traits) or information isn't available. BD=brachytic dwarf; BMR=brown mid-rib; DS=dry stalk; IG=iGrowth herbicide technology; MS=male sterile; SCA=sugar cane aphid.

^eForage quality analyses based on oven-dried weight. RFQ=relative forage quality.

^fIf the difference between two hybrids equals or exceeds the LSD value, the difference is significant. Farmers selecting a hybrid based on yield should use the LSD (0.30) to protect from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (0.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD value are considered the same.

Site Information

Collaborator:	CSU Arkansas Valley Research Center (Kevin Tanabe and Lane Simmons)
Planting Date:	May 16, 2022
Harvest Date:	September 22, 2022
Herbicide:	Huskie at 16 oz/ac and Starane at 6.4 oz/ac applied on June 20th
Fertilizer:	Pre-plant: N at 111, P at 14, and K at 1.5 lb/ac
Irrigation:	Furrow irrigated
Soil Type:	Rocky Ford silty clay loam
GPS Coordinates:	38.0389, -103.6933

2022 Irrigated Forage Sorghum Hybrid Performance Trial Feed Quality at Rocky Ford

Brand	Hybrid	Forage Quality ^a														
		Forage Yield ^b tons/ac	RFQ	CP	aNDFom	Lignin	WSC Sugar	Starch	Ash	Fat	NDFD 30hr	NDFD 240hr	TDN	NEL	Milk/Ton lb/ton	Beef/Ton lb/ton
Dyna-Gro Seed	Fullgraze II	34.7	72	5.7	65	6.3	7.5	4	6	2	46	63	63	64	2346	31
Dyna-Gro Seed	Super Sile 20	34.2	90	7.0	52	5.1	5.3	18	10	2	42	60	65	67	2482	50
Warner Seeds, Inc	2-Way AT	30.8	106	7.0	45	4.9	2.6	28	8	2	37	57	67	69	2839	72
Dyna-Gro Seed	Danny Boy II BMR	30.5	80	7.7	64	4.2	8.4	0	14	2	54	68	63	64	1899	26
Dyna-Gro Seed	5FS Star	30.1	112	5.8	44	4.6	8.1	23	7	2	38	56	67	69	2978	98
Alta Seeds	ADV F8322	29.6	98	6.4	49	4.6	4.5	24	11	2	42	60	66	68	2579	56
Dyna-Gro Seed	F72FS05	29.3	113	6.2	46	5.1	3.2	27	7	2	42	61	66	68	2955	106
Dyna-Gro Seed	Super Sile 30	28.0	90	7.1	59	4.7	10.0	5	9	2	51	66	64	66	2450	67
Dyna-Gro Seed	F75FS13	27.1	126	6.5	43	4.5	8.4	24	6	3	40	58	67	69	3123	128
Alta Seeds	ADV F8484IG	26.3	90	7.7	53	4.9	4.6	17	11	2	45	63	65	67	2454	54
Dyna-Gro Seed	Dynagraze II BMR	26.1	108	6.8	50	5.5	5.9	21	6	2	45	62	66	68	2939	115
Dyna-Gro Seed	Fullgraze II BMR	25.8	92	6.8	65	5.3	11.9	2	9	2	56	69	64	65	2415	78
Dyna-Gro Seed	SweetTon MS	25.6	120	6.9	43	3.5	9.1	22	9	3	42	58	68	70	2916	98
Dyna-Gro Seed	F74FS23 BMR	25.3	131	6.1	44	2.7	5.7	26	13	2	51	63	68	70	2760	94
Dyna-Gro Seed	Dynagraze II	24.3	100	7.4	47	4.5	7.3	23	12	2	42	58	66	68	2529	45
Mojo Seed	PEARL	23.2	107	6.3	47	3.6	6.0	25	13	2	44	60	67	69	2528	54
Warner Seeds, Inc	W7706-W	21.6	124	6.5	40	4.0	3.2	31	11	2	40	57	67	69	2854	75
Alta Seeds	AF7102	21.2	131	6.3	43	3.1	8.9	23	13	3	51	64	67	70	2785	102
Dyna-Gro Seed	F72FS25 BMR	20.5	141	6.3	38	3.5	2.5	29	10	2	44	60	68	71	3122	120
Dyna-Gro Seed	F71FS72 BMR	20.4	163	6.7	36	3.8	5.7	34	7	3	42	58	69	71	3378	155
Dyna-Gro Seed	Super Sweet 10	20.2	112	8.5	46	5.5	6.2	19	7	2	41	59	65	67	2925	102
Dyna-Gro Seed	F74FS72 BMR	19.6	120	8.1	46	3.3	3.7	24	13	2	49	63	67	69	2689	88
Mojo Seed	OPAL	19.6	86	6.7	50	4.0	7.3	19	13	2	41	58	66	68	2272	14
Alta Seeds	ADV F7232	19.5	123	8.8	45	3.1	4.4	18	14	2	53	67	66	68	2650	98
	Average	25.6	110	6.9	48	4.3	6.3	20	10	2	45	61	66	68	2703	80
	^c LSD (0.30)	2.1														
	^c LSD (0.05)	4.1														

^aAll forage quality analyses results are dry basis values. CP=crude protein; aNDFom=ash free neutral detergent fiber; NDFD=neutral detergent fiber digestibility; TDN=total digestible nutrients; NEL=net energy for lactation; Milk/ton= predicted amount of milk produced per ton of silage dry matter calculated using

^bYields are adjusted to 65% moisture content based on oven-dried samples. Yields in bold are in the top LSD (.30) group and are not significantly different from one another.

^cIf the difference between two hybrids equals or exceeds the LSD value, the difference is significant. Farmers selecting a hybrid based on yield should use the LSD (0.30) to protect from false negative conclusions (concluding hybrids are the same when they are actually different). Companies or researchers may be interested in the LSD (0.05) to avoid false positive conclusions (concluding hybrids are different when they are actually the same). Yield differences less than the LSD value are considered the same.

Dryland Grain Sorghum In-Furrow Microbiological Product Trials in 2021 & 2022

Sally Jones-Diamond and Kevin Larson

Introduction

Plant microbiological products represent a growing part of the agriculture market and include seed treatments and soil and/or foliar applied products to help improve plant growth. Many of these products contain naturally occurring microbes using endophytes (bacteria or fungi that live inside the plant without causing harm) to help create a symbiotic relationship between the plant and the microbiological product being applied. These products are reported to increase root and plant structures, increase yield, and improve plant nutrient uptake.

A grain sorghum microbiological product trial was conducted at three locations in 2021 and four locations in 2022 in eastern Colorado. The trial consisted of three product treatments plus an untreated control in the first year, and five products plus an untreated control in the second year. Treatments included a mycorrhizal fungal product, multiple bacterial products, and a micronutrient, bacterial, and humic acid blend product. The purpose of the study was to determine if/how the various products affected the grain yield compared to the untreated control. Data collected and summarized included soil test results, field management, grain yield, and grain test weight.

Approach

The trial was planted in farmer or research station fields at Akron, Seibert, and Sheridan Lake, Colorado under dryland production for two years, and Walsh, CO in 2021. Up to five combinations of products were tested on grain sorghum, using commercially available hybrids (DKS28-05 (Akron, Seibert, and Sheridan Lake) and M59GB57 (Walsh) in 2021, and 5C35 (Akron, Seibert, and Sheridan Lake) and M59GB57 (Walsh) in 2022.

In 2021 the treatments were 1) Valent[®] MycoApply[®] [EndoPrime SC](#) in-furrow applied at 2 fluid oz/ac; 2) PivotBio[®] [ReturN](#) in-furrow applied at 12.8 fluid oz/ac; and 3) Royal-Grow[®] [Enzyme Max[®]](#) and [Ultra Sweet](#) at 16 oz/ac each. There were three total products plus an untreated check tested in 2021. In 2022, treatments one and two (Valent[®] and PivotBio[®]) from the year prior were tested again, treatment three (Royal-Grow[®]) was dropped, and the following treatments were added: 1) Indigo Ag BioTrinsic[™] [M33 FP](#) and [M34 FP](#) products seed applied at 16.2 grams/cwt each; 2) Indigo Ag BioTrinsic[™] [W10 FP](#) seed applied at 16.2 grams/cwt; and 3) Indigo Ag BioTrinsic[™] [W12 FP](#) seed applied at 16.2 grams/cwt. There were five total products tested in 2022 along with an untreated check.

The treatments were replicated a minimum of four times in 2021 and a minimum of six times in 2022. Plots were planted in 4-rows that were 10 feet wide by 31 feet long (harvested area). Plots were planted using 30" row spacing, and the sorghum was seeded at a rate of 43,000 seeds/acre. No starter fertilizer was applied but all sites had nitrogen applied pre-plant. Plot seed weight, moisture, and test weight were collected using a Harvest Master H2 grain weighing system on a modified plot combine. Seed yield was adjusted to 14% moisture content. Soil samples were pulled at planting (0-12" and 12-24" depth) and were analyzed at American Agricultural

Laboratory, Inc. in McCook, Nebraska. Treatment yield results were analyzed using the mixed model procedure in SAS 9.4. Significant differences were determined using an alpha level of 0.05, which protects against false positives (concluding treatments are different when they are actually the same).

Results

2021

The average yield across the four sites was 64.9 bu/ac, and test weight was 59 lb/bu. There were no significant differences among the four treatment yields, and no significant difference was found when comparing each of the product treatments to the untreated control within any of the four locations. When data was combined across locations, there was not a location by treatment interaction. Test weight was not significantly different among the treatments or across locations.

2022

The average yield across the three sites was 37.1 bu/ac, and test weight was 57 lb/bu. There were no significant differences among the six treatment yields, and no significant difference was found when comparing each of the product treatments to the untreated control within any of the three locations. When data was combined across locations, there was not a location by treatment interaction. Test weight was not significantly different among the treatments or across locations.

A bar graph for each year comparing each product treatment to the untreated control has been provided. Error bars were added to the graph to help visualize treatment differences (or lack thereof). When the error bars overlap between the two treatments being compared, it indicates that those treatments were not significantly different from one another. Tables for each year with single location yield and yield averaged across sites have also been provided, with the untreated control treatment being repeated to allow direct comparison to each of the product treatments.

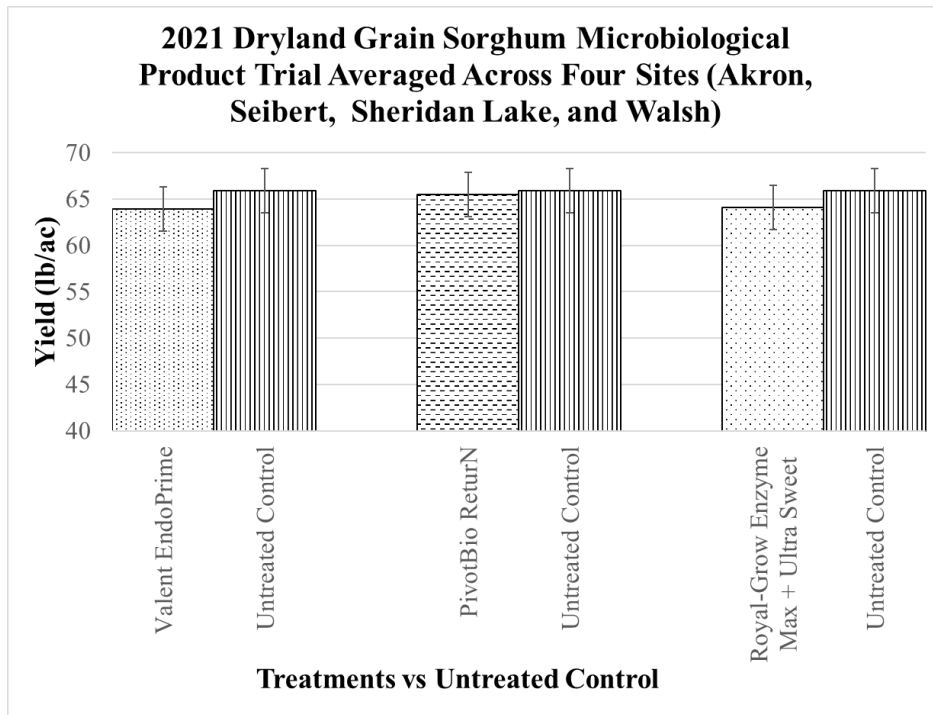
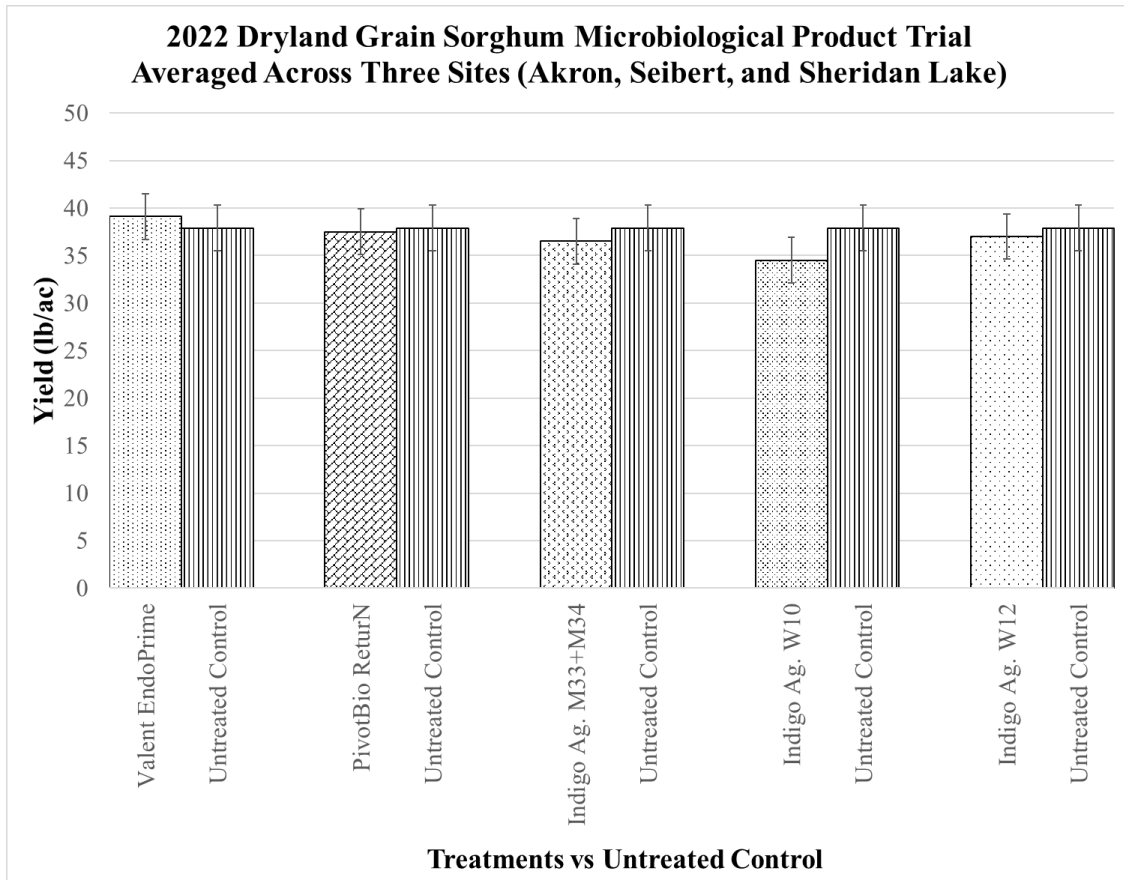
Discussion

Across the seven site-years, no significant yield increase was observed when sorghum had seed or in-furrow applications of these products. The main benefit/purpose of these products is to increase the plant's ability to obtain important nutrients such as nitrogen and phosphorus, along with water from the soil due to the symbiotic relationship with the bacteria and/or fungi that colonize in the soil and plant roots. Studies have been conducted in both the lab and field and have showed varied plant responses to these products depending on the crop, management practices such as tillage and fertilization, and the general growing environment.

In our study, the amount of available nutrients in the form of nitrogen varied widely among site-years (see tables on following pages). The presence or lack of sufficient nitrogen in the soil did not influence grain yield in our study, possibly due to the more yield-limiting lack of water. In 2022, our grain yield was below 50 bu/ac across all treatments and sites due to drought conditions across eastern Colorado. Grain yield was higher in 2021, ranging from 45 to 76 bu/ac across the sites, but no differences in grain yield, test weight, or visual plant vigor were observed among the treatments.

More research across more environments is needed to parse out potential differences in yield, and in the future we will likely conduct the study under irrigation to see if more plant available water will allow us to detect yield improvements to the plants when these products are applied.

Results Graphs and Tables





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**2022 Dryland Grain Sorghum
Microbiological Product Trial at Three Sites**



Company	Treatments	Avg. Yield bu/ac	Test Weight lb/bu	Akron	Seibert	Sheridan Lake
					bu/ac	
<i>None</i>	<i>Untreated Control</i>	37.9	56	36	44	34
Valent Biosciences	EndoPrime SC	39.1	57	37	43	37
<i>None</i>	<i>Untreated Control</i>	37.9	56	36	44	34
Pivot Bio	ReturN	37.5	57	36	45	31
<i>None</i>	<i>Untreated Control</i>	37.9	56	36	44	34
Indigo Ag	W12	37.0	56	34	41	36
<i>None</i>	<i>Untreated Control</i>	37.9	56	36	44	34
Indigo Ag	M33 and M34	36.5	57	35	38	36
<i>None</i>	<i>Untreated Control</i>	37.9	56	36	44	34
Indigo Ag	W10	34.5	56	31	41	31
	Average	37.1	57	35	42	34
	^b LSD (0.05)	NS	NS	NS	NS	NS
	Available Nitrate-N (lb/ac top 2 feet):			46	77	73
	Organic Matter Content (%):			1.6	1.3	1.2
	Soil pH in top foot:			6.6	6.8	8.2
	Soil Type:			Keith-Kuma complex	Ascalon sandy loam	Keith- Richfield silt loam

^aYields corrected to 14% moisture.

^bAn LSD (alpha 0.05) has been used to minimize the risk of false positive results, or concluding there is a difference when one doesn't exist.



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2021 Dryland Grain Sorghum Microbiological Product Trial at Four Sites



Company	Treatments	Avg. Yield bu/ac	Test Weight lb/bu	Sheridan			
				Akron	Seibert	Lake	Walsh
<i>None</i>	<i>Untreated Control</i>	65.9	59	72	68	73	51
Valent Biosciences	EndoPrime SC	63.9	59	72	65	73	47
<i>None</i>	<i>Untreated Control</i>	65.9	59	72	68	73	51
Pivot Bio	ReturN	65.5	59	76	74	67	45
<i>None</i>	<i>Untreated Control</i>	65.9	59	72	68	73	51
Royal-Grow	Enzyme Max + Ultra Sweet	64.1	59	67	71	72	46
	Average	64.9	59	72	69	71	47
	^b LSD (0.05)	NS	NS	NS	NS	NS	NS
	Available Nitrate-N (lb/ac top 2 feet):			56	32	66	124
	Organic Matter Content (%):			1.4	1.1	1.0	1.7
	Soil pH in top foot:			7.3	7.3	8.3	7.7
	Soil Type:			Weld silt loam	Ascalon sandy loam	Olney sandy loam	Richfield silt loam

^aYields corrected to 14% moisture.

^bAn LSD (alpha 0.05) has been used to minimize the risk of false positive results, or concluding there is a difference when one doesn't exist.