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1994 Grain Sorghum Performance Trials

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Recommended Citation

Hall, R. G., "1994 Grain Sorghum Performance Trials" (1994). *Agricultural Experiment Station Circulars*. Paper 287.
http://openprairie.sdstate.edu/agexperimentsta_circ/287

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South Dakota

**GRAIN
SORGHUM
PERFORMANCE
TRIALS**

Agricultural Experiment Station
South Dakota State University
U.S. Department of Agriculture



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South Dakota

GRAIN SORGHUM

PERFORMANCE TRIALS

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Grain sorghum hybrids grown under similar environmental conditions in 1992 are evaluated in this report. Tables include 1992 grain yields in pounds per acre adjusted to 14% moisture content, 1991-92 2-year yield averages, test weight, plant height, and stalk lodging score. Results in this report were obtained from the Plant Science Department Crop Performance Testing Program.

Location of the 1992 Trials

Trial locations and dates of seeding and harvesting are given in

The assistance of technicians Kevin Kirby and Bruce Swan and of Darin Huber, Dwayne Beck and Clair Stymiest of the Agricultural Experiment Station; and Robert Clark and Paul Patterson, farmer-cooperators, is gratefully acknowledged.

Table 1. Soil classes and fertility applied are shown in Table 3. Trials were located near Armour, Draper, and at the Dakota Lakes Research Farm near Pierre. The trials at Wall, Hayes, Winner, and Kennebec in 1991 were eliminated as test sites in 1992 due to a lack of entries among seed companies in testing hybrids at these locations.

Weather and Climatic Conditions

Climatic data (Table 2) for the 1992 grain sorghum growing season, May through September, are based upon U.S. Monthly Climatological Data (NOAA) recorded at a weather station reasonably near each trial site. The Pierre FAA (airport) data are used for the Dakota Lakes site. Data from Murdo is used for the Draper site. Weather stations are

located at or near the other trial sites. Precipitation quantities could vary widely from the actual site to the recording station. However, temperatures are similar over a much wider area and are considered applicable to the trial area.

Growing season temperatures were nearly similar among the three test sites. However, total precipitation was higher at Armour than at Pierre and Draper. Warm, dry conditions in early spring allowed seeding to be completed at Pierre and Armour by May 19 and at Draper by May 27.

The major environmental factors affecting grain sorghum in 1992 were (1) the late-May hard freeze over Memorial Day weekend, and (2) the below-average temperatures across most of the state starting about mid-June and continuing until first fall frost. Temperatures were about 3 degrees below averages in June, 9 degrees below average in July, and about 6 degrees below average in August. Across most of the grain sorghum area, only about 70 to 75% of the normal heat unit load was received in 1992. Consequently, heading and flowering of the crop were quite variable. Freezing temperatures occurred in most regions of the state on September 28 through October 2.

Grain sorghum harvest was completed between October 22 and 27 at all three test sites. Statewide, 92% of the grain sorghum crop was harvested by the last of October. Stalk lodging was not a factor in 1992.

Hybrid Entry Procedure

Only hybrids offered for sale in South Dakota or being produced

for sale in 1992 were eligible for entry. Entries had to exhibit a laboratory germination of 80% or higher as required by state certification standards. A fee was charged for each entry in each trial. Entries included are the those selected by the participating companies.

Experimental Procedure

Each trial consisted of four replications of two-row plots. Each plot was randomly located within each replication. Trials were seeded with cone seeders mounted above maxi-merge or Buffalo till units. A herbicide recommended for grassy weed control was applied at seeding time. Thirty-inch row spacings were used at all trial sites. Plot lengths depended upon the space available at each trial site. Plots were seeded at a rate of 6 seeds per foot of row (104,544 seeds/acre) and later thinned to a final stand of 2.5 plants per foot of row (43,560 plants/acre). The trials at Pierre and Draper were seeded no-till into wheat stubble.

Test weight of the grain was a realistic indicator of relative grain quality in 1992. Grain moisture determinations for adjusting final yields were obtained by collecting a yield sample at harvest and later measuring the moisture content with an electronic moisture meter. The grain moisture content at harvest was not determined.

Harvesting was done as soon as possible after the first frost. Delayed harvest can contribute to high levels of lodging. Plot harvesting was completed by October 27, nearly one month after the first killing frost; however, stalk lodging was not significant in 1992.

Trials were harvested by small-plot combine when plots were mature enough to shell out readily. Harvest samples were returned to Brookings or Box Elder for drying and processing.

Yields are reported in pounds per acre (lb/acre) with three replications harvested for yield and one left for observation.

Discussion of Results

Average yields varied among sites from a high of 4,900 lb at Armour to about 3,200 lb/acre at Pierre and Draper. At Armour, hybrids had to yield 5,130 lb/acre to be in the best yield group. Likewise, hybrids had to yield 3,816 lb or higher at Pierre and 2,815 lb/acre or higher at Draper to be in the best yield group.

The test yield results at Pierre should not be used to make hybrid comparisons due to the high coefficient of variation (CV) value. A high CV value of 24.2% indicated there was a higher-than-expected level of experimental error associated with this test. Some of the experimental error was likely associated with the hard freeze at Pierre on Memorial Day weekend. The test at Pierre was left following the frost and not replanted. In addition, the cool temperatures in June, July, and August delayed the maturity of many hybrids. Prior to the first killing fall frost at Pierre, many of the hybrids were not yet physiologically mature. Consequently, there was a large amount of variation in yield and test weight.

Test weights varied from an average of 52 lb/bu at Pierre to 50 lb at Armour and 45 lb at Draper.

Although Armour averaged 2 lb lower in test weight compared to Pierre, the highest recorded test weights were at Armour. This was because the Armour trial contained more entries and had both higher and lower test weights which averaged lower than at Pierre.

At Armour, hybrids had to weigh 51.2 lb/bushel or higher to be in the best test weight group. Likewise, at Pierre hybrids had to weigh 52.4 lb or higher and at Draper 45.6 lb or higher to be in the best test weight group.

There were no significant stalk lodging differences among hybrids in 1992. The final population at all test trials was good. Most likely, had the trial at Pierre been replanted following the hard freeze, the yields and test weights would have been lower and lighter than what was obtained by not replanting.

Measurement of Performance

Variations in soil fertility, slope, or stand may cause hybrids of equal potential to yield differently. Statistical determinations were made to determine if yield differences were caused by variations in environment or were true hybrid differences. Hybrid performance results are reported in Tables 4, 5, and 6. A listing of all entries is presented on the back of this publication.

Published in accordance with an act passed in 1881 by the 14th Legislative Assembly, Dakota Territory, establishing the Dakota Agricultural College and with the act of re-organization passed in 1887 by the 17th Legislative Assembly, which established the Agricultural Experiment Station at South Dakota State University.
1,800 printed by AES at a cost of 26¢ each, 1-93
AX119

Table 1. Test trial locations, seeding dates, and harvest dates.

LOCATION	COUNTY	POST OFFICE	DATE SEEDED	DATE HARVESTED
ROBERT CLARK FARM, 4W, 1S	DOUGLAS	ARMOUR	MAY 19	OCT. 26
DAK. LAKES RES. FARM, 17E	HUGHES	PIERRE	MAY 19	OCT. 22
PAUL PATTERSON FARM, 10.5SE	JONES	DRAPER	MAY 27	OCT. 14

Table 2. Temperature and precipitation data for the 1992 South Dakota grain sorghum performance trials.

LOCATION	TYPE OF DATA	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	TOTAL
ARMOUR (DOUGLAS CO.)	PRECIPITATION	2.76	0.53	1.97	6.12	4.67	2.78	19.83
	AVER. TEMP.	47.0	62.1	67.1	67.4	67.9	62.7	
	TEMP. DIFF.	-2.0	+1.8	-2.9	-8.8	-5.6	-0.5	
	FIRST FREEZE - SEPT.				28, 29	DEGREES, F.		
PIERRE AIRPORT (DLRF)	PRECIPITATION	0.47	0.54	4.74	4.52	1.70	0.93	12.90
	AVER. TEMP.	45.7	60.4	65.2	66.5	67.3	62.6	
	TEMP. DIFF.	-1.4	+2.1	-3.5	-9.5	-6.6	-0.2	
	FIRST FREEZE - SEPT.				28, 26	DEGREES, F.		
DRAPER (JONES CO.)	PRECIPITATION	0.00	0.82	4.95	6.11	1.77	0.94	14.59
	AVER. TEMP.	47.2	60.3	64.5	66.1	65.8	61.8	
	TEMP. DIFF.	+0.4	+2.2	-3.5	-9.1	-7.8	-1.3	
	FIRST FREEZE - SEPT.				28, 26	DEGREES, F.		

*PRECIPITATION = INCHES, TEMPERATURE = DEGREES FAHRENHEIT.

Table 3. Soil classification, fertilizer applied and land preparation.

LOCATION	SOIL TYPE	STARTER, 2 X 2 FERTILIZER APPLIED (ACTUAL PER ACRE)	LAND PREPARATION
ARMOUR	EAKIN SIL	37 - 18 - 00	CONVENTIONAL
PIERRE	LOWRY SIL	37 - 18 - 00	NO-TILL, WHEAT STUBBLE
DRAPER	CL	8.8- 32 - 00	NO-TILL, WHEAT STUBBLE

SIL= SILT LOAM, CL= CLAY.

Table 4. 1992 grain sorghum hybrid performance trial results--Armour, South Dakota, Robert Clark farm.

----- BRAND & HYBRID -----		YIELDS AT 14.0% MOIST.		BUSHEL TEST WT. (LB)	HT. (IN)	STALKS LODGED (%)
		1992 (LB/AC)	2-YR			
DEKALB	DK-28E	5769	5460	54.5	42	0
AGRIPRO	ST 3280	5651	.	55.6	45	0
ASGROW	MADERA	5619	4877	54.9	41	0
CARGILL	577	5352	5074	55.7	47	0
DEKALB	X-117	5229	.	52.6	46	0
DEKALB	DK-37	5204	5705	52.7	56	0
CIBA	1422	5074	.	50.5	40	0
STINE	S64BZ	4784	.	51.4	45	0
CARGILL	630	4455	4665	46.1	48	0
SIGCO	1061	4361	.	50.9	44	0
CIBA	1640A	4198	.	51.8	51	0
CARGILL	607E	4097	.	46.7	43	0
CIBA	1492	3815	.	43.3	44	0
CARGILL	618Y	3662	4588	46.4	43	0
DEKALB	DK-38Y	3574	.	46.7	46	0
NORTHROP KING	X-9120	3512	.	47.2	48	0
DEKALB	DK-40Y	3246	3667	46.0	48	0
CARGILL	X11733	3230	.	44.9	42	0
NORTHROP KING	KS 383Y	2861	.	44.8	42	0
STINE	S68BZ	1820	.	44.6	44	0
TEST AVERAGE:		4276	4862	49.3	46	0
TEST LSD (5%) VALUE:		640		4.6	2.4	*NS
MINIMUM BEST VALUE:		5130		51.2		
TEST C.V.#:		9.1	10.8			

*NS - INDICATES HYBRID DIFFERENCES WITHIN A COLUMN ARE NOT SIGNIFICANT.
#COEF. OF VARIATION - A MEASURE OF EXPERIMENTAL ERROR; IF VALUE EXCEEDS
16.0% DATA SHOULD NOT BE USED TO MAKE HYBRID COMPARISONS.

Table 5. 1992 grain sorghum hybrid performance trial results (no-till)--Pierre, South Dakota, Dakota Lakes Research Farm.

----- BRAND & HYBRID -----		YIELDS AT 14.0% MOIST.		BUSHEL TEST WT. (LB)	HT. (IN)	STALKS LODGED (%)
		1992 (LB/AC)	2-YR			
DEKALB	DK-18	5002	3692	54.4	49	0
DEKALB	X-218	4584	.	53.6	50	0
ASGROW	MADERA	3926	3275	54.7	47	0
CARGILL	577	3878	2977	52.4	53	0
NORTHROP KING	X-9121	3787	.	54.5	51	0
NORTHROP KING	1210	3760	3064	54.1	47	0
DEKALB	DK-28E	3487	2969	53.1	46	0
CIBA	1640A	2979	.	52.1	53	0
CIBA	251	2885	.	52.6	43	0
STINE	S56R	2667	.	48.9	45	0
NORTHROP KING	X-8803	2642	.	49.7	42	0
CARGILL	X11733	2029	.	47.3	45	0
SIGCO	1061	1953	.	49.1	45	0
STINE	S64BZ	1942	.	48.6	48	0
TEST AVERAGE:		3252	3195	51.8	47	0
TEST LSD (5%) VALUE:		1322		2.4	4.4	*NS
MINIMUM BEST VALUE:		3681		52.4		
TEST C.V.:		#24.2	#25.6			

*NS - INDICATES HYBRID DIFFERENCES WITHIN A COLUMN ARE NOT SIGNIFICANT.
#COEF. OF VARIATION - A MEASURE OF EXPERIMENTAL ERROR; SINCE THIS VALUE
EXCEEDS 16.0% DATA SHOULD NOT BE USED TO MAKE HYBRID COMPARISONS.

Table 6. 1992 grain sorghum hybrid performance trial results(no-till)--Draper, South Dakota, Paul Patterson farm.

---- BRAND & HYBRID ----		YIELDS AT		BUSHEL TEST WT. (LB)	HT. (IN)	STALKS LODGED (%)
		14.0% MOIST.				
		1992	2-YR			
		(LB/AC)	(LB/AC)			
DEKALB	X-218	3161	.	50.1	39	0
DEKALB	DK-28E	2894	3488	49.9	42	0
DEKALB	X-110	2283	3031	48.7	43	0
DEKALB	DK-18	2080	2874	45.6	40	0
CARGILL	577	2028	3081	47.9	39	0
DEKALB	X-117	1937	.	42.3	41	0
ASGROW	MADERA	1810	3348	48.5	39	0
NORTHROP KING	X-8803	1682	.	44.4	39	0
STINE	S64BZ	1272	.	45.8	38	0
CARGILL	X11733	1182	.	38.0	42	0
SIGCO	1061	1157	.	43.9	42	0
STINE	S56R	1098	.	46.0	39	0
NORTHROP KING	KS 383Y	458	.	30.8	40	0
TEST AVERAGE:		1772	3164	44.8	40	0
TEST LSD (5%) VALUE:		347		4.6	*NS	*NS
MINIMUM BEST VALUE:		2815		45.6		
TEST C.V.#:		11.6	9.9			

*NS - INDICATES HYBRID DIFFERENCES WITHIN A COLUMN ARE NOT SIGNIFICANT.
#COEF. OF VARIATION - A MEASURE OF EXPERIMENTAL ERROR; IF VALUE EXCEEDS 16.0% DATA SHOULD NOT BE USED TO MAKE HYBRID COMPARISONS.

Entries in the 1992 South Dakota grain sorghum performance trials.

COMPANY (BRAND)	HYBRID	COMPANY (BRAND)	HYBRID	COMPANY (BRAND)	HYBRID
AGRIPRO	ST 3280	CIBA-GEIGY	251	NORTHROP KING	1210
		'CIBA'	1640A		X-8803
ASGROW	MADERA		1422		KS 383Y
			1492		X-9120
CARGILL	630				X-9121
	577	DEKALB	DK-18		
	607E		DK-37	SIGCO	1061
	618Y		DK-28E		
	X11733		DK-40Y	STINE	S56R
			X109		S64BZ
			DK-38Y		S68BZ
			X117		
			X218		