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## 1992 Grain Sorghum Performance Trials

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# GRAIN SORGHUM

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## PERFORMANCE TRIALS

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Grain sorghum hybrids grown under 1993 environmental conditions are evaluated in this report. Tables include 1993 grain yields in pounds per acre adjusted to 14% moisture content, and 1992-93 2-year yield averages, test weight, and plant height. Results in this report were obtained from the Plant Science Department, Crop Performance Testing Program, Agricultural Experiment Station, South Dakota State University.

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

### Location of the 1993 Trials

Trial locations and dates of seeding and harvesting are shown in Table 1. Soil classes and fertility are given in Table 3. Trials were seeded at Armour, Draper, and the Dakota Lakes Research Farm near Pierre.

The trial at Draper was not harvested because no grain developed in any of the entries. This was probably the result of the cool growing season and shortage of heat units needed for proper plant development and grain filling of the crop.

Climatic data (Table 2) for the 1993 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. Pierre FAA (airport) data are used for the Dakota Lakes 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 in 1993 were below normal at both Armour and Pierre. Seeding was done at both Pierre and Armour on May 25.

The major environmental factor affecting grain sorghum in 1993 was the below-average temperatures across most of the state in June, July, and September. Temperatures were near normal in May, about 4 degrees below average in June, over 5 degrees below average in July, 2 degrees below average in August, and 4 degrees below average in September. Across most of the grain sorghum area, only about 85% of the normal heat unit load was received in 1993.

As of October 29, 1993, the statewide crop was listed as 1% excellent, 35% good, 43% fair, 16% poor, and 5% very poor, according to the South Dakota Agricultural Statistics Service. Statewide, 96% of the grain sorghum crop was harvested by November 14. Stalk lodging was not a factor in 1993.

### Hybrid Entry Procedure

Only hybrids offered for sale in South Dakota or being

produced for sale in 1993 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 were selected by the participating companies.

### Experimental Procedure

Each trial consisted of four replications of two-row plots, with each plot 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 six 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 Armour were no-till seeded into wheat stubble and corn stubble, respectively.

Test weight was a realistic indicator of relative grain quality in 1993. Grain moisture determinations for adjusting final yields were made by collecting a yield sample, enclosing it within a paper bag, and later measuring the moisture content with an electronic moisture meter.

Harvesting was delayed until shortly after the first frost. Delayed harvest can contribute to lodging; however, stalk lodging

was not significant in 1993. At both sites, two replications were harvested by small-plot combine when plots were mature enough to shell out readily.

Only two replications were harvested at Armour because of partial flooding which resulted in a severely reduced stand in one block. At Pierre, only two replications were harvested; a poor stand in the third replication was probably the result of chemical carryover. Harvest samples were returned to Brookings for drying and processing.

### Discussion of Results

The average yield at Pierre was 3,871 pounds per acre in 1993. The test coefficient of variation (CV) value (31.7%) indicated there was a high level of experimental error associated with the test. Therefore, the test yield results at Pierre should not be used to make hybrid comparisons.

Some of the experimental error at Pierre was probably associated with the below-normal temperatures, along with the fact that only two replications were harvested in 1993. Test weight values of the entries at Pierre only averaged 45.1 pounds per bushel. Entries at Pierre had to yield 39.6 pounds per bushel to be in the best test weight group; however, all test weight values at this location were too low to be of acceptable market value.

The average yield at Armour was 3,345 pounds per acre in 1993. The test coefficient of variation (CV) value (14.4%) was relatively high but within acceptable limits to qualify as a test.

However, even though the test was acceptable, it was not significant at the 5% level of probability. Entries averaged from a high of 4,117 to a low of 2,418 pounds per acre.

The combination of (1) cool growing season, and (2) the number of replications harvested (two) probably affected the ability of the test to measure hybrid yield differences at Armour. Test weight values averaged 52.5 pounds per bushel, over 7 pounds higher than at Pierre. At Armour, entries that averaged 53.9 pounds or higher were in the best test weight group. Test weight values of many entries at Armour were within acceptable market limits.

### 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 of yield differences were caused by variations in environment or were true hybrid differences. Hybrid performance results are reported in Tables 4 and 5. A listing of entries is presented after the tables.

**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 25	OCT. 25
DAK. LAKES RES. FARM, 17E	HUGHES	PIERRE	MAY 25	NOV. 4

**Table 2. Temperature and precipitation data for the 1993 South Dakota grain sorghum performance trials.**

LOCATION	TYPE OF DATA	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	TOTAL
ARMOUR (DOUGLAS CO.)	PRECIPITATION	2.70	5.87	3.70	6.65	3.46	1.13	23.51
	AVER. TEMP.	46.9	59.7	66.4	71.5	72.0	59.2	
	TEMP. DIFF.	-2.1	-0.3	-3.6	-4.4	-1.5	-4.0	
PIERRE AIRPORT (DLRF)	PRECIPITATION	2.33	1.79	3.07	3.80	0.52	1.66	13.17
	AVER. TEMP.	44.8	58.3	63.5	70.0	71.3	57.9	
	TEMP. DIFF.	-2.3	0.0	-5.2	-6.0	-2.6	-4.5	

\*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-ETHAN COMPLEX	37 - 18 - 00	NO-TILL, CORN STUBBLE
PIERRE	CANNING LOAM	37 - 18 - 00	NO-TILL, WHEAT STUBBLE

\*A MIXED SILT AND FINE LOAM

**Table 4. 1993 grain sorghum hybrid performance trial results:  
Armour, S.D., Robert Clark farm, seeded May 25, 1993.**

---- BRAND & HYBRID ----	YIELDS AT 14.0% MOIST.		BUSHEL TEST WT. (LB)	HT. (IN)	STALKS LODGED (%)
	1993 (LB/AC)	2-YR			
CARGILL 577	4117	4638	53.7	52	.
CARGILL X11206	3948	.	54.8	42	.
DEKALB X-317	3826	.	53.8	46	.
DEKALB DK-37	3810	4484	52.2	56	.
PIONEER XS810	3706	.	54.6	44	.
PIONEER 8925	3627	.	53.9	42	.
DEKALB X-219	3478	.	53.9	42	.
DEKALB DK-28E	3474	4731	53.7	46	.
DEKALB X-335	3389	.	51.9	42	.
CARGILL X11733	3210	3333	50.1	44	.
AGRIPRO ST 3280	3190	.	54.0	49	.
PIONEER 8855	3158	.	56.3	43	.
CARGILL 607E	3131	3757	50.1	44	.
DEKALB X-117	3040	4072	53.5	49	.
PIONEER 8877	3022	.	51.5	45	.
DEKALB X-322	2922	.	50.5	45	.
PIONEER 8950	2754	.	51.5	43	.
DEKALB DK-39Y	2418	.	46.0	49	.
TEST AVERAGE:	3345	4169	52.5	46	.
TEST LSD (5%) VALUE:	NS*	NS	2.5		
MINIMUM BEST VALUE:			53.9		
MAXIMUM BEST VALUE:					
TEST C.V. #:	14.4	9.7			

\*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. 1993 grain sorghum hybrid performance trial results:  
Pierre, S.D., Dakota Lakes Research Farm, seeded May 25, 1993.**

---- BRAND & HYBRID ----	YIELDS AT 14.0% MOIST.		BUSHEL TEST WT. (LB)	HT. (IN)	STALKS LODGED (%)
	1993 (LB/AC)	2-YR			
CARGILL 577	6184	5088	50.3	50	.
PIONEER 8950	5728	.	50.4	43	.
DEKALB X-219	4918	.	45.4	41	.
DEKALB X-317	4180	.	42.0	45	.
PIONEER 8925	4005	.	49.4	41	.
DEKALB DK-28E	3608	3611	42.4	47	.
DEKALB DK-18	3434	4116	49.3	50	.
DEKALB X-335	3432	.	42.0	40	.
PIONEER XS810	3249	.	49.3	43	.
CARGILL X11206	2965	.	46.2	42	.
CARGILL X11733	875	1464	29.6	42	.
TEST AVERAGE:	3871	3569	45.1	44	.
TEST LSD (5%) VALUE:	NS*	NS	10.9		
MINIMUM BEST VALUE:			39.6		
MAXIMUM BEST VALUE:					
TEST C.V.#:	31.7	25.9			

\*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 1993 South Dakota grain sorghum hybrid performance trials.**

COMPANY (BRAND)	HYBRID	COMPANY (BRAND)	HYBRID	COMPANY (BRAND)	HYBRID
AGRIPRO	ST 3280	DEKALB	DK-39Y	PIONEER	8855
			DK-18		8877
CARGILL	577		DK-37		8950
	607E		DK-28E		8925
	X11733		X117		XS810
	X11206		X335		
			X219		
			X317		
			X322		

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