1990

1990 Grain Sorghum Performance Trials

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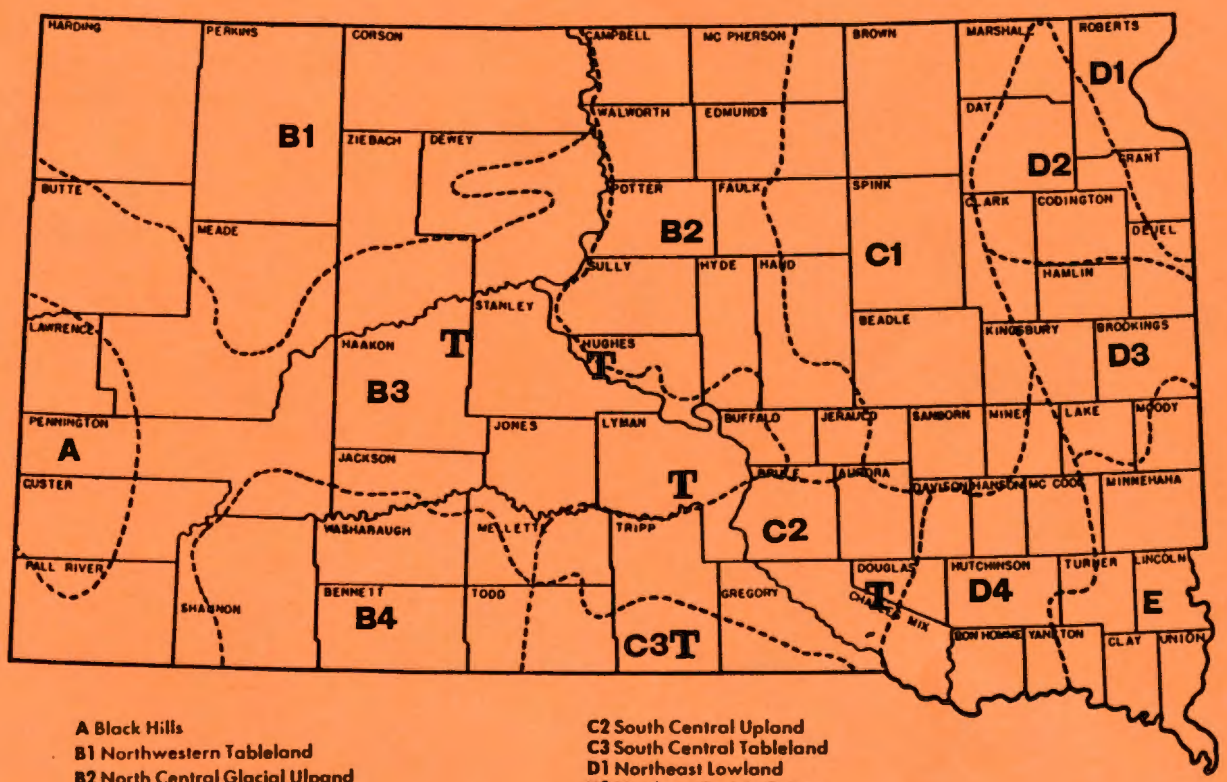
1990 South Dakota GRAIN SORGHUM PERFORMANCE TRIALS

Plant Science Department
Agricultural Experiment Station
South Dakota State University

TABLES

CROP ADAPTATION AREAS OF

SOUTH DAKOTA



A Black Hills
B1 Northwestern Tableland
B2 North Central Glacial Ulpand
B3 Pierre Plain
B4 Southwestern Tableland
C1 Northern James Valley
C2 South Central Upland
C3 South Central Tableland
D1 Northeast Lowland
D2 Northern Prairie Coteau
D3 Central Prairie Coteau
D4 Southern James Flatland
E Southeast Prairie Upland

1990 GRAIN SORGHUM PERFORMANCE TRIALS

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The relative performance of grain sorghum hybrids grown under similar environmental conditions in 1990 is evaluated in this report. Information in the accompanying tables includes grain yields in bushels per acre, test weight, moisture percentages of threshed grain sorghum immediately after first frost, and other related information. Performance records of entries harvested in 1990 and available two- and three-year averages, are also presented. The trials reported were conducted under the Plant Science Department programs in Crop Performance Testing, Agricultural Experiment Station, South Dakota State University.

Location of the 1990 Trials

Trials were located at the sites marked on the accompanying map of South Dakota. Several changes were made in trial site locations in 1990. The trials at Brookings and Centerville were dropped because of limited acreage of grain sorghum and participation. The irrigation station at Redfield was closed at the end of the 1989 crop year. An irrigated B3 trial was seeded at the newly established Dakota Lakes Research Farm 17 miles southeast of Pierre. This will be the site of the new irrigation research trials. A new dryland B3 site was established in Haakon County west of Hayes. The C2 trial was moved from south of Geddes to west of Armour. A new C3 trial was to be established in Tripp County but wet conditions delayed field operations and the trial was not seeded. The exact location of each trial and date of seeding and harvesting are included in Table 1. The soil classification, laboratory analyses of soil samples taken, and fertility applied are given in Table 2.

Weather and Climatic Conditions

Climatic data (Table 3) for the 1990 grain sorghum growing season, May-September, are based upon US Monthly Climatological Data(NOAA) recorded at a weather station reasonably near each trial site. The Pierre FAA data are used for the Hayes site. Stations are located at or near the other trial sites. Precipitation quantities would vary from the actual site to the recording station but temperatures are similar over a much wider area and considered applicable to the trial area.

Field conditions varied in the eastern portion of South Dakota most of the growing period. The early spring was warm and very dry and seeding was off to an early start through the first week in May. The cool, wet field conditions that began after May 10 delayed any plot seeding until the last of May. Hail damaged the trials at Armour mid-June. The Pierre site was abandoned because of unknown excess residual herbicides. The trials at Armour were hurt by dry, hot weather accompanied by high-velocity winds until mid-July. Douglas County was declared a disaster area. From mid-July until late August temperatures were below normal, partially reducing crop stresses in those areas that received below normal amounts of precipitation. Crop progress, heading and pollination, was delayed where precipitation was limited and temperatures above normal. Temperatures were above normal through mid-October, except mid-September. Beneficial precipitation was recorded in most areas in mid-July. Over the crop season only the east-central area of the state received above normal rainfall.

The assistance of the following individuals is appreciated: Dwayne Beck, Harry Geise and Clair Stymiest of the Stations; technicians Lucian Edler, Kevin Kirby and Bruce Swan; Robert Clark, Harlan Halverson and R. Petersek, farmer-cooperators; and personnel of the SDSU Data Processing Center.

Table 1. Location of Trials, Dates of Seeding and Harvesting of Grain Sorghum Performance Trials, South Dakota, 1990

Area	County	Location	Post Office	Dates When Seeded	Harvested
B3-irri.	Hughes	Dakota Lakes Farm, 17E	Pierre	May 16	abandoned
B3	Haakon	David Vogel Farm, 5W, 1N	Hayes	June 17	Oct. 19
B3	Lyman	H.Halverson Farm, 4S,1E	Kennebec	June 11	Oct. 10
C2	Douglas	Robert Clark Farm, 4W,1S	Armour	May 30	Oct. 10
C3	Tripp	R. Petersek, 3E	Colome	not seeded	

The first killing frost in the northern portion of the state generally occurred the week of September 23rd. Grain sorghum harvest did not proceed too rapidly as it was cheaper to let the crop dry in the field than pay the high cost of energy to operate crop dryers. Most harvest did not begin until the week of October 8.

Lodging occurred where the stalks were weakened by heat or drouth stress, especially in Haakon County.

Hybrid Entry Procedure

Only grain sorghum offered for sale in South Dakota or being produced for sale in 1991 was eligible for entry. A closed-pedigree hybrid was entered by the name and number under which it was sold by the participating company. All entries maintained a minimum laboratory germination of 80% as required by South Dakota Certification Standards. A nominal fee was charged for each entry in each trial. Proprietary entries included are the choice of the participating companies.

Experimental Procedure

Each trial consisted of four replications of two-row plots. Each plot was randomly located within each replication. All trials were seeded with 31-cell cone seeders mounted above maxi-merge units. An herbicide recommended for grassy weed control was banded over each row at seeding time. The row spacing used was 30 inches in all trials. Plot lengths seeded depended upon the space available at each trial site. Seeding rates were adequate, under normal conditions, to achieve an average of 2-3 plants per foot. The trial at Pierre was seeded into no-till.

Moisture determinations were made on September 23, the date when the first frost occurred over much of the state. This was more informative as to maturity than determinations made at harvest. Moisture and test weight of the grain realistically indicate relative maturity. Grain samples for moisture determinations were 10-12 heads, 400-500 grams, cut from each entry, placed in a polyethylene bag, tagged, and sealed. The samples were threshed and cleaned, and moisture percentages determined with an electronic moisture meter. The upper limits of the meter are 35% and the data in the tables showing 33.0% could be that or considerably higher. Data above 30.0% would generally indicate lines of later maturity for the area.

Delayed harvest can contribute to higher levels of lodging or can be caught in the bad weather of the later fall. Harvesting is usually done as soon as possible after the first frost. Plot harvest was completed by October 19. The trials were harvested by small-plot combine in 1990 as all plots were mature enough to shell out readily. The harvested samples were returned to Brookings or Box Elder for drying and processing.

Table 2. Laboratory Analysis, Soil Classification, and Fertilizer Applied to the 1990 Hybrid Corn Performance Trials

Area	Soil Classification	% O.M.	P lb/A	K	pH	Preparation and method	pounds/acre N	P	K
B3-P	Lowry SiL	3.5	57	999	7.2	No-till into wheat stubble	160	40	0
B3-K	Pierre Cl	4.0	22	999	8.0	Wheat stubble, field cult.	35	18	0
C2	Eakin-Ethan	3.5	40	780	7.4	Oats, plowed and disced	80	60	0

Table 3. Temperature and Precipitation Data for the 1990 Grain Sorghum Performance Trials, South Dakota

Location	Type of Data	Months of May	June	July	August	Sept.	Total
Armour	Precip. (inches)	6.26	3.17	1.85	1.39	0.23	12.90
	Temp. (mean)	57.8	72.3	74.6	75.7	70.3	
	Mean Departure	-1.9	+2.6	-1.0	+2.0	+6.9	
	Days 90 F. +	00	10	10	18	17	
		First freeze - Sept. 23 - 28					
Kennebec	Precip. (inches)	4.26	3.81	2.48	2.41	1.12	14.08
	Temp. (mean)	57.5	70.2	73.6	74.0	68.6	
	Mean Departure	-2.9	0.0	-2.2	-0.4	+3.5	
	Days 90 F. +	00	04	11	15	13	
		First freeze - Sept. 23 - 29					
Pierre FAA	Precip. (inches)	1.72	2.37	3.77	1.40	0.97	10.23
	Temp. (mean)	56.0	69.3	73.8	74.2	67.3	
	Mean Departure	-1.7	+1.4	-1.2	+0.6	+4.8	
	Days 90 F. +	00	08	12	13	10	
		First freeze - Sept. 23 - 27					

Yields are reported in pounds per acre (x 1.12 for kg/ha) with three or four replications harvested for yield purposes and one left for observation.

Discussion of Results

Yields were quite variable from site to site and within trials. Hundred-weight yields topped the 60's at Armour, the 50's at Kennebec and the 20's at Hayes. Moisture averages ranged from 18% at Armour to nearly 40% at Hayes. The later maturity entries at Kennebec and Hayes were most seriously set back by the lack of moisture and extended periods of high temperatures. The mean average test weight was good at Armour(58#) and poorer at the other two sites. The quality of the grain at Hayes was good to fair while most of the Armour entries were of excellent quality.

The kernel moisture recorded was obtained when the first frost-nipping temperatures occurred. Moisture was highest in the Hayes trial; but, it was also not seeded until mid-June. Only limited drying of grain sorghum was necessary following the harvest of 1990.

Lodging was not a serious problem at any of the locations. Limited lodging occurred at the Hayes site. Bird damage was not evident in the 1990 trials and little damage has occurred when trials were part of larger cooperator fields. Though not a serious problem in 1990, yield, quality, and test weights were affected by the time of seeding and stage of growth when temperature or moisture effects occurred.

Measurement of Performance

Variations in factors such as soil fertility, slope, or stand may cause varieties of equal potential to yield differently. Mathematical determinations were made to determine if yield differences were caused by variations in environment or were true varietal differences. Small yield differences have no significance.

Yields of 1990 and other agronomic data are reported in Table 4 through Table 7. A listing of all entries is presented in Table 8.

Table 4. Grain Sorghum Performance Trials, Area C2, Robert Clark Farm, Armour, Douglas County, South Dakota

Company/ Brand	Hybrid/ Variety	Headed 50 Pct Mo-Day	Plant Height In (cm)	Early Moist %	Stalk Lodgn %	Test Wt. Lb/Bu	Grain Yield Lb/A	(Kg/Ha)
1990								
Asgrow	Seneca	8/ 8	44 (112)	25.8	0.0	59.7	6238	(6990)
AgriPro	ST3280	8/ 1	48 (122)	13.0	0.0	58.8	5999	(6720)
Dahlgren	DG-33B	8/ 5	46 (117)	16.3	0.0	59.3	5815	(6510)
Asgrow	Madera	8/ 6	45 (114)	16.5	0.0	58.4	5516	(6180)
Cargill	618Y	8/ 9	44 (112)	24.6	0.0	54.0	5445	(6100)
DeKalb	X-828	8/ 1	41 (104)	14.5	0.0	59.0	5261	(5890)
Pioneer	8728	8/ 4	41 (104)	15.1	0.0	59.2	5154	(5770)
Pioneer	8877	8/ 5	43 (109)	15.9	0.0	58.9	5053	(5660)
DeKalb	DK-37	8/ 5	50 (127)	24.2	0.0	55.3	4993	(5590)
DeKalb	DK-28	7/31	41 (104)	15.1	0.0	59.0	4952	(5550)
Cargill	1022	8/10	46 (117)	26.2	0.0	58.1	4932	(5520)
AgriPro	AP940G	8/ 8	48 (122)	25.3	0.0	55.6	4895	(5480)
DeKalb	X-928	8/ 1	40 (102)	14.4	0.0	58.4	4891	(5480)
Dahlgren	DG-27B	8/ 5	43 (109)	12.4	0.0	57.3	4890	(5480)
Cargill	630	8/ 9	44 (112)	21.3	0.0	59.4	4862	(5440)
Pioneer	8790	8/ 3	43 (109)	14.2	0.0	57.6	4822	(5400)
Warner	WX89018	8/ 9	46 (117)	22.0	0.0	57.6	4568	(5120)
Pioneer	8855	7/31	42 (107)	16.1	0.0	59.1	4413	(4940)
Warner	W-494	8/ 5	39 (99)	18.2	0.0	58.0	4095	(4590)
Warner	WX90560	8/ 7	37 (94)	10.8	0.0	56.4	3894	(4360)
Entry Averages		8/ 5	43	18.1	0.0	57.9	5034	
LSD (.05)							1117	
CV - %							13.6	
1988 & 1990								
Pioneer	8855	7/31	41 (104)	14	0.0	59.5	4759	(5330)
Pioneer	8728	8/ 4	39 (99)	14	0.0	60.2	5128	(5740)
Dahlgren	DG-27B	8/ 5	41 (104)	12	0.0	58.0	4817	(5390)
Dahlgren	DG-33B	8/ 5	43 (109)	15	0.0	59.3	5783	(6480)
DeKalb	DK-37	8/ 5	46 (117)	18	0.0	57.8	5911	(6620)
Warner	W-494	8/ 5	38 (97)	15	0.0	58.9	4405	(4930)
Asgrow	Madera	8/ 6	41 (104)	14	0.0	58.9	5381	(6030)
Asgrow	Seneca	8/ 8	39 (99)	19	0.0	60.9	5781	(6470)
Cargill	630	8/ 9	42 (107)	17	0.0	60.2	5195	(5820)
Cargill	1022	8/10	41 (107)	19	0.0	59.7	5321	(5960)
Entry Averages		8/ 6	41	16	0.0	59.3	5248	
LSD (.05)							254	
CV - %							10.3	

Table 5. Grain Sorghum Performance Trials, Area B3, Harlan Halverson Farm, Kennebec, Lyman County, South Dakota

Company/ Brand	Hybrid/ Variety	Headed 50 Pct Mo-Day	Plant Height In (cm)	Early Moist %	Stalk Lodgn %	Test Wt. Lb/Bu	Grain Yield Lb/A	(Kg/Ha)
			1990					
AgriPro	ST3280	8/10	45 (114)	26.7	0.0	54.2	5393	(6040)
Dahlgren	DG-33B	8/13	42 (107)	27.2	0.0	55.0	4773	(5340)
Pioneer	8855	8/12	43 (109)	26.9	0.0	56.0	4632	(5190)
Cargill	577	8/12	44 (112)	23.9	0.0	55.1	4581	(5130)
Warner	WX89018	8/19	45 (114)	30.5	0.0	53.2	4538	(5080)
Asgrow	Seneca	8/18	45 (114)	29.5	0.0	56.0	4253	(4760)
Golden Acres	T-E Chico	8/10	41 (104)	27.1	0.0	55.7	4228	(4730)
Cargill	1022	8/17	43 (109)	28.7	0.0	53.1	4224	(4730)
Cargill	618Y	8/15	45 (114)	30.6	0.0	49.3	4136	(4630)
Cargill	630	8/16	42 (107)	30.4	0.0	49.8	4040	(4520)
AgriPro	AP940G	8/18	46 (117)	29.5	0.0	49.7	3948	(4420)
Asgrow	Madera	8/15	41 (104)	32.5	0.0	53.1	3934	(4410)
Pioneer	8877	8/11	44 (112)	24.8	0.0	57.0	3889	(4350)
Warner	W-494	8/14	39 (99)	28.4	0.0	56.0	3857	(4320)
Pioneer	894	8/ 8	37 (94)	24.8	0.0	57.3	3846	(4310)
DeKalb	DK-28	8/ 9	39 (99)	25.9	0.0	56.0	3791	(4250)
DeKalb	X-828	8/ 7	40 (102)	26.1	0.0	56.8	3759	(4210)
Cargill	607E	8/17	41 (104)	31.1	0.0	53.1	3557	(3980)
DeKalb	X-928	8/ 9	38 (97)	27.0	0.0	51.8	3533	(3960)
DeKalb	DK-18	8/ 7	42 (107)	25.3	0.0	54.7	3527	(3950)
Pioneer	8790	8/12	41 (104)	28.1	0.0	56.7	3494	(3910)
Warner	WX90560	8/14	36 (91)	26.0	0.0	55.0	3473	(3890)
DeKalb	X-918	8/ 8	43 (109)	22.2	0.0	54.4	3327	(3730)
Golden Acres	T-E X8883	8/15	37 (94)	31.8	0.0	50.7	3070	(3440)
Dahlgren	DG-27B	8/14	42 (107)	28.1	0.0	55.0	2999	(3360)
Entry Averages		8/13	42	27.7	0.0	54.2	3952	
LSD (.05)							836	
CV - %							13.0	

Table 5. Kennebec(cont.)

Company/ Brand	Hybrid/ Variety	Headed 50 Pct Mo-Day	Plant Height In (cm)	Early Moist %	Stalk Lodgn %	Test Wt. Lb/Bu	Grain Yield Lb/A (Kg/Ha)
			1989-1990				
DeKalb	DK-18	8/ 7	40 (102)	27	0.0	54.4	1776 (1990)
DeKalb	X-828	8/ 7	39 (99)	26	0.0	53.9	1890 (2120)
Pioneer	894	8/ 8	36 (91)	25	0.0	57.0	1934 (2170)
DeKalb	DK-28	8/ 9	38 (97)	28	0.0	55.2	1906 (2130)
Pioneer	8877	8/11	41 (104)	29	0.0	54.2	1956 (2190)
Cargill	577	8/12	42 (107)	27	0.0	54.3	2300 (2580)
Pioneer	8790	8/12	40 (102)	31	0.0	55.4	1760 (1970)
Pioneer	8855	8/12	41 (104)	28	0.0	54.2	2326 (2600)
Dahlgren	DG-33B	8/13	40 (102)	30	0.0	53.5	2396 (2680)
Dahlgren	DG-27B	8/14	41 (104)	31	0.0	53.7	1510 (1690)
Warner	W-494	8/14	38 (97)	31	0.0	54.9	1939 (2170)
Asgrow	Madera	8/15	39 (99)	33	0.0	52.0	1976 (2210)
Cargill	630	8/16	41 (104)	32	0.0	49.0	2028 (2270)
AgriPro	AP940G	8/18	45 (114)	31	0.0	47.6	1981 (2220)
Asgrow	Seneca	8/18	39 (99)	31	0.0	53,7	2131 (2390)
Warner	WX89018	8/19	40 (102)	32	0.0	49.8	2270 (2540)
Entry Averages		8/13	40	29	0.0	53.3	2004
LSD (.05)							122
CV - %							16.7
			1988-1990				
DeKalb	DK-18	8/ 7	39 (99)	26	0.0	55.0	2198 (2460)
DeKalb	X-828	8/ 7	38 (97)	24	0.0	54.7	2100 (2350)
Pioneer	894	8/ 8	36 (91)	24	0.0	57.2	2325 (2600)
DeKalb	DK-28	8/ 9	39 (99)	26	0.0	55.3	2154 (2410)
Cargill	577	8/12	42 (107)	25	0.0	54.8	2652 (2970)
Pioneer	8790	8/12	39 (99)	27	0.0	56.4	2329 (2610)
Pioneer	8855	8/12	39 (99)	27	0.0	56.3	2475 (2770)
Dahlgren	DG-33B	8/13	40 (102)	27	0.0	54.2	2622 (2940)
Dahlgren	DG-27B	8/14	40 (102)	27	0.0	54.1	2009 (2250)
Warner	W-494	8/14	36 (91)	26	0.0	55.5	2145 (2400)
Asgrow	Madera	8/15	37 (94)	30	0.0	55.3	2365 (2650)
Cargill	630	8/16	39 (99)	29	0.0	52.6	2502 (2800)
Asgrow	Seneca	8/18	37 (94)	29	0.0	56.7	2507 (2810)
Entry Averages		8/13	38	27	0.0	55.2	2337
LSD (.05)							97
CV - %							14.4

Table 6. Grain Sorghum Performance Trials, Area B3, David Vogel Farm, Hayes, Haakon County, South Dakota

Company/ Brand	Hybrid/ Variety	Headed 50 Pct Mo-Day	Plant Height In (cm)	Early Moist %	Stalk Lodgn %	Test Wt. Lb/Bu	Grain Yield Lb/A	(Kg/Ha)
			1990					
AgriPro	ST3280		35 (89)	33.0	2.0	54.5	2849	(3190)
Asgrow	Madera		32 (81)	33.0	3.0	55.6	2499	(2800)
Pioneer	894		30 (76)	23.2	1.5	56.8	2430	(2720)
Pioneer	8790		30 (76)	30.1	3.0	57.7	2428	(2720)
Warner	W-494		31 (79)	33.0	1.3	54.1	2407	(2700)
DeKalb	DK-28		29 (74)	27.5	2.7	58.5	2312	(2590)
Pioneer	8877		34 (86)	28.3	1.0	57.5	2289	(2560)
Cargill	630		33 (84)	33.0	4.0	52.0	2211	(2480)
Cargill	577		36 (91)	33.0	2.0	50.7	2189	(2450)
Warner	WX90560		28 (71)	33.0	0.0	49.8	2139	(2400)
Pioneer	8855		33 (84)	31.1	3.5	56.6	2121	(2380)
DeKalb	DK-18		32 (81)	25.3	3.0	57.0	2032	(2280)
Asgrow	Seneca		33 (84)	30.9	1.0	53.6	1997	(2240)
DeKalb	X-918		32 (81)	28.3	1.5	55.6	1748	(1960)
Cargill	1022		34 (86)	33.0	2.0	51.3	1678	(1880)
Cargill	618Y		37 (94)	33.0	2.3	45.1	1669	(1870)
Cargill	607E		32 (81)	33.0	2.0	49.9	1520	(1700)
Warner	WX89018		33 (94)	33.0	2.0	48.2	1369	(1530)
AgriPro	AP940G		36 (91)	33.0	2.0	48.4	1343	(1500)
Entry Averages			33	30.9	1.3	53.3	2064	
LSD (.05)							619	
CV - %							21.3	

Table 7. Entries Included in the 1990 Grain Sorghum Trials and Tables where the Results Appear.

Company and Brand	Entry	Tables
AgriPro Seeds 824 2nd St., S. PO Box 250 Brookings, SD 57007 "AgriPro"	AP 940G ST 3280	4,5,6 4,5,6
Asgrow Seed Company PO Box 1945 Plainview, TX 79072 "Asgrow"	Madera Seneca	4,5,6 4,5,6
Cargill Hybrid Seeds PO Box 5645 Minneapolis, MN 55440 "Cargill"	577 607E 618Y 630 1022	4,6 4,6 4,5,6 4,5,6 4,5,6
Dahlgren & Co. PO Box 609 Crookston, MN 56716 "Dahlgren"	DG-27B DG-33B	4,5 4,5
DeKalb-Pfizer Gen. Rt. 1, Box 225 Glenvil, NE 68941 "DeKalb"	DK-18 DK-28 DK-37 X-828 X-918 X-928	4,6 4,5,6 5 4,5 4,6 4,5
Pioneer Hi-Bred, Int. 1000 W. Jefferson St. Tipton, IN 46072 "Pioneer"	894 8728 8790 8855 8877	4,6 5 4,5,6 4,5,6 4,5,6
Taylor-Evans Seed Co. PO Box 68, 505 S. Hwy 87 Tulia, TX 79008 "T-E"	Chico X8883	4 4
Warner Seed Co. PO Box 1448 Hereford, TX 79045 "Warner"	W-494 Wx-89018 Wx-90560	4,5,6 4,5,6 4,5,6

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