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EC 93-107-A

NEBRASKA PROSO, SAFFLOWER, SUNFLOWER AND AMARANTH VARIETY TESTS 1993

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EXTENSION CIRCULAR 93-107

FEBRUARY 1994

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Thanks to Daryl Ellis for his assistance on price and acreage history. Thanks to Jerry Nachtman, Don Thrailkill and Donna Fritzler for their assistance on trial maintenance and data analysis.

METRIC EQUIVALENTS

1 centimeter = 0.394 inches	cm = inches x 2.541
1 hectare = 2.471 acres	ha = acres x 0.405
1 kilogram = 2.205 pounds	kg = pounds x 0.454
1 hectoliter = 2.838 bushels	hl = bushels x 0.352
kg/hl = lb/bu x 1.287	kg/ha = bu/A x 62.78 (56# bu)

DEFENITIONS

CWT = hundred weight

LSD = A statistic (calculated at the 5% probability level in this book) used to compare the difference between two entries for significance. If the difference between two entries is larger than the LSD value at the bottom of each table, it is assumed significant.

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Proso Millet Price Doubles 10 Year High

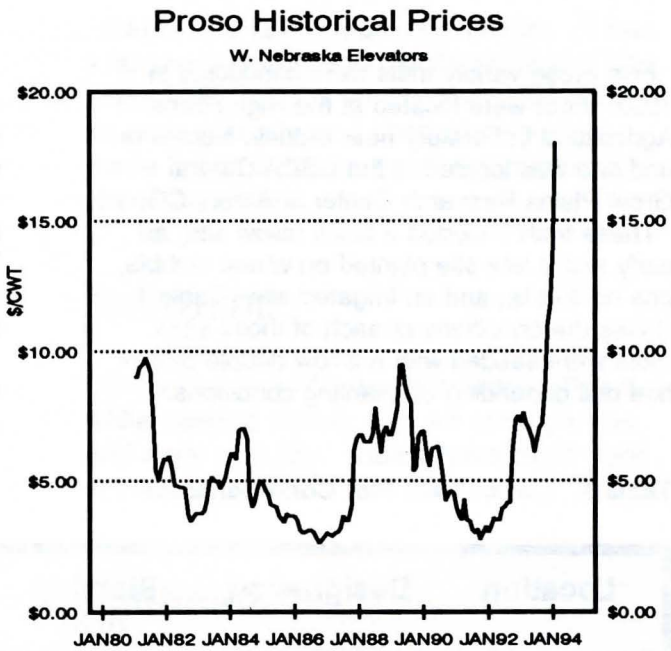
Daryl E. Ellis, Bill Kucera, and David D. Baltensperger

University of Nebraska, Panhandle Research and Extension Center

The 1990 Farm Bill allows the flexibility of planting alternative crops on flex acres. In the dryland areas of Nebraska, proso millet is one possible crop alternative. Proso millet is primarily grown in the 4-state region of North Dakota, South Dakota, Nebraska and Colorado. Historically Nebraska produces about 16% of U.S. millet grain production with an annual acreage ranging from 35,000 to 66,000 acres. The major producing area in Nebraska is Cheyenne County and counties adjacent to it.

Primary uses of proso millet are bird seed, livestock feed, and human consumption. The specialty markets, bird seed and the health food industry, are the major components of millet consumption. Generally, the U.S. exports 15-20% of annual production to over 70 countries. The top four export markets for U.S. proso are Netherlands, Canada, Japan, and United Kingdom. Argentina is a major U.S. competitor.

Proso millet prices have reacted very strongly to increased demand and successive years of decreased production. During the latter months of 1993 and early months of 1994, proso millet prices have doubled the previous ten year high. Obviously, increased acreage will be planted during 1994. With an estimated wheat deficiency payment of $0.80 per bushel, and assuming a 35 bushel wheat yield, and 1500 lb proso millet yield, proso millet prices must only remain above $7.50/cwt for the 0/92 or 50/92 farm program options to be viable. However, under the conventional farm program, acreage expansion may be limited due to current provisions allowing 100 percent of wheat base acres to be planted.



Given the strong market, opportunities may be available for forward contracting. Establishing a contract for future delivery provides a guaranteed price level, but also binds the producer for delivery of commodity. It is important to remember early 1994 prices are abnormally high and not likely to remain at current levels. However, forward contract price levels should be established at rates that provide competitive returns with wheat or other alternative crops. Also, given the potential price and production risks, a limited percentage, 50%, of a realistic yield projection should be contracted.

PROSO VARIETY TRIALS

1993

David Baltensperger, Randy Anderson, Glen Frickel and Mark Swanson

The 1993 proso test contained 33 white seeded entries of which nine were named varieties used as check varieties. The other 24 entries were selections from crosses from the proso breeding program at the Panhandle Research and Extension Center. All these selections are screened for the primary purpose of identifying a better yielding, larger seeded variety. Huntsman and Earlybird are new releases from the crosses and have demonstrated improved yield over other varieties and are larger seeded than Rise. Certified seed will be available in 1995.

DESCRIPTION OF PLOT TECHNIQUES

Five proso variety trials were conducted in 1993. Four were located at the High Plains Agricultural Laboratory near Sidney, Nebraska and one was located at the USDA Central Great Plains Research Center at Akron, CO.

These trials included a black fallow site, an early and a late site planted on wheat stubble, one no-till site, and an irrigated site. Table 1 shows the conditions of each of those sites. Plots were seeded with a 6-row double disc or hoe drill depending on planting conditions.

Each plot was 24 feet long and six feet wide, except for the 15 feet long irrigated plot. The center four rows were harvested from each plot with a self-propelled combine when the variety was mature. Four replications of each variety in each location were planted and harvested. The irrigated and late planted wheat-proso plots were left out of the results due to high trial variation and poor yield performance.

In Table 4, the "Heading" column refers to the average date of the 4 replications relative to August 1.

Table 1. List of 1993 Plot Conditions.

Location	Designation	Planting date	Fertilizer	Yield cwt/ac	Previous crop
HPAL	Fallow	June 25	8#N-28#P	16.8	fallow
HPAL	Wheat-Proso	June 2	48#N-28#P	17.3	wheat
HPAL	Wheat-Proso	July 1	48#N-28#P	no-yield	wheat
HPAL	Irrigated	July 2	58#N-28#P	no-yield	wheat
Akron	No-till	June 9	68#N-28#P	27.0	wheat

DESCRIPTION OF CHECK VARIETIES

SUNUP

Sunup is a 1989 release from Nebraska. It is a white seeded variety with good yield potential. Its height is greater than Rise but is not as tall as Panhandle. Sunup is as lodging resistant as Dawn and Rise in spite of its taller height. Sunup is currently the most widely grown proso variety in Nebraska.

RISE

Rise is a 1983 Nebraska release. It is the result of a Dawn X Minn 402 cross made in 1975. It is later and taller than Dawn with many of the same characteristics in head type and lodging resistance. It has had a good yield record in the time it has been tested. It does not have the large seed size of Dawn. In comparison to Panhandle, it is shorter.

COPE

Cope is a 1978 Colorado release. It is much later maturing than other varieties. It has yielded well in Nebraska, especially when planted early.

EARLYBIRD

Earlybird is a moderately early variety developed by the Nebraska Agricultural Research Division. It is an F3 derived F4 line from the cross Minco/NE76010 //Rise/NE79017 and was tested as NE 870041. Plant height is slightly shorter than Sunup with good straw strength. It has a white seed coat and larger seed size than most other varieties.

MINCO

Minco is a joint Colorado-Minnesota release. It is taller and later than Panhandle. It has white seed and produces good yields.

DAWN

Dawn is a 1976 Nebraska release. It has a large seed with good white color and has been well accepted in the bird seed trade. Its early maturity and short stature have made it less suitable under environmental stress conditions.

SNOWBIRD

Snowbird is a Minnesota release. It is a white seeded variety with an open panicle and early maturity. Yields have been poor in Nebraska.

PANHANDLE

Panhandle is a 1968 Nebraska release. It is the first variety selected from the common white proso grown in western Nebraska. It has a good yield but is lower yielding than newer varieties. It is white seeded.

HUNTSMAN

Huntsman is a moderately late variety developed cooperatively by the Nebraska Agricultural Research Division and the USDA/ARS. It is an F3 derived F4 line from the cross NE79012/NE79017/3/Cope// Dawn/ Common and was tested as NE-870063. Yield performance, test weight, plant height, and straw strength have all been similar to Sunup. Huntsman has a white seed coat and larger seed than most other varieties. Hunstman seed size is slightly smaller than Earlybird seed size.

EXPERIMENTAL LINES

860053 is a high-yielding, large seeded, early maturing line. It has good straw strength, short plant height, and a fair test weight. It is being considered for release as a result of its agronomic potential due to these characteristics.

860203 is a high-yielding, average seeded, mid maturing line. It has good straw strength, short plant height and a good test weight. It is also being considered for release as a result of its agronomic potential due to these characteristics.

Table 2. Agronomic characteristics of proso millet cultivars/lines.

CULTIVAR/ LINE	SEED SIZE	MATURITY	STRAW STRENGTH	HEIGHT	TEST WEIGHT
DAWN	LARGE	EARLY	GOOD	VERY SHORT	GOOD
860203	AVERAGE	MID	GOOD	SHORT	GOOD
EARLYBIRD	LARGE	EARLY	GOOD	SHORT	FAIR
860053	LARGE	MID	GOOD	SHORT	GOOD
RISE	SMALL	MID	GOOD	AVERAGE	FAIR
HUNTSMAN	LARGE	LATE	GOOD	AVERAGE	GOOD
SUNUP	AVERAGE	MID	GOOD	AVERAGE	GOOD
SNOWBIRD	LARGE	EARLY	GOOD	AVERAGE	GOOD
PANHANDLE	AVERAGE	EARLY	POOR	TALL	GOOD
MINCO	AVERAGE	EARLY	GOOD	TALL	GOOD
COPE	AVERAGE	LATE	FAIR	VERY TALL	FAIR
MINSUM	LARGE	EARLY	POOR	AVERAGE	FAIR
ABARR	LARGE	MID	POOR	TALL	GOOD

Table 3. Proso yields for 1993 variety trials at three locations.

ENTRY	EARLY PLANT	FALLOW	NO-TILL AKRON	AVERAGE
EARLY VARIETIES	----------CWT/ACRE----------			
860203	21.6	22.6	30.6	24.9
860053	22.6	20.7	30.4	24.6
87004-1P	25.1	18.2	29.3	24.2
760103	23.3	17.7	30.7	23.9
87004-1ori	21.8	15.6	30.9	22.8
860192	20.5	17.4	29.2	22.3
EARLYBIRD	18.7	16.5	30.1	21.8
RISE	22.2	15.3	27.6	21.7
8603521B	19.2	17.6	28.3	21.7
MINCO	20.1	16.1	25.6	20.6
SUNUP (check)	14.9	14.4	29.3	20.5
SNOWBIRD	21.6	14.0	24.8	20.1
870026	16.1	18.4	24.3	19.6
PANHANDLE	16.6	12.9	22.4	17.3
DAWN	13.9	9.8	23.0	15.6
MINSUM	-	9.4	21.5	15.5
LATE VARIETIES				
860214	14.9	20.1	30.0	21.6
86005-25B	20.6	15.9	27.7	21.4
880035	18.0	18.6	27.2	21.3
880025	17.0	18.5	28.4	21.3
830146	14.1	19.3	30.4	21.3
880021	18.9	17.7	27.1	21.2
860201	14.6	20.5	28.2	21.1
850043	13.7	20.9	27.3	20.7
HUNTSMAN	15.7	18.1	28.1	20.6
SUNUP (check)	14.9	14.4	29.3	20.5
850093	14.1	18.7	28.5	20.4
880017	14.2	16.1	30.3	20.2
880026	15.8	18.2	26.4	20.1
830126	14.7	18.7	26.6	20.0
880011	10.8	17.5	30.9	19.7
880022	16.1	16.4	26.4	19.7
COPE	13.6	16.4	23.0	17.7
MEAN	17.5	17.0	27.7	20.8
LSD 0.05	3.9	3.1	3.6	2.0

Table 4. Agronomic characteristics of entries in 1993 proso trials averaged over locations.

ENTRY	TEST WT Lbs/Bu	HEIGHT Inches	SEEDS /5g	H_2O %	LODGE %	HEADING August
EARLY VARIETIES						
860203	53.9	27	720	16.4	19	4
860053	53.8	27	669	16.6	21	4
87004-1P	53.5	32	737	19.9	13	7
760103	53.3	31	674	16.0	21	2
87004-1ori	52.7	28	668	17.1	23	3
860192	54.3	30	715	18.8	19	5
EARLYBIRD	52.6	27	674	17.6	29	3
RISE	53.0	29	743	17.3	16	4
8603521B	53.2	27	680	16.6	24	4
MINCO	55.0	31	707	14.9	23	3
SUNUP (check)	53.5	29	734	15.3	25	5
SNOWBIRD	54.3	32	689	14.1	26	1
870026	51.2	28	768	18.0	28	4
PANHANDLE	54.0	32	693	14.4	32	1
DAWN	54.2	26	681	13.4	34	1
MINSUM	54.1	26	658	12.2	79	2
LATE VARIETIES						
860214	53.2	30	709	15.7	37	6
86005-25B	52.4	28	695	17.7	18	5
880035	52.5	28	747	15.0	30	7
880025	52.7	32	731	15.6	17	7
830146	54.0	29	705	14.7	31	5
880021	53.5	32	735	15.8	23	7
860201	53.4	28	729	14.0	18	6
850043	52.2	31	717	14.7	36	6
HUNTSMAN	53.4	29	712	14.8	29	6
SUNUP (check)	53.5	29	734	15.3	25	5
850093	52.0	28	714	14.3	26	6
880017	51.6	29	693	13.5	61	4
880026	53.1	30	747	15.5	17	7
830126	53.0	33	736	16.0	16	7
880011	52.3	29	686	13.4	49	4
880022	53.4	31	742	15.5	20	7
COPE	52.6	36	713	14.4	24	5
MEAN	53.3	29	710	15.6	28	5
LSD 0.05	0.9	2	25	.9	10	1

Table 5. Eight year yield summary of proso varieties included in test.

Variety	8 yr Avg	1993	1992	1991	1990	1989	1988	1987	1986
	cwt/acre								
Sunup	**21**	16	24	26	21	23	21	23	15
Rise	**21**	18	24	25	19	19	22	19	20
Minco	**18**	17	17	22	16	17	18	19	16
Cope	**17**	14	21	18	14	18	17	18	14
Panhandle	**16**	14	17	21	16	17	16	16	12
Dawn	**12**	10	15	15	15	12	10	12	6
Snowbird	**18**	16	17	22	-	-	-	-	-
Average	**17**	15	19	21	17	18	17	18	14

DESCRIPTION OF SAFFLOWER PLOTS

David D. Baltensperger, James Krall, Glen Frickel, and Mark Swanson

The 1993 safflower trials were conducted at the High Plains Ag Lab near Sidney, Nebraska and at the University of Wyoming Research and Extension Center at Archer, Wyoming.

The Cheyenne County safflower trial was planted May 12, 1993 on fallowed ground with a 6 row double disk drill with a 12 inch row spacing. The 6 feet by 17 feet plots were trimmed to 10 feet prior to harvesting the center 4 rows on October 7. Plots were treated prior to planting with 1 pint of Treflan /acre. Seeding rate was 15 lbs/acre. Plots were fertilized with 8 lbs. N and 28 lbs. P starter at planting. As shown in Table 6, yields corresponded directly with the stand rating of each plot. Stand rating was based on a scale of 0 to 10, with 10 being the best stand.

The Archer, Wyoming safflower trial was planted May 14, 1993 on fallow with a 6 row small grain drill with a 9-inch row spacing. The 5 feet by 20 feet plots were harvested on September 22, 1993 using a small plot grain combine. No fertilizer or herbicide were applied. Weed competition and soil fertility were not believed to be factors influencing yields. Cool dry summer growing conditions contributed to low overall yields.

The column in Table 6 titled "FLWR" refers to average date of flowering in August for the four replications. Oil % is at 10 % moisture. Thanks to Dr. Jerry Miller and his USDA/ARS staff at Fargo, ND for their assistance with oil analysis. All entries designated with an S were provided by Seed Tec International. Thanks to Dr. Jerald Bergman, Eastern Montana Research Center, for providing the other entries.

Table 6. Safflower grown in a wheat-fallow-safflower-fallow rotation at the High Plains Ag Lab in 1993.

ENTRY	YIELD Lbs/Ac	TEST WT Lbs/Bu	FLWR Aug	HEIGHT Inches	STAND RATING	OIL %
MONTOLA 2000	1320	39.3	5	18	7	46.3
S517	1270	36.8	6	22	6	45.2
MORLIN	1220	37.8	8	21	5	43.7
FINCH	1200	43.3	7	23	4	41.9
CENTENNIAL	1190	37.6	7	23	6	46.7
S208	1150	37.2	6	22	5	41.8
GIRARD	980	38.9	8	23	4	42.2
S541	940	38.6	7	20	4	46.3
92D 112	940	37.5	6	20	3	43.6
OKER	860	38.2	6	22	3	45.0
92D 110	290	34.6	9	24	1	41.3
MEAN	1030	38.2	7	21	4	44.0
LSD 0.05	300	1.1	1	2	2	1.1

Table 7. 1993 Archer, Wyoming Safflower Trial.

ENTRY	YIELD Lbs/Ac	TEST WT Lbs/Bu	HEIGHT Inches	OIL %
MONTOLA 2000	570	28.9	18	28.8
92D 112	550	27.7	19	29.2
S517	530	27.9	22	28.9
S208	530	28.0	21	26.0
MORLIN	480	24.3	21	18.9
S541	480	27.6	23	28.6
CENTENNIAL	420	26.5	21	26.5
FINCH	340	28.6	21	23.4
GIRARD	320	24.4	22	22.0
OKER	300	24.2	21	23.4
92D 110	290	24.6	22	16.3
MEAN	440	26.6	21	24.7
LSD 0.05	150	3.2	2	6.0

Table 8. Cheyenne County safflower yields averaged over three years.

ENTRY	1991 YIELD Lbs/Ac	1992 YIELD Lbs/Ac	1993 YIELD Lbs/Ac	AVERAGE Lbs/Ac
MONTOLA 2000	1260	1710	1320	1430
MORLIN	.	1680	1220	1450
FINCH	940	1620	1200	1250
CENTENNIAL	1130	1690	1190	1340
S208	1130	1820	1150	1370
GIRARD	1080	1940	980	1330
S541	1170	1760	940	1290
OKER	1200	1410	860	1160
MEAN	1130	1700	1110	1310

Table 9. Cheyenne County safflower oils averaged over three years.

ENTRY	1991 OIL %	1992 OIL %	1993 OIL %	AVERAGE OIL %
MONTOLA 2000	44.7	36.6	46.3	42.5
MORLIN	.	34.5	43.7	39.1
FINCH	40.8	32.5	41.9	38.4
CENTENNIAL	47.4	37.2	46.7	43.8
S208	42.4	34.6	41.8	39.6
GIRARD	41.7	35.2	42.2	39.7
S541	46.4	37.6	46.3	43.4
OKER	44.3	35.1	45.0	41.5
MEAN	44.0	35.4	44.2	41.2

DESCRIPTION OF AMARANTH PLOTS

David D. Baltensperger, Glen Frickel, and Mark Swanson

The 1993 amaranth trials were conducted at the High Plains Agriculture Laboratory near Sidney, Nebraska and at the Panhandle Research and Extension Center at Scottsbluff, Nebraska. Four replications of each variety in each location were planted and harvested.

The Cheyenne County amaranth trial was planted June 14 on fallowed ground with a 30 inch row corn planter. Each plot was 25 feet long and 2 rows wide. 7 lbs. N and 24 lbs. P fertilizer was applied at planting. No herbicides or insecticides were applied. After a severe damaging frost on September 14, the plots were harvested on October 7.

The Scottsbluff County amaranth trial was planted June 14 on fallowed ground with a 30 inch row corn planter. Each plot was 25 feet long and 2 rows wide. 60 lbs. N was applied preplant and 7 lbs. N and 24 lbs. P fertilizer was applied at planting. No herbicides or insecticides were applied. After a severe damaging frost on September 14, the plots were harvested on October 6.

The column in Table 11 titled "FLR" refers to the average flowering date. "STND SCOR" refers to stand on a scale of 0-10, with 10 being the best. "LODG SCOR" refers to lodging on a scale of 0-10, with 10 being the worst.

Plainsman grain amaranth was released to certified seed growers in 1991 and was commercially available for planting in 1992. It represents the first amaranth variety to be released by the University of Nebraska. Plainsman is shorter statured than Amont and has a dark red or purple head that produces a light tan seed. Plainsman is earlier in maturity and less susceptible to lodging than Amont when both are mature.

Table 10. 1993 Amaranth yield trial, Scottsbluff County, Nebraska.

ENTRY	YIELD Lbs/Ac	TEST WT	HEIGHT Inches	H_2O %	LODGE %
K433	1260	63.9	60	18.5	0
K432	1010	61.5	58	16.3	0
PLAINSMAN	800	60.3	81	24.3	0
K593	760	62.1	77	20.1	100
A200	410	55.5	69	37.2	0
K283	320	56.9	80	28.4	0
K266	220	59.0	85	24.0	0
D136-1	170	57.3	65	23.0	0
K436	110	55.6	85	24.0	0
MEAN	560	59.1	73	24.0	11
LSD 0.05	220	0.0	7	0.0	0

Table 11. 1993 Amaranth yield trial, High Plains Ag Lab.

ENTRY	YIELD Lbs/Ac	TEST WT Lbs/Bu	HT In	H_2O %	LODG SCOR	FLR Aug	STND SCOR
D34-1-1	780	66.3	55	10.9	2	13	8
K549	690	62.6	59	11.2	1	15	7
K432	670	65.3	47	10.9	1	15	4
D108	650	65.5	62	11.0	1	13	7
K433	650	65.6	47	10.9	2	17	4
PLAINSMAN	640	64.5	61	11.1	1	14	9
K551	610	66.1	61	10.9	1	15	6
D106	600	65.8	59	11.2	0	16	6
K433-B	600	62.8	56	10.6	1	11	6
D43B	590	65.7	59	11.1	2	15	7
K709	580	64.8	62	11.7	1	15	7
K578	550	65.2	54	11.1	0	15	8
D113	510	66.0	61	11.2	0	17	6
A5200	510	65.5	62	10.9	1	15	8
D107	470	65.3	61	11.0	1	15	7
D70-1	440	65.6	59	10.9	0	18	7
K591	440	65.6	59	11.0	2	14	7
K583	440	64.3	69	11.5	1	17	6
K432-B	430	65.7	52	11.2	3	16	7
A5199	380	65.3	57	11.2	1	17	7
D141	370	65.4	60	10.8	1	17	8
K593	330	65.0	55	10.8	5	18	4
A5198	330	65.3	66	10.8	1	17	6
A5192	290	65.1	59	11.2	2	15	9
A200D	290	64.9	54	10.7	0	18	7
A5188	280	65.8	65	11.1	1	17	6
A5183	270	65.1	64	10.9	1	17	8
A5196	250	66.0	62	11.0	1	15	7
K266	220	63.9	60	10.7	1	16	4
K283	200	65.3	56	10.7	0	15	3
AMONT	190	64.4	63	10.8	0	16	5
K436	120	62.5	60	10.4	1	17	7
D136-1	110	66.5	52	10.9	0	22	8
MEAN	440	65.1	59	11.0	1	16	6
LSD 0.05	160	0.1	5	0.0	2	3	3

Table 12. Amaranth yields at High Plains Ag. Lab. averaged over two or three years.

ENTRY	1991 YIELD Lbs/Ac	1992 YIELD Lbs/Ac	1993 YIELD Lbs/Ac	AVERAGE Lbs/Ac
PLAINSMAN	820	1550	640	1000
K432	610	1460	670	910
K433	680	1330	650	890
D70-1	620	1480	440	850
D34-1-1	860	-	780	820
K593	510	1600	330	810
A200D	520	1490	290	770
K549	830	-	690	760
K709	840	-	580	710
D43B	810	-	590	700
D106	800	-	600	700
D107	900	-	470	680
K433-B	730	-	600	670
D108	660	-	650	660
K551	700	-	610	660
K578	750	-	550	650
D113	790	-	510	650
AMONT	650	1090	190	640
K432-B	680	-	430	550
K583	650	-	440	550
K591	650	-	440	540
K283	500	780	200	490
A5198	650	-	330	490
D141	600	-	370	480
A5200	430	-	510	470
K266	360	760	220	450
D136-1	210	980	110	430
A5188	570	-	280	430
A5183	500	-	270	390
A5199	380	-	380	380
A5192	420	-	290	360
K436	270	630	120	340
A5196	390	-	250	320
MEAN	620	1200	440	750

SUNFLOWER TRIALS - 1993

David D. Baltensperger, Robert N. Klein, James Krall, Glen Frickel and Mark Swanson

The 1993 dryland sunflower tests were conducted in Cheyenne County, NE, Hitchcock County, NE, Perkins County, NE, and Laramie County, WY. An irrigated sunflower trial was also conducted at the High Plains Agriculture Laboratory near Sidney, Nebraska. Each plot consisted of four, 30 inch rows and each hybrid was replicated four times. Plots were planted approximately 30 feet long. Of the four planted rows, the two center rows were harvested with a small plot combine. The growing season had considerably below average temperatures at all locations.

Oil percentage is based on 10% moisture. Analysis was provided by Dr. J.F. Miller, USDA-ARS in Fargo, North Dakota. Thanks to Dr. Miller and all of his assistants for their contributions to these tests.

The Cheyenne County wheat-fallow-sunflower-fallow trial was planted at the High Plains Agriculture Laboratory near Sidney, Nebraska. 1.5 pints/acre Prowl was applied preplant. 7 lbs. N and 24 lbs. P starter was applied at planting. Harvest stand was approximately 16,000 plants/acre. The plants were severely damaged by frost on Sept. 14 and then killed Oct. 9.

The Cheyenne County wheat-sunflower-fallow trial was planted at the High Plains Agriculture Laboratory near Sidney, Nebraska. 40 lbs. N and 1.5 pints/acre Prowl were applied preplant. 7 lbs. N and 24 lbs. P starter was applied at planting. Harvest stand was approximately 16,000 plants/acre. The plants were severely damaged by frost on Sept.14 and then killed Oct. 9.

The Cheyenne County irrigated sunflower trial was planted at the High Plains Agriculture Laboratory near Sidney, Nebraska. 60 lbs. N and 1.5 pints/acre Prowl were applied preplant. 7 lbs. N and 24 lbs. P starter was applied at planting. Harvest stand was approximately 20,000 plants/acre. The plants were severly damaged by frost on Sept. 14 and killed on Oct. 9

The Hitchcock County sunflower trial was planted on John Faimon's farm south of Trenton, Nebraska. 50 lbs. N and 1.5 pints/acre Treflan were applied preplant. 18,300 seeds/acre were planted, and harvest stand was good. The plot received hail and high wind on August 1 with approximately 15% loss. The plot received adequate rainfall. The entry Dahlgren 3864 was left out of the results due to very poor stands.

The Perkins County sunflower trial was planted on Steve Martens' farm east of Grant, Nebraska. 60 lbs. N and 1.5 pints/acre Treflan were applied preplant. 7 lbs. N and 24 lbs. P starter was applied at planting. 18,300 seeds/acre were planted, and harvest stand was good. The plot received hail and high winds late in the season resulting in approximately 30% loss.

The Laramie County sunflower trial was planted on Stan Butler's farm at Carpenter, Wyoming. 0.5 lb/acre trifluralin and 15-15-0/acre starter fertilizer were applied preplant and incorporated. Harvest stand was 15,900 plants/acre. This plot was hand harvested.

Companies entering the 1993 Sunflower Test

Kaystar Seed,	Huron, SD 57350
DeKalb Plant Genetics,	Dekalb, IL 60115
Cargill Hybrid Seeds,	Fargo, ND 58102
Jacques Seed Co.,	Prescott, WI 54021-1499
Pioneer Hi-Bred Int., Inc.,	Tipton, IN 46072-9423
Interstate Payco Seed Co.,	West Fargo, ND 58078
Sigco Research,	Breckenridge, MN 56520
Triumph Seed Co., Inc.,	Ralls, TX 79357
Dahlgren & Company, Inc.,	Crookston, MN 56716-0609
Red River Commodities, Inc.,	Colby, KS 67701
Proseed	Arthur, ND 58006

Table 13. 1993 Sunflower Plot Culture Summary.

Location	Rotation	Soil type	Fertilizer	Plant date	Harvest date
Cheyenne County, NE	Wheat-Sunflower-Fallow	Duroc loam	47# N 24# P	June 16	October 25
Cheyenne County, NE	Wheat-Fallow Sunflower-Fallow	Duroc loam	7# N 24# P	June 15	October 27
Hitchcock County, NE	Wheat-Sunflower-Fallow	Keith silt loam	50# N	June 15	November 4
Laramie County, WY	Wheat-Sunflower-Fallow	Sandy loam	15# N 15# P	June 10	October 28
Perkins County, NE	Wheat-Sunflower-Fallow	Kuma silt loam	67# N 24# P	June 8	October 12
Cheyenne County, NE	Irrigated Wheat-Sunflower	Keith silt loam	67# N 24# P	June 22	November 1

Table 14a. Sunflower hybrids grown in Cheyenne County, NE on wheat stubble in 1993.

BRAND	HYBRID	YIELD Lbs/Ac	TEST WT Lbs/Bu	FLOWER August	HEIGHT Inches	OIL %
OIL TYPES						
CARGILL	X-18128	2230	26.5	19	52	40.0
DEKALB	EXP-5346	2220	24.5	20	47	41.0
KAYSTAR	SUNBIRD II	2140	29.0	25	62	34.1
DEKALB	EXP-5322	2110	24.6	22	55	40.2
CARGILL	SF-100	2080	24.9	21	52	37.7
CARGILL	SF-187	2040	24.1	22	52	38.6
DEKALB	DK-3904	1960	25.5	21	56	38.6
SIGCO	658	1910	24.7	19	57	41.7
INTERSTATE	IS-6363	1890	24.6	24	63	39.1
TRIUMPH	565	1890	26.3	23	57	42.9
CARGILL	SF-270	1870	25.3	17	51	40.6
PROSEED	120	1870	23.1	21	59	39.3
JACQUES	COMET	1860	23.5	17	53	39.3
KAYSTAR	HYSUN-341	1860	23.5	20	48	38.7
SIGCO	475	1860	24.5	23	55	38.8
PIONEER	6339	1840	22.5	22	57	41.1
PIONEER	6322	1780	23.6	20	55	41.4
SIGCO	452	1780	24.5	18	55	40.5
PIONEER	6451	1770	24.7	21	56	42.9
TRIUMPH	546	1750	23.9	22	57	42.4
DAHLGREN	DO-725	1750	23.0	19	55	37.7
JACQUES	CADILLAC	1730	24.3	20	56	42.0
SIGCO	675	1720	25.3	23	58	43.1
DEKALB	DK-3790	1710	24.7	18	56	41.3
JACQUES	COL II	1660	23.9	19	57	40.3
KAYSTAR	8806	1650	23.9	22	55	38.2
KAYSTAR	X-27004	1620	25.4	24	59	40.3
DAHLGREN	DE-3864	1580	22.8	24	60	39.0
DAHLGREN	DO-707	1550	22.1	18	52	37.6
KAYSTAR	8807	1540	23.2	25	64	40.3
CARGILL	X-18177	1510	24.7	23	58	40.3
INTERSTATE	IS-6111	1490	25.8	17	48	38.7
PROSEED	109	1470	21.1	21	58	37.8
PIONEER	6415HO	1460	25.3	22	54	39.6
INTERSTATE	IS-3311	1440	25.0	20	57	39.0
TRIUMPH	HO645	1410	24.4	23	56	42.8
PIONEER	6661HO	1350	20.6	25	62	37.9
PIONEER	6400HO	1320	22.0	21	47	38.3
KAYSTAR	HYSUN-354	1230	20.4	21	53	37.8
	MEAN	1730	23.8	21	56	39.8
	LSD 0.05	370	1.8	1	5	1.3

Table 14b. Sunflower hybrids grown in Cheyenne County, NE on wheat stubble in 1993.

BRAND	HYBRID	YIELD Lbs/Ac	TEST WT Lbs/Bu	FLOWER August	HEIGHT Inches	% Over Size 20/64
CONFECTION TYPES						
RED RIVER	RRC-2331-EX	1700	19.4	19	59	59.6
RED RIVER	RRC-2211	1640	18.4	21	63	50.1
RED RIVER	RRC-954	1590	19.7	18	59	47.4
	MEAN	1643	19.2	19	60	52.4
	LSD 0.05	370	1.8	1	5	10

Table 15. Sunflower hybrids grown in Cheyenne County, NE on fallow ground in 1993.

BRAND	HYBRID	YIELD Lbs/Ac	TEST WT Lbs/Bu	FLOWER August	HEIGHT Inches	OIL %
DEKALB	DK-3790	1850	27.7	17	59	41.4
DAHLGREN	DO-707	1750	25.6	16	55	37.9
DEKALB	EXP-5346	1660	27.9	18	52	39.8
DEKALB	DK-3904	1550	28.5	21	56	38.1
DEKALB	EXP-5322	1480	26.8	21	55	39.0
DAHLGREN	DO-725	1470	25.8	17	55	38.2
PROSEED	120	1410	24.5	19	60	38.9
SIGCO	658	1380	27.9	18	57	40.4
INTERSTATE	IS-6363	1370	28.5	23	61	38.0
KAYSTAR	8806	1300	26.0	20	58	36.8
INTERSTATE	IS-3311	1280	26.9	18	57	37.1
JACQUES	CADILLAC	1260	27.5	19	59	40.4
JACQUES	COL II	1210	25.8	18	55	38.7
KAYSTAR	HYSUN-354	1160	22.9	18	56	37.0
DAHLGREN	DE-3864	1030	24.2	23	63	38.3
	MEAN	1411	26.4	19	57	38.7
	LSD 0.05	250	1.0	1	4	1.3

Table 16. Irrigated sunflower hybrids grown in Cheyenne County, Nebraska in 1993.

BRAND	HYBRID	YIELD Lbs/Ac	TEST WT Lbs/Bu	FLWR Aug	HEIGHT Inches	OIL %
CARGILL	X-18128	1530	29.2	21	54	39.2
CARGILL	SF-100	1450	27.8	24	49	39.2
INTERSTATE	IS-6363	1380	29.4	27	55	39.3
JACQUES	COMET	1360	26.2	20	49	39.8
CARGILL	SF-187	1350	26.7	25	50	39.8
PROSEED	120	1240	25.0	23	56	40.5
CARGILL	SF-270	1220	26.7	21	46	40.3
JACQUES	CADILLAC	1170	27.7	22	51	41.9
CARGILL	X-18177	1080	28.4	26	54	41.8
KAYSTAR	HYSUN-354	1030	23.4	23	53	39.3
KAYSTAR	X-27004	1020	29.0	27	57	40.3
KAYSTAR	8807	910	28.2	28	55	42.2
KAYSTAR	8806	880	26.9	24	55	40.2
	MEAN	1200	27.3	24	53	40.3
	LSD 0.05	250	0.9	1	5	.8

Table 17. Sunflower hybrids grown in Perkins County, Nebraska in 1993.

BRAND	HYBRID	YIELD Lbs/Ac	TEST WT Lbs/Bu	HEIGHT Inches	OIL %
OIL TYPES					
DEKALB	EXP-5322	2350	29.2	55	41.8
CARGILL	SF-270	2210	30.6	50	43.1
DEKALB	DK-3790	2170	31.8	57	43.5
CARGILL	SF-100	2160	31.0	52	40.7
DEKALB	DK-3904	2100	29.2	55	41.0
DEKALB	EXP-5346	2100	30.9	53	42.4
CARGILL	X-18128	2080	31.4	54	41.5
KAYSTAR	X-27004	2080	30.1	59	40.7
CARGILL	SF-187	2070	28.7	50	39.3
INTERSTATE	IS-6363	1970	30.4	68	40.0
PIONEER	6451	1940	30.8	55	45.5
PIONEER	6425HO	1930	28.2	44	43.2
PIONEER	6322	1910	30.4	54	43.8
CARGILL	X-18177	1890	29.2	62	41.3
KAYSTAR	8806	1890	29.4	57	42.0
INTERSTATE	IS-6111	1850	30.1	47	43.0
SIGCO	658	1790	28.4	56	44.7
KAYSTAR	HYSUN-341	1790	30.6	51	42.8
PIONEER	6661HO	1780	24.8	62	41.0
PROSEED	120	1750	28.6	55	41.5
PIONEER	6339	1720	27.7	63	43.8
PIONEER	6400HO	1670	29.4	53	42.1
SIGCO	675	1650	31.4	53	44.5
INTERSTATE	IS-3311	1620	30.9	56	41.8
PIONEER	6415HO	1600	30.4	56	41.8
KAYSTAR	SUNBIRD II	1460	30.5	68	37.9
CONFECTION TYPES					
RED RIVER	RRC-2331-EX	1740	26.2	53	.
RED RIVER	RRC-954	1660	26.3	54	.
RED RIVER	RRC-2211	1490	25.1	55	.
RED RIVER	RRC-954	1480	24.9	55	.
	MEAN	1860	29.2	55	42.1
	LSD 0.05	290	2.2	5	2.1

Table 18. Sunflower hybrids grown in Hitchcock County, Nebraska in 1993.

BRAND	HYBRID	YIELD Lbs/Ac	TEST WT Lbs/Bu	HEIGHT Inches	OIL %
OIL TYPES					
DEKALB	EXP-5322	1790	30.8	49	46.8
CARGILL	X-18128	1740	32.9	54	44.9
CARGILL	SF-100	1590	31.2	49	44.5
CARGILL	SF-187	1550	31.6	48	44.4
DEKALB	DK-3904	1520	31.4	49	45.1
KAYSTAR	8806	1500	33.2	50	45.2
DEKALB	EXP-5346	1500	32.8	46	46.3
KAYSTAR	X-27004	1480	31.9	55	45.6
INTERSTATE	IS-6363	1460	33.4	58	46.0
CARGILL	X-18177	1450	34.1	56	45.8
DAHLGREN	DO-707	1380	30.9	51	45.6
CARGILL	SF-270	1340	33.0	49	46.0
PROSEED	120	1320	30.1	52	45.6
INTERSTATE	IS-6111	1310	32.3	44	45.3
PIONEER	6339	1300	30.3	55	48.4
DAHLGREN	DO-725	1280	31.5	51	46.3
TRIUMPH	565	1230	32.5	45	48.1
PROSEED	109	1230	29.3	53	45.5
TRIUMPH	546	1230	31.5	51	48.3
KAYSTAR	HYSUN-341	1230	32.8	47	46.4
PIONEER	6451	1120	32.0	50	49.2
TRIUMPH	550	1060	31.3	52	47.7
KAYSTAR	HYSUN-354	1060	29.3	52	45.1
PIONEER	6322	1040	30.6	51	46.4
TRIUMPH	HO645	1030	31.7	50	48.4
INTERSTATE	IS-3311	980	29.8	49	46.5
PIONEER	6400HO	970	31.0	49	46.4
PIONEER	6661HO	960	31.0	56	46.3
PIONEER	6415HO	940	33.7	53	47.1
PIONEER	6425HO	920	30.7	47	45.3
DEKALB	DK-3790	890	31.0	49	47.2
CONFECTION TYPES					
RED RIVER	RRC-2211	1420	26.9	51	.
RED RIVER	RRC-954	1050	25.7	51	.
RED RIVER	RRC-2331-EX	1030	29.0	50	.
	MEAN	1260	31.2	51	46.3
	LSD 0.05	330	2.5	4	1.3

Table 19. Sunflower hybrids grown in Laramie County, Wyoming in 1993.

BRAND	HYBRID	YIELD Lbs/Ac	TEST WT Lbs/Bu	HT In	FLOWER August	OIL %
CARGILL	SF-100	920	29.3	31	17	36.9
INTERSTATE	IS-6363	850	29.2	39	22	40.7
INTERSTATE	IS-6111	820	30.3	37	14	40.6
CARGILL	X-18177	810	29.2	40	20	44.1
CARGILL	X-18128	760	30.6	39	16	39.7
CARGILL	SF-187	750	30.0	30	19	40.4
JACQUES	CADILLAC	710	33.7	36	19	48.5
INTERSTATE	IS-3311	710	31.4	37	16	43.9
KAYSTAR	HYSUN-341	700	32.7	32	18	40.4
SIGCO	675	700	32.0	37	20	47.4
SIGCO	658	700	33.3	36	17	47.2
KAYSTAR	HYSUN-354	700	28.9	34	18	42.5
JACQUES	COMET	700	29.3	38	15	42.3
SIGCO	458	690	32.3	38	17	47.0
PROSEED	120	670	28.9	34	16	43.3
CARGILL	SF-270	670	29.1	33	13	42.0
	MEAN	740	30.6	35	17	42.9
	LSD 0.05	190	2.7	4	2	2.1

Table 20. Cheyenne County sunflower on wheat stubble trial yields and oils, averaged over two years.

BRAND	HYBRID	1992 YIELD Lbs/Ac	1993 YIELD Lbs/Ac	AVG Lbs /Ac	1992 OIL %	1993 OIL %	AVG OIL %
SIGCO	658	1420	1910	1670	36.5	41.7	39.1
SIGCO	452	1320	1780	1550	35.1	40.5	37.8
TRIUMPH	565	1180	1890	1540	37.4	42.9	40.2
TRIUMPH	546	1270	1750	1510	36.1	42.4	39.3
JACQUES	CADILLAC	1250	1730	1490	35.7	42.0	38.9
SIGCO	675	1210	1720	1470	36.7	43.1	39.9
KAYSTAR	8806	1240	1650	1450	34.9	38.2	36.6
INTERSTATE	IS-6111	1360	1490	1430	33.5	38.7	36.1
INTERSTATE	IS-3311	1300	1440	1370	35.5	39.0	37.3
KAYSTAR	HYSUN-354	1360	1230	1300	33.6	37.8	35.7
	MEAN	1290	1660	1480	35.5	40.6	38.1

Table 21. Cheyenne County fallow sunflower trial yields and oils, averaged over two years.

BRAND	HYBRID	1992 YIELD Lbs/Ac	1993 YIELD Lbs/Ac	AVG Lbs /Ac	1992 OIL %	1993 OIL %	AVG OIL %
DAHLGREN	DO-707	1900	1750	1830	32.6	37.9	35.3
DAHLGREN	DO-725	1770	1470	1620	33.1	38.2	35.7
KAYSTAR	8806	1630	1300	1470	32.2	36.8	34.5
INTERSTATE	IS-3311	1580	1280	1430	32.8	37.1	35.0
KAYSTAR	HYSUN-354	1570	1160	1370	32.2	37.0	34.6
	MEAN	1690	1390	1540	32.6	37.4	35.0

Table 22. Hitchcock County sunflower trial yields and oils, averaged over two years.

BRAND	HYBRID	1992 YIELD Lbs/Ac	1993 YIELD Lbs/Ac	AVG Lbs /Ac	1992 OIL %	1993 OIL %	AVG OIL %
DEKALB	EXP-5322	2410	1790	2100	36.1	46.8	41.5
DEKALB	DK-3904	2350	1520	1940	35.0	45.1	40.1
CARGILL	SF-100	2170	1590	1880	35.3	44.5	39.9
CARGILL	SF-187	2150	1550	1850	35.1	44.4	39.8
KAYSTAR	8806	2060	1500	1780	34.8	45.2	40.0
CARGILL	SF-270	2110	1340	1730	36.7	46.0	41.4
PIONEER	6400HO	2430	970	1700	36.1	46.4	41.3
PIONEER	6451	2160	1120	1640	38.0	49.2	43.6
DEKALB	DK-3790	2030	890	1460	37.8	47.2	42.5
PIONEER	6425HO	1930	920	1430	35.7	45.3	40.5
PIONEER	6322	1800	1040	1420	37.0	46.4	41.7
	MEAN	2150	1290	1720	36.2	46.1	41.2

Table 23. Laramie County Wyoming sunflower trial yields and oils averaged over two years.

BRAND	HYBRID	1992 YIELD Lbs/Ac	1993 YIELD Lbs/Ac	AVG Lbs /Ac	1992 OIL %	1993 OIL %	AVG OIL %
CARGILL	SF-100	1430	920	1180	30.9	36.9	33.9
CARGILL	SF-187	1340	750	1050	31.4	40.4	35.9
JACQUES	COMET	1250	700	980	35.9	42.3	39.1
JACQUES	CADILLAC	1240	710	980	37.1	48.5	42.8
CARGILL	SF-270	1240	670	960	35.1	42.0	38.6
SIGCO	675	1140	700	920	-	47.4	47.4
	MEAN	1270	740	1010	34.1	42.9	38.5

Table 24. Perkins County sunflower trial yields and oils, averaged over two years.

BRAND	HYBRID	1992 YIELD Lbs/Ac	1993 YIELD Lbs/Ac	AVG Lbs /Ac	1992 OIL %	1993 OIL %	AVG OIL %
CARGILL	SF-270	2220	2210	2220	38.8	43.1	41.0
PIONEER	6451	2410	1940	2180	39.5	45.5	42.5
CARGILL	SF-100	2150	2160	2160	35.4	40.7	38.1
INTERSTATE	IS-6111	2350	1850	2100	38.3	43.0	40.7
CARGILL	SF-187	2020	2070	2050	37.2	39.3	38.3
KAYSTAR	8806	2090	1890	1990	39.5	42.0	40.8
PIONEER	6322	1930	1910	1920	38.3	43.8	41.1
PIONEER	6425HO	1880	1930	1910	37.3	43.2	40.3
SIGCO	675	2100	1650	1880	39.6	44.5	42.1
SIGCO	658	1870	1790	1830	39.6	44.7	42.2
PIONEER	6400HO	1880	1670	1780	38.6	42.1	40.4
INTERSTATE	IS-3311	1940	1620	1780	38.4	41.8	40.1
KAYSTAR	SUNBIRD II	1730	1460	1600	32.9	37.9	35.4
	MEAN	2040	1860	1950	38.0	42.4	40.2