

**EC 909**  
Revised  
Annually

# **Sunflower**

**2001 South Dakota Hybrid Performance Trials**

**Oilseed**  
**Non-Oilseed**

**Available electronically on the internet**  
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# Sunflower

## 2001 South Dakota Hybrid Performance Trials Oilseed and Non-Oilseed

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Sunflower production is greatly affected by choice of hybrid. When selecting a hybrid, carefully consider characteristics such as seed yield potential, oil content, oil composition, maturity, stalk strength, and disease resistance. Choose hybrids with characteristics that best suit your needs and production practices.

### Yield

Evaluate as much performance information as possible when selecting a hybrid. Give more weight to information from trials close to home and look at relative performance over many locations and years. Performance averaged over many tests is called "yield stability".

Good yield stability means that a hybrid may or may not be the best yielder at all locations but that it does rank high in yielding potential at many locations. A hybrid that ranks in the upper 20% at all locations exhibits better yield stability than one that is the top yielder at two locations, but ranks in the lower 40% at two other locations.

To determine if one hybrid is better than another for a given trait, use the least significant difference (LSD 5%) value at the bottom of each data table. This LSD 5% value is a statistical way to indicate if a trait like yield differs when comparing two hybrids. If two hybrids differ by more than the indicated LSD value for a given trait, they would most likely differ again when grown under similar conditions.

For example, if the Miller test (Table 4) could be repeated in 2002 exactly as it was in 2001, the yield ranking of a hybrid that yielded 3122 lbs/A and one that yielded 2712 lbs/A might change places since their yield difference (410 lbs/A) is less than the indicated yield LSD value of 445 lbs/A. Within the accuracy level of the equipment used, there was no statistical difference in yield between the two hybrids when grown under the conditions that existed at Miller in 2001.

However, if the test was repeated under similar conditions, we would expect the hybrid that yielded 3122

lbs/A at Miller in 2001 to produce more than a hybrid that yielded 2644 lbs/A, since their yield difference (478 lbs/A) is greater than the indicated yield LSD value (445 lbs/A).

The coefficient of variability (C.V.) listed at the bottom of each data table is a relative measure of the amount of variation recorded for a particular trait expressed as a percentage of the mean for that trait. Generally, trials with low C.V. rates are more reliable for making hybrid choices than trials with higher C.V. rates. Trials with C.V. rates not exceeding 15-20% may be considered reliable.

Look at as many trials as possible. It is unlikely that environmental conditions of any particular test will be repeated in any future year.

### Oil Content and Composition

Among similar-yielding hybrids, select the one with the highest oil content. The oilseed market pays a premium for over 40% oil (at 10% moisture) and discounts for less than 40% oil.

Oil type may also be important. Hybrids are available with 'traditional', high oleic, and mid-oleic (NuSun) oil composition. Markets may pay a premium based on the composition of the oil produced by a particular hybrid. Some companies offer guarantees for NuSun oleic levels. Consistency of oleic levels for particular hybrids will be an important trait to evaluate, as data become available.

### Maturity

Full-season hybrids generally yield higher than early hybrids.

Maturity is especially important if planting is delayed. Often, with delayed planting, an early hybrid will mature and exhibit its full yield potential. Yield, oil content and test weight are often reduced when a

hybrid is damaged by frost before it is fully mature. An earlier hybrid will likely be drier at harvest than a later hybrid, thus reducing drying costs. To spread risk and workload, consider planting hybrids with different maturity dates.

### **Moisture Content**

Harvesting sunflower at moisture contents as high as 20-25% may reduce bird damage and seed shattering loss during harvest. Seed must then be dried to 9.5% or less for storage.

### **Disease Resistance**

The most economical and effective means of sunflower disease control is to plant resistant or tolerant hybrids and to rotate successive sunflower crops a minimum of four years.

Most sunflower hybrids in the United States have resistance to *Verticillium* wilt, such as races 1 and 2 of downy mildew and two or more races of rust. Consult the seed company for information on the reaction of a particular hybrid to these and other diseases that may pose a risk in your growing area.

## **2001 Trial Procedures**

### **Locations and Hybrids**

Oilseed hybrid sunflower trials were planted at four locations in South Dakota (Miller, Ipswich, Pukwana, and the Dakota Lakes Research Station near Pierre). Entries in the oilseed sunflower trials included traditional oil hybrids, a high oleic hybrid, and NuSun (mid-oleic) hybrids. Non-oilseed (confection) sunflower trials were conducted at Dakota Lakes, Miller, and Pukwana. Trial sites are indicated on the map in Figure 1. Lists of hybrids planted at each site appear in Table 2 and Table 9.

### **Climatic Conditions**

The 2001 growing season began with adequate to surplus topsoil and subsoil moisture. A summary of 2001 climatic conditions near the sunflower test sites is presented in Table 1. Average maximum temperatures were below normal at Ipswich and Pukwana, but above normal at Dakota Lakes. Minimum temperatures were warmer than normal at all locations. Most of the state received a killing frost October 5th. The 2001 growing season was generally dry. All stations received below to much below normal precipitation in May, June, and August, with normal to above normal rainfall in July and September.

### **Experimental Methods**

Plots at all locations consisted of two rows 24 feet long, spaced 30 inches apart. The plot layout was in a randomized complete block design with four replications at each location. The experiments were randomized for a nearest neighbors statistical analysis, which removes effects of field trends.

All plots were overseeded and thinned. Stands were spotty at Ipswich due to downy mildew. Where excess

plants were present, oilseed plots at Ipswich were thinned to a plant population of approximately 18,000 plants/acre. Plants systemically infected with downy mildew were preferentially removed during thinning. Stands were also variable at Dakota Lakes and Pukwana. Oilseed plots with excess plants were thinned to approximately 18,000 plants/acre at Miller and Dakota Lakes, and 17,000 plants/acre at Pukwana. Non-oil plots at all locations were thinned to 16,000 plants/acre.

The Dakota Lakes trial was seeded no-till. All other trials were planted with conventional tillage practices. Spartan and Prowl herbicides were applied for weed control at Dakota Lakes. All other locations had either Sonalan or Treflan applied.

At Miller, flowering was recorded as the number of days from planting to 50% ray petals extended. Plant height and lodging notes were taken at all locations immediately before harvest. Lodging was greatest at Dakota Lakes, ranging from 0% to 39%. Lodging was generally low (<10%) at Miller, Ipswich, and Pukwana.

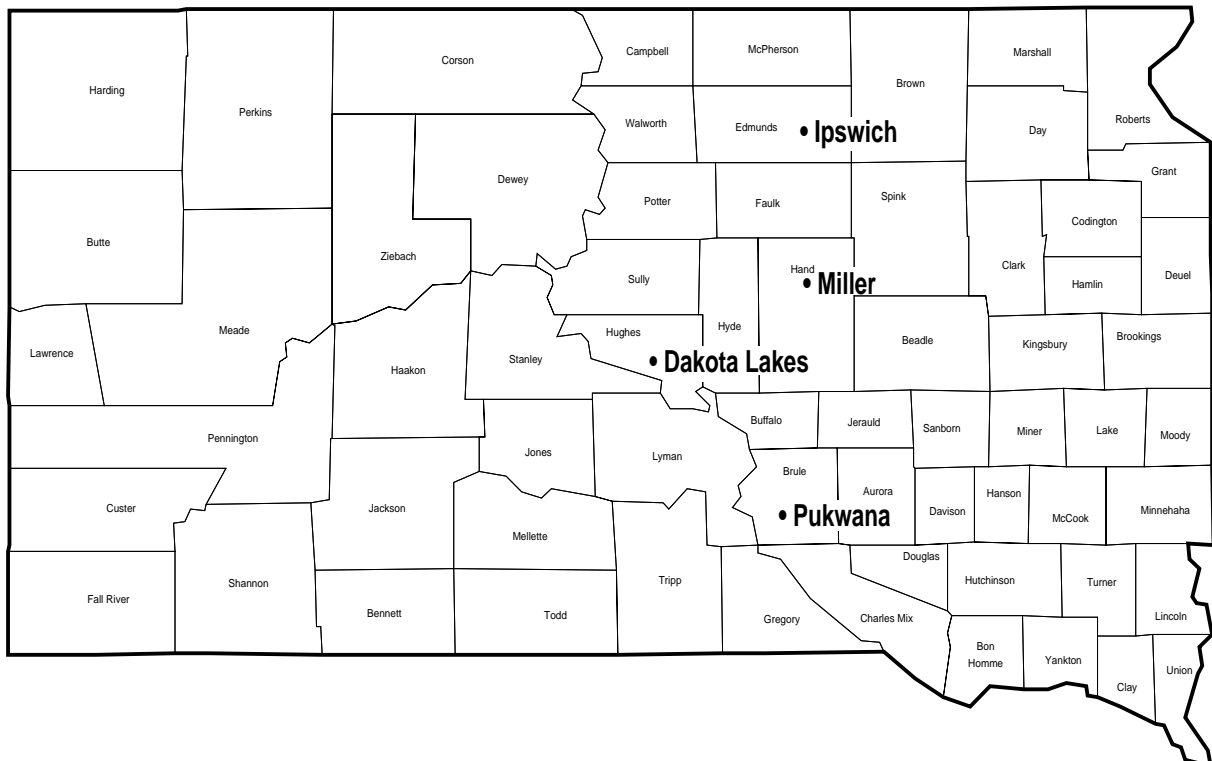
Plots were harvested with a Gleaner Model K combine fitted with a two-row all row crop header. All oilseed trial seed yields were adjusted to a 10% moisture basis. Oil content was determined by NMR analysis of oven-dry seed samples and converted to 10% moisture. Oil values for NuSun hybrids were adjusted according to the formula: (original NMR % X 0.953)+0.7148=true NuSun oil %. Oil yield was calculated by multiplying seed yield by oil percent.

Seed from the non-oilseed trials was dried before weighing. A one-pint subsample of seed from each plot was passed over 22/64, 20/64, and 18/64 round-hole screens to determine the percentage of large seed. Nut-meal percent was determined by weighing 20 whole seeds, dehulling, and weighing the 20 dehulled kernels.

## Results

Data from each location and averaged location data are contained in Tables 3-8 (oilseed) and 10-12 (confection). Results from the Dakota Lakes confection trial are not included because high C.V.'s at that location (due to lodging and moisture stress) precluded valid hybrid comparisons. The highest average seed yield across oilseed hybrids was 2684 lbs/A at Miller and the lowest was 1168 lbs/A at Dakota Lakes. Non-oilseed seed yields were also highest at Miller (2173 lbs/A) and lowest at Dakota Lakes (1129 lbs/A). In the tables that follow, hybrids are listed according to 2001 seed yields.

***Presentation of data in this report on the hybrids tested does not imply approval or endorsement by SDSU to the exclusion of other varieties that may be suitable. South Dakota State University approves the reproduction of any table in this publication only if no portion is deleted.***



**Figure 1. 2001 South Dakota sunflower test sites.**

**Table 1. Climate summary for 2001 South Dakota sunflower test sites.**

Month	Temperature		Depart. from Normal		Precipitation	
	Ave. Max.	Ave. Min.	Max. Temp.	Min. Temp.	Total	Depart.
<b><u>Miller*</u></b>						
May	68.7	46.8	-1.9	1.6	2.78	0.04
June	77.9	56.0	-2.3	0.6	2.51	-0.40
July	88.2	62.4	0.8	1.4	2.64	0.26
August	86.5	58.5	1.2	0.9	1.35	-0.61
September	NA	NA	NA	NA	NA	NA
<b><u>Dakota Lakes*</u></b>						
May	72.0	48.6	1.1	3.0	1.96	-0.91
June	80.9	56.5	-0.6	0.7	1.88	-1.64
July	91.0	66.2	1.1	4.2	2.64	0.02
August	92.0	62.1	4.0	2.2	0.05	-1.64
September	79.6	53.6	3.4	5.1	1.69	0.13
<b><u>Ipswich*</u></b>						
May	70.2	46.8	-0.7	4.2	1.97	-0.66
June	76.9	54.7	-3.2	2.0	2.69	-0.85
July	84.5	61.1	-2.5	3.5	3.53	0.91
August	85.5	56.6	-0.5	1.5	1.33	-0.72
September	NA	NA	NA	NA	1.42	-0.12
<b><u>Academy (Pukwana)*</u></b>						
May	70.8	48.2	-1.3	3.0	2.81	-0.72
June	79.8	55.4	-2.3	0.3	1.28	-2.25
July	86.6	63.7	-2.8	2.8	4.36	1.42
August	87.5	59.9	0.3	2.5	0.04	-2.01
September	76.5	49.8	-0.5	2.6	4.31	2.22

\* The data in this table are for sites as close to the actual test plot sites as available, however, temperature and/or precipitation at the actual test plot sites may have differed from the values shown above.

**Table 2. Hybrids and test sites for the 2001 South Dakota oilseed hybrid sunflower trial.**

Sunflower Brand-Hybrid	Hybrid Type	Ipswich	Miller	Dakota Lakes	Pukwana
Croplan CL 345 NS	NuSun	X	X		
Croplan CL 380 NS	NuSun	X	X		
Croplan CL 385 NS	NuSun	X	X	X	
Dekalb DK3868	Trad.	X	X	X	X
Dekalb DKF31-01NS	NuSun	X	X	X	X
Dekalb DKF36-40NS	NuSun	X	X	X	X
Dekalb EX3804NS	NuSun	X	X	X	X
Garst/Interstate F0001	Trad.		X		
Garst/Interstate F84021	Trad.		X	X	X
Garst/Interstate F90039 HO	High Oleic		X	X	X
Garst/Interstate IS4049	Trad.	X	X	X	X
Garst/Interstate IS4340	Trad.		X	X	X
Garst/Interstate IS5331(V15045)	Trad.		X	X	X
Garst/Interstate IS6039	Trad.	X	X	X	X
Garst/Interstate IS6521(F74018)	Trad.		X	X	X
Garst/Interstate IS6767	Trad.		X	X	X
Kaystar 2015NS	NuSun	X	X		
Kaystar 2020NS	NuSun			X	X
Kaystar 8300	Trad.	X			
Kaystar 9404	Trad.	X	X		X
Kaystar 9501	Trad.		X	X	X
Legend LSF142N	NuSun	X	X	X	X
Mycogen 8372	Trad.	X	X	X	
Mycogen 8377NS	NuSun	X	X	X	
Mycogen 8488NS	NuSun	X	X	X	X
Mycogen Cavalry	Trad.	X	X	X	X
Mycogen SF 187	Trad.	X	X	X	X
Mycogen SF 260	Trad.	X	X	X	X
Mycogen SF 270	Trad.	X	X	X	
Mycogen SF 290	Trad.	X	X	X	X
Pioneer hybrid 63A70	Trad.	X	X	X	X
Pioneer hybrid 63M80	NuSun	X	X	X	X
Pioneer hybrid 63M91	NuSun	X	X	X	X
Pioneer hybrid XF306	NuSun	X	X	X	X
Pioneer hybrid XF3920	Trad.	X	X	X	X
Proseed 9123	NuSun	X	X	X	X
Proseed EX9405 NS	NuSun	X	X	X	X
Proseed 9441	NuSun	X	X	X	X
Proseed 9612	Trad.	X	X	X	X
Proseed 9911	Trad.	X	X	X	X
Proseed 99-14	NuSun	X	X	X	X
Proseed 99-746	NuSun	X	X	X	X
Proseed 99-78	NuSun	X	X	X	X
Proseed 99-90	NuSun	X	X	X	X
Seeds 2000 Bronco	NuSun	X			X
Seeds 2000 Maverick	NuSun	X			

**Table 2 (continued).**

Sunflower Brand-Hybrid	Hybrid Type	Ipswich	Miller	Dakota Lakes	Pukwana
Seeds 2000 Ranger	NuSun	X			X
Seeds 2000 Blazer	NuSun	X			X
Syngenta 278	Trad.	X	X	X	X
Syngenta NX30002	NuSun	X	X	X	X
Syngenta T46-R9	Trad.	X	X	X	X
Triumph 636	NuSun				X
Triumph 658	NuSun	X			X
Triumph 665	NuSun				X
USDA 894 (check)	Trad.	X	X	X	X
cmsHA412/RHA377 (check)	Trad.			X	X
Total hybrids		44	46	43	46

**Table 3. Results of the 2001 commercial oilseed sunflower trial grown at Ipswich, SD.**

Sunflower Brand-Hybrid	Type	Seed Yield	Oil	Oil Yield	Test Wt.	Harv. Moist.	Plant Height	Lodgng	Final Pop.
		lbs/A	%	lbs/A	lb/bu	%	cm	%	plnt/A
Proseed 9612	Trad.	3007	38.9	1163	28.6	16.4	179	4	18000
Croplan CL 345 NS	NuSun	2519	40.0	1008	28.4	18.0	176	0	17800
Croplan CL 380 NS	NuSun	2436	39.4	961	28.7	19.7	178	1	20200
Mycogen 8488NS	NuSun	2386	39.1	936	28.0	17.7	173	3	17600
Mycogen SF 270	Trad.	2360	39.6	932	27.6	14.9	168	4	15900
Proseed 9911	Trad.	2287	39.4	902	28.4	15.6	172	5	17300
Garst/Interstate IS6039	Trad.	2275	40.3	918	28.1	15.4	169	2	18000
Syngenta 278	Trad.	2266	40.5	915	28.0	16.8	168	5	17300
Seeds 2000 Blazer	NuSun	2238	39.9	892	27.9	17.4	164	0	19500
Dekalb DK3868	Trad.	2229	40.6	902	28.5	15.1	159	3	17600
Pioneer hybrid 63A70	Trad.	2211	41.0	907	28.7	16.3	174	2	18300
Syngenta T46-R9	Trad.	2190	40.1	879	28.7	15.6	178	0	16900
Pioneer hybrid 63M91	NuSun	2123	39.6	841	27.9	14.8	185	2	18100
Seeds 2000 Ranger	NuSun	2090	39.3	821	27.8	20.6	170	2	18500
Mycogen 8377NS	NuSun	2062	39.4	817	28.0	19.0	180	0	17900
Mycogen SF 260	Trad.	2051	40.7	831	28.3	15.7	160	2	17500
Garst/Interstate IS4049	Trad.	2051	40.1	824	28.1	20.0	178	3	18200
Mycogen Cavalry	Trad.	2050	42.1	867	28.3	16.9	187	1	18500
Syngenta NX30002	NuSun	2048	38.3	779	27.9	18.7	180	6	18900
Kaystar 9404	Trad.	2040	39.2	799	27.0	14.3	173	1	16300
Mycogen 8372	Trad.	2026	41.0	833	28.3	17.0	177	2	18100
Kaystar 8300	Trad.	2023	41.1	833	27.2	14.8	163	4	17600
Pioneer hybrid XF3920	Trad.	2012	41.0	826	28.1	18.3	175	3	15500
Pioneer hybrid 63M80	NuSun	1982	40.5	804	27.7	17.9	175	6	19000
Proseed 99-746	NuSun	1959	38.4	750	27.8	13.8	171	4	17500
Mycogen SF 290	Trad.	1948	41.2	803	28.5	17.9	168	2	18200
Dekalb EX3804NS	NuSun	1938	37.4	733	28.4	18.5	160	2	17500
Legend LSF142N	NuSun	1927	39.8	769	28.4	17.1	176	0	17800
Proseed 99-14	NuSun	1912	38.9	746	27.4	13.4	184	2	18400
Croplan CL 385 NS	NuSun	1903	39.8	759	27.4	19.0	170	4	17200
Proseed EX9405 NS	NuSun	1838	39.1	714	26.6	21.5	183	4	19100
Seeds 2000 Maverick	NuSun	1796	38.8	694	27.2	17.4	168	1	18200
Proseed 99-78	NuSun	1789	39.0	694	27.4	17.9	164	1	13000
Triumph 658	NuSun	1781	39.7	708	26.5	18.7	179	3	19300
Dekalb DKF36-40NS	NuSun	1747	37.6	657	27.2	18.7	177	1	16900
Dekalb DKF31-01NS	NuSun	1729	38.2	656	27.6	14.0	183	2	17000
Proseed 9441	NuSun	1657	39.0	641	28.0	15.6	179	0	15100
Seeds 2000 Bronco	NuSun	1624	38.7	627	26.2	18.9	165	0	17600
Proseed 9123	NuSun	1608	38.8	617	27.0	20.4	180	4	14900
Kaystar 2015NS	NuSun	1552	39.1	607	26.1	20.2	166	2	17800
Proseed 99-90	NuSun	1537	39.4	604	26.7	15.0	169	1	13300
Mycogen SF 187	Trad.	1515	38.9	583	27.3	17.8	158	2	17500
USDA 894 (check)	Trad.	1388	40.7	567	26.8	16.8	174	0	12800
Pioneer hybrid XF306	NuSun	1249	39.8	490	26.3	19.4	169	4	17700
Grand Mean		1985	39.6	787	27.7	17.2	173	2	17400
LSD 5%		499	1.3	202	1.6	3.2	11	4	2700
C.V.		18.0	2.3	18.4	4.0	13.3	4.4	111.8	10.9

Planted June 2, 2001.

Harvested October 2, 2001.

Design: Nearest neighbors in RCBD layout with 4 replications.

Seed yield, % oil, and oil yield are reported at 10% moisture.

**Table 4. Results of the 2001 commercial oilseed sunflower trial grown at Miller, SD.**

Sunflower Brand-Hybrid	Type	Seed Yield (lbs/A)			2001	Oil	Test	Harv.	Plant	Lodg	Days to
		2001	2000	Mean	Oil	Yield	Wt.	Moist.	Hght	-ing	Flower
		Miller	Frnkfrt	-2-	%	lbs/A	lb/bu	%	cm	%	
Proseed 9911	Trad.	3122	2006	2564	39.8	1241	28.9	13.2	171	4	61
Syngenta 278	Trad.	3090	2102	2596	40.6	1257	27.6	13.4	161	5	60
Mycogen 8488NS	NuSun	3027	2237	2632	38.8	1177	30.2	13.4	163	2	60
Mycogen Cavalry	Trad.	3020	2420	2720	42.1	1273	29.3	14.3	173	4	63
Garst/Interstate IS4049	Trad.	2984	2256	2620	39.9	1190	27.6	13.2	172	5	63
Croplan CL 380 NS	NuSun	2948	2368	2658	40.4	1189	29.5	13.3	162	4	60
Kaystar 9404	Trad.	2944	2439	2692	39.2	1148	28.6	12.9	164	6	60
Garst/Interstate IS5331	Trad.	2913	2319	2616	40.5	1180	29.0	12.2	162	2	59
Proseed 9612	Trad.	2881	2597	2739	38.3	1101	28.7	13.0	173	4	62
Mycogen SF 260	Trad.	2879	--	--	40.8	1181	28.1	13.0	161	3	60
Legend LSF142N	NuSun	2876	1253	2064	39.2	1124	28.4	14.5	166	3	65
Croplan CL 385 NS	NuSun	2876	1661	2268	37.4	1076	28.5	14.3	163	9	65
Garst/Interstate F84021	Trad.	2848	1962	2405	40.2	1146	29.1	13.8	171	4	64
Garst/Interstate IS6039	Trad.	2834	1882	2358	40.2	1138	29.0	12.9	166	4	59
Kaystar 9501	Trad.	2830	2043	2437	38.4	1089	28.8	13.2	178	5	64
Pioneer hybrid 63A70	Trad.	2812	1767	2290	41.1	1151	28.4	12.8	160	4	60
Pioneer hybrid 63M91	NuSun	2782	1935	2358	40.1	1112	29.8	12.9	175	5	60
Dekalb DK3868	Trad.	2759	1714	2236	40.3	1113	29.8	13.0	166	13	60
Mycogen SF 187	Trad.	2742	--	--	39.4	1077	27.4	13.0	159	4	61
Pioneer hybrid XF3920	Trad.	2735	--	--	41.9	1143	30.3	12.7	163	4	61
Proseed 99-746	NuSun	2723	--	--	38.5	1049	28.0	12.6	165	7	62
Mycogen 8372	Trad.	2714	2039	2377	40.5	1102	29.3	12.7	169	6	59
Garst/Interstate F00001	Trad.	2712	--	--	40.0	1083	27.8	12.9	168	4	60
Croplan CL 345 NS	NuSun	2681	1792	2236	38.9	1046	29.2	12.5	164	4	59
Proseed 99-14	NuSun	2680	--	--	39.1	1047	27.0	12.9	168	9	61
USDA 894 (check)	Trad.	2666	1320	1993	40.0	1067	27.7	12.8	165	8	61
Mycogen 8377NS	NuSun	2652	1733	2192	40.1	1066	29.8	12.9	156	3	59
Proseed 9123	NuSun	2644	1957	2301	38.5	1020	27.7	13.1	174	5	62
Garst/Interstate IS4340	Trad.	2630	1561	2095	40.8	1072	30.4	14.9	168	4	66
Proseed EX9405 NS	NuSun	2622	1949	2285	40.1	1053	27.9	14.0	163	1	62
Garst/Interstate F90039 HO	HghOleic	2615	--	--	39.8	1046	27.6	14.4	172	4	60
Pioneer hybrid 63M80	NuSun	2615	2295	2455	40.3	1055	29.6	12.6	163	3	59
Garst/Interstate IS6767	Trad.	2604	2013	2309	40.6	1063	29.4	13.0	159	7	61
Proseed 99-78	NuSun	2599	--	--	38.5	1004	26.9	12.7	170	6	61
Garst/Interstate IS6521	Trad.	2590	1155	1873	40.1	1042	28.7	12.5	158	9	60
Pioneer hybrid XF306	NuSun	2550	--	--	37.9	970	27.6	12.8	163	3	59
Syngenta T46-R9	Trad.	2497	1939	2218	40.1	1002	28.3	12.8	168	4	59
Mycogen SF 290	Trad.	2482	--	--	40.1	996	27.7	15.6	153	3	61
Kaystar 2015NS	NuSun	2380	--	--	39.4	938	28.2	12.8	164	5	60
Dekalb EX3804NS	NuSun	2360	--	--	38.6	916	29.0	12.7	167	6	58
Proseed 99-90	NuSun	2338	--	--	39.2	915	27.2	12.5	160	7	63
Proseed 9441	NuSun	2274	--	--	38.8	882	28.0	13.2	176	2	63
Syngenta NX30002	NuSun	2253	1877	2065	38.2	854	30.2	13.5	163	4	60
Mycogen SF 270	Trad.	2233	--	--	39.9	890	30.4	13.1	158	4	58
Dekalb DKF36-40NS	NuSun	2223	1601	1912	37.9	847	29.7	12.9	178	9	60
Dekalb DKF31-01NS	NuSun	2215	1339	1777	38.7	855	29.3	12.6	179	8	60
Grand Mean		2684	1847	2265	39.6	1065	28.7	13.2	166	5	61
LSD 5%		445	442		1.2	182	1.5	1.1	8	5	1
C.V.		11.8	17.2		2.2	12.2	3.8	5.7	3.5	68.3	1.4

Planted June 8, 2001.

Harvested October 12, 2001.

Design: Nearest neighbors in RCBD layout with 4 replications.

Seed yield, % oil, and oil yield are reported at 10% moisture.

**Table 5. Results of the 2001 commercial oilseed sunflower trial grown at the Dakota Lakes Research Station, Pierre, SD.**

Sunflower Brand-Hybrid	Type	Seed Yield (lbs/A)			2001	Oil	Test	Harv.	Plant	Lodg	Final
		2001	2000	Mean	Oil	Yield	Wt.	Moist.	Hght	-ing	Pop.
		-2-			%	lbs/A	lb/bu	%	cm	%	plnt/A
Mycogen SF 270	Trad.	1629	--	--	36.6	601	26.6	11.3	164	7	17900
Garst/Interstate IS533	Trad.	1567	2345	1956	36.2	642	25.9	12.2	154	12	17600
Garst/Interstate IS6039	Trad.	1524	2126	1825	37.5	562	29.0	9.1	164	9	18000
Garst/Interstate IS4340	Trad.	1496	2352	1924	37.4	501	26.9	11.2	168	11	17900
Proseed 9612	Trad.	1402	2151	1777	35.9	509	26.8	11.2	178	9	17200
Garst/Interstate IS4049	Trad.	1356	2326	1841	35.9	490	26.9	10.4	179	6	19800
Dekalb DK3868	Trad.	1326	1976	1651	36.4	486	26.9	10.6	164	16	17600
cmsHA412/RHA377(check)	Trad.	1309	--	--	36.6	506	25.4	11.8	179	7	14800
Garst/Interstate IS6767	Trad.	1294	1788	1541	36.7	458	27.8	9.7	172	10	17700
Syngenta T46-R9	Trad.	1272	2362	1817	36.4	447	27.6	10.2	176	13	18400
Proseed EX9405 NS	NuSun	1249	1704	1476	35.3	438	25.5	13.5	181	13	18100
Mycogen 8372	Trad.	1235	2026	1631	36.8	483	26.5	10.8	175	9	17300
Kaystar 2020NS	NuSun	1235	--	--	35.3	437	25.5	11.7	168	12	18200
Legend LSF142N	NuSun	1233	1568	1400	35.6	438	28.3	12.7	173	7	17400
Mycogen SF 187	Trad.	1227	--	--	35.8	434	25.0	10.7	160	10	17600
Croplan CL 385 NS	NuSun	1226	1911	1569	34.9	434	25.1	10.6	172	12	17600
Mycogen 8377NS	NuSun	1219	1962	1590	35.8	448	27.3	11.7	169	12	19300
Garst/Interstate F90039 HO	HghOleic	1218	--	--	35.8	436	28.0	10.7	171	13	18400
Mycogen 8488NS	NuSun	1211	1996	1603	35.6	406	26.6	13.3	178	1	17400
Proseed 9911	Trad.	1190	2390	1790	36.4	440	27.1	10.5	183	10	17900
Mycogen SF 290	Trad.	1187	--	--	36.4	437	28.3	10.2	154	15	17400
Proseed 9123	NuSun	1182	1641	1411	35.2	430	26.7	10.7	180	8	16600
Mycogen SF 260	Trad.	1182	--	--	36.3	422	26.4	10.0	167	8	18200
Proseed 9441	NuSun	1173	--	--	35.9	434	26.8	10.5	175	9	18300
Mycogen Cavalry	Trad.	1169	2509	1839	36.3	430	26.9	12.5	186	7	17600
Garst/Interstate F84021	Trad.	1138	2316	1727	36.6	418	26.3	12.2	185	13	17500
Pioneer hybrid 63M80	NuSun	1136	2114	1625	35.9	378	25.6	11.6	169	13	18500
Kaystar 9501	Trad.	1119	2528	1824	35.5	383	26.3	11.3	180	24	17400
USDA 894 (check)	Trad.	1118	1279	1198	36.3	407	27.8	12.6	172	14	14700
Garst/Interstate IS6521	Trad.	1079	1985	1532	36.4	391	26.0	11.5	157	14	16400
Dekalb EX3804NS	NuSun	1053	--	--	34.7	361	26.6	10.0	164	7	18500
Pioneer hybrid 63M91	NuSun	1053	1874	1463	36.1	374	26.6	11.1	180	7	18200
Syngenta 278	Trad.	1048	1706	1377	37.7	398	25.8	10.4	168	16	18200
Pioneer hybrid XF3920	Trad.	1044	--	--	37.3	376	25.8	12.2	176	7	17700
Proseed 99-90	NuSun	1034	--	--	35.0	355	26.7	9.4	170	14	17800
Pioneer hybrid 63A70	Trad.	1003	2391	1697	37.6	374	27.4	10.5	166	7	18300
Pioneer hybrid XF306	NuSun	983	--	--	35.8	344	25.7	9.3	162	15	18000
Syngenta NX30002	NuSun	980	2114	1547	34.9	333	25.9	10.7	165	10	18400
Dekalb DKF36-40NS	NuSun	963	1441	1202	35.4	354	25.3	11.4	181	33	18300
Proseed 99-78	NuSun	951	--	--	35.4	335	26.3	12.1	175	14	19000
Proseed 99-14	NuSun	861	--	--	35.5	322	25.0	9.6	172	14	17200
Dekalb DKF31-01NS	NuSun	772	1266	1019	35.7	279	23.5	9.8	182	34	18000
Proseed 99-746	NuSun	718	--	--	36.0	259	25.5	11.7	165	39	18400
Grand Mean		1168	1918	1543	36.0	422	26.5	11.0	172	13	17800
LSD 5%		329	452		0.9	119	2.0	2.5	9	11	1800
C.V.		20.2	16.9		1.8	20.2	5.5	16.2	3.9	62.7	7.1

Planted May 17, 2001.  
Harvested Sept. 26, 2001.

Design: Nearest neighbors in RCBD layout with 4 replications.  
Seed yield, % oil, and oil yield are reported at 10% moisture.

**Table 6. Results of the 2001 commercial oilseed sunflower trial grown at Pukwana, SD.**

Sunflower Brand-Hybrid	Type	Seed Yield (lbs/A)			2001	Oil	Test	Harv.	Plant	Lodg	Final
		2001	2000	Mean	Oil	Yield	Wt.	Moist.	Hght	-ing	Pop.
					%	lbs/A	lb/bu	%	cm	%	plnt/A
Syngenta 278	Trad.	3595	1796	2696	42.5	1518	26.9	13.9	164	0	16800
Garst/Interstate F84021	Trad.	3332	--	--	41.6	1392	27.5	14.0	160	2	14500
Proseed EX9405 NS	NuSun	3293	2151	2722	40.8	1339	26.9	16.7	156	1	14600
Garst/Interstate IS4340	Trad.	3191	1917	2554	41.4	1342	28.4	14.8	175	0	17100
Triumph 658	NuSun	3173	--	--	41.4	1342	26.7	15.1	161	4	16400
Proseed 9911	Trad.	3116	2110	2613	41.4	1256	27.7	14.0	164	1	17000
Garst/Interstate IS5331	Trad.	3034	2476	2755	39.6	1217	27.3	13.8	142	1	17400
Mycogen 8488NS	NuSun	3034	1960	2497	40.3	1212	28.4	13.9	160	0	18000
Triumph 636	NuSun	2939	--	--	41.6	1220	24.7	15.2	162	1	17100
Pioneer hybrid XF3920	Trad.	2883	--	--	42.9	1254	27.7	14.4	166	1	15500
Garst/Interstate IS6039	Trad.	2844	2121	2483	42.1	1200	27.3	12.2	163	0	15700
Mycogen SF 260	Trad.	2813	--	--	41.8	1149	28.1	10.7	154	3	15200
Mycogen Cavalry	Trad.	2801	2436	2618	42.6	1199	28.0	12.9	164	1	14100
Garst/Interstate IS4049	Trad.	2799	2110	2454	41.1	1155	27.5	13.9	166	1	17800
Seeds 2000 Blazer	NuSun	2768	1937	2353	41.2	1140	27.9	14.5	149	1	15300
Proseed 99-78	NuSun	2713	--	--	40.9	1097	27.0	13.5	162	2	16800
Pioneer hybrid XF306	NuSun	2687	--	--	40.6	1126	25.9	13.0	158	1	14300
Pioneer hybrid 63A70	Trad.	2684	2244	2464	41.9	1144	27.2	14.3	162	1	16700
Pioneer hybrid 63M91	NuSun	2672	2205	2439	42.2	1106	27.3	14.6	171	0	14600
Syngenta NX30002	NuSun	2637	1713	2175	40.0	1054	28.7	14.7	156	0	15200
Garst/Interstate IS6521	Trad.	2630	--	--	41.5	1107	29.6	11.9	157	1	15000
Kaystar 9404	Trad.	2630	2121	2376	41.4	1051	25.4	13.7	157	1	18300
Garst/Interstate IS6767	Trad.	2629	2043	2336	42.7	1109	27.1	15.0	155	0	14200
Dekalb DK3868	Trad.	2592	1995	2294	41.2	1085	28.2	12.2	160	1	14900
Garst/Interstate F90039 HO	HghOleic	2591	--	--	39.7	1042	27.1	14.8	160	0	13700
Triumph 665	NuSun	2552	--	--	40.7	1068	27.3	16.5	156	1	14200
Proseed 9612	Trad.	2524	2595	2560	40.0	998	27.7	12.1	160	0	13900
Proseed 99-14	NuSun	2522	--	--	41.3	1020	25.9	13.6	168	2	14000
Dekalb DKF31-01NS	NuSun	2518	1477	1998	38.8	969	27.4	13.8	175	3	12500
Syngenta T46-R9	Trad.	2514	2340	2427	41.2	1016	28.0	12.0	163	0	13800
Kaystar 2020NS	NuSun	2511	--	--	40.4	1053	26.8	15.1	158	2	15100
Kaystar 9501	Trad.	2480	2634	2557	39.3	988	28.0	15.7	163	2	14500
Mycogen SF 290	Trad.	2469	--	--	40.4	1027	27.9	15.9	145	0	12500
Pioneer hybrid 63M80	NuSun	2443	1725	2084	41.1	1019	27.0	13.3	162	2	12600
Proseed 9123	NuSun	2440	1889	2164	41.1	979	25.6	19.0	151	2	14500
Seeds 2000 Bronco	NuSun	2399	2190	2295	41.6	1013	27.2	13.2	154	0	13200
Mycogen SF 187	Trad.	2392	--	--	40.3	946	26.9	14.0	156	1	14800
Seeds 2000 Ranger	NuSun	2216	--	--	41.2	893	26.5	14.1	149	1	15200
Legend LSF142N	NuSun	2167	1432	1800	39.8	831	28.3	15.6	148	1	10100
Proseed 9441	NuSun	2126	--	--	40.5	848	27.4	14.0	159	0	15100
Proseed 99-746	NuSun	2095	--	--	40.7	851	26.7	14.2	158	1	14000
Dekalb EX3804NS	NuSun	2063	--	--	37.6	789	26.9	13.5	152	0	12900
cmsHA412/RHA377(check)	Trad.	1994	--	--	42.0	826	24.9	12.5	153	0	6900
USDA 894 (check)	Trad.	1951	1802	1877	41.5	806	26.3	13.8	153	3	14300
Proseed 99-90	NuSun	1938	--	--	39.3	771	27.6	12.2	155	2	13000
Dekalb DKF36-40NS	NuSun	1830	2174	2002	39.2	725	26.2	15.8	176	0	15300
Grand Mean		2614	2023	2318	40.9	1072	27.2	14.1	159	1	14800
LSD 5%		668	434		1.4	284	1.7	2.9	11	2	3500
C.V.		18.3	15.4		2.5	19.0	4.6	14.9	4.8	163	17.0

Planted June 8, 2001.

Harvested October 16, 2001.

Design: Nearest neighbors in RCBD layout with 4 replications.

Seed yield, % oil, and oil yield are reported at 10% moisture.

**Table 7. Results of the 2001 commercial oilseed sunflower trial averaged over all four locations.**

Sunflower Brand-Hybrid	Type	Seed Yield	Oil	Oil Yield	Test Wt.	Harv. Moist.	Plant Height	Lodgng
		lbs/A	%	lbs/A	lb/bu	%	cm	%
Syngenta 278	Trad.	2502	40.3	1023	27.0	13.6	165	6
Proseed 9612	Trad.	2457	38.7	785	27.9	13.1	173	4
Proseed 9911	Trad.	2431	38.4	728	28.0	13.2	173	5
Mycogen 8488NS	NuSun	2417	38.4	934	28.3	14.5	168	2
Garst/Interstate IS6039	Trad.	2372	40.0	955	28.4	12.3	165	4
Garst/Interstate IS4049	Trad.	2300	39.3	916	27.5	14.3	174	4
Mycogen Cavalry	Trad.	2263	40.8	943	28.1	14.1	177	3
Proseed EX9405 NS	NuSun	2253	38.6	702	26.7	16.4	170	5
Mycogen SF 260	Trad.	2234	39.9	897	27.7	12.3	161	4
Dekalb DK3868	Trad.	2229	39.6	897	28.4	12.6	162	8
Pioneer hybrid 63A70	Trad.	2180	40.4	895	27.9	13.4	166	3
Pioneer hybrid XF3920	Trad.	2171	40.8	901	28.0	14.3	170	4
Pioneer hybrid 63M91	NuSun	2160	39.5	859	27.9	13.3	178	3
Syngenta T46-R9	Trad.	2121	39.5	837	28.1	12.6	171	4
Legend LSF142N	NuSun	2053	38.6	792	28.3	14.9	166	3
Pioneer hybrid 63M80	NuSun	2047	39.5	815	27.5	13.8	167	6
Mycogen SF 290	Trad.	2025	39.5	817	28.1	14.8	155	5
Proseed 99-78	NuSun	2016	39.3	961	26.9	13.9	167	6
Proseed 99-14	NuSun	1997	38.5	784	26.3	12.3	173	7
Syngenta NX30002	NuSun	1982	37.8	756	28.2	14.3	166	5
Mycogen SF 187	Trad.	1972	38.6	761	26.6	13.8	158	4
Proseed 9123	NuSun	1971	38.4	762	26.7	15.7	171	5
Proseed 99-746	NuSun	1877	38.2	662	27.0	13.0	165	13
Pioneer hybrid XF306	NuSun	1870	38.5	734	26.3	13.6	163	6
Dekalb EX3804NS	NuSun	1856	37.1	701	27.7	13.6	161	4
Dekalb DKF31-01NS	NuSun	1811	37.9	691	27.0	12.5	180	12
Proseed 9441	NuSun	1810	38.3	944	27.5	13.3	172	3
USDA 894 (check)	Trad.	1784	39.6	713	27.1	13.9	166	6
Proseed 99-90	NuSun	1714	38.8	887	27.0	12.2	163	6
Dekalb DKF36-40NS	NuSun	1694	37.5	647	27.1	14.6	178	11
Grand Mean		2086	39.0	823	27.5	13.7	168	5
LSD 5%		335	0.8	141	1.1	1.7	7	ns
C.V.		18.3	2.4	19.2	4.6	14.6	4.2	100.6

Seed yield, % oil, and oil yield are reported at 10% moisture.

**Table 8. Results of the 2001 commercial oilseed sunflower trial averaged over Miller, Dakota Lakes, and Pukwana.**

Sunflower Brand-Hybrid	Type	Seed Yield	Oil %	Oil Yield	Test Wt.	Harv. Moist.	Plant Height	Lodgng
		lbs/A	%	lbs/A	lb/bu	%	cm	%
Syngenta 278	Trad.	2585	40.3	1061	26.7	12.6	164	7
Garst/Interstate IS5331	Trad.	2512	38.8	1016	27.4	12.7	153	5
Proseed 9911	Trad.	2483	38.4	723	27.9	12.6	173	5
Garst/Interstate F84021	Trad.	2447	39.5	988	27.6	13.3	172	7
Garst/Interstate IS4340	Trad.	2447	39.9	974	28.6	13.6	170	5
Mycogen 8488NS	NuSun	2431	38.2	934	28.4	13.5	167	1
Garst/Interstate IS6039	Trad.	2408	40.0	969	28.5	11.4	164	4
Proseed EX9405 NS	NuSun	2395	38.4	724	26.8	14.8	166	5
Garst/Interstate IS4049	Trad.	2387	39.0	948	27.3	12.5	172	4
Mycogen Cavalry	Trad.	2337	40.4	970	28.1	13.3	174	4
Mycogen SF 260	Trad.	2299	39.7	920	27.5	11.3	161	5
Proseed 9612	Trad.	2277	38.7	799	27.7	12.1	171	4
Dekalb DK3868	Trad.	2233	39.3	898	28.3	11.9	163	10
Pioneer hybrid XF3920	Trad.	2228	40.7	927	27.9	13.1	168	4
Garst/Interstate IS6767	Trad.	2183	40.0	880	28.1	12.6	162	6
Pioneer hybrid 63M91	NuSun	2176	39.5	867	27.9	12.9	175	4
Pioneer hybrid 63A70	Trad.	2174	40.2	892	27.7	12.5	163	4
Kaystar 9501	Trad.	2150	37.7	823	27.7	13.4	173	10
Garst/Interstate F90039 HO	High Oleic	2149	38.5	844	27.6	13.3	168	5
Mycogen SF 187	Trad.	2128	38.5	822	26.4	12.6	158	5
Garst/Interstate IS6521	Trad.	2107	39.4	849	28.1	12.0	157	8
Syngenta T46-R9	Trad.	2102	39.3	825	27.9	11.7	169	6
Legend LSF142N	NuSun	2099	38.2	800	28.3	14.3	163	4
Proseed 9123	NuSun	2096	38.3	812	26.7	14.3	168	5
Proseed 99-78	NuSun	2095	39.2	982	26.7	12.7	169	7
Pioneer hybrid XF306	NuSun	2081	38.1	816	26.4	11.7	161	6
Pioneer hybrid 63M80	NuSun	2072	39.1	820	27.4	12.5	165	6
Mycogen SF 290	Trad.	2054	39.0	823	27.9	13.9	150	6
Proseed 99-14	NuSun	2029	38.3	815	25.9	12.0	170	8
Syngenta NX30002	NuSun	1964	37.7	750	28.3	12.9	161	4
USDA 894 (check)	Trad.	1919	39.3	763	27.3	13.1	164	8
Proseed 9441	NuSun	1865	38.1	872	27.4	12.6	170	4
Proseed 99-746	NuSun	1853	37.9	683	26.8	12.8	163	16
Dekalb DKF31-01NS	NuSun	1843	37.8	704	26.7	12.1	179	15
Dekalb EX3804NS	NuSun	1833	37.0	691	27.5	12.1	161	5
Proseed 99-90	NuSun	1777	38.8	946	27.2	11.4	162	8
Dekalb DKF36-40NS	NuSun	1680	37.5	645	27.1	13.4	178	14
Grand Mean		2159	38.9	853	27.5	12.7	166	6
LSD 5%		372	1.0	161	1.4	1.7	8	ns
C.V.		17.6	2.4	18.5	4.7	13.5	4.1	88.4

Seed yield, % oil, and oil yield are reported at 10% moisture.

**Table 9. Hybrids and test sites for the 2001 South Dakota non-oilseed hybrid sunflower trial.**

Sunflower Brand-Hybrid	Dakota Lakes	Miller	Pukwana
Agway RH 118	X	X	X
Agway RH 3708	X	X	X
Agway RH 3738	X	X	X
Dahlgren D-9518		X	
Dahlgren D-9522		X	
Dahlgren DX-9525		X	
Garst/Interstate F89008	X	X	X
Garst/Interstate IS8048	X	X	X
Red River Commodities 2213	X	X	X
Red River Commodities 2413	X	X	X
Red River Commodities 2582	X	X	X
Seeds 2000 Bigfoot		X	X
Seeds 2000 Grizzly		X	X
Seeds 2000 X3987		X	X
Sigco Sun Products Exp 396	X	X	X
Sigco Sun Products Rustler	X	X	X
Triumph 777C	X	X	X
USDA 924 (check)	X	X	X
Proseed C9802	X	X	X
Total Hybrids	13	19	16

**Table 10. Results of the 2001 non-oil sunflower hybrid trial grown at Miller, SD.**

Sunflower Brand-Hybrid	Seed Yield	Days to Flower	Plant Hght	Test Wt.	Lodg -ing	% Over Screen			Nut- meat
						22/64	20/64	18/64	
	lbs/A		cm	lb/bu	%				%
Seeds 2000 X3987	3052	69	170	23.2	1	63	84	94	52
Dahlgren DX-9525	2761	66	160	21.5	7	72	88	94	54
Seeds 2000 Grizzly	2611	66	169	24.3	5	58	85	94	54
Agway RH 118	2540	68	165	23.8	1	48	77	91	55
Agway RH 3738	2327	67	163	24.9	5	41	74	91	56
Triumph 777C	2272	66	166	22.4	7	65	83	91	55
Sigco Sun Products Exp 396	2246	69	170	24.7	3	42	70	86	54
Dahlgren D-9518	2177	68	168	24.1	2	58	82	90	54
Dahlgren D-9522	2158	61	156	23.9	6	50	77	91	53
Seeds 2000 Bigfoot	2150	60	159	23.8	0	46	73	89	59
Garst/Interstate F89008	2091	63	165	23.8	4	41	69	88	56
Garst/Interstate IS8048	2078	60	152	25.2	4	38	75	89	54
Red River Commodities 2213	1998	60	156	23.8	4	31	70	88	57
Red River Commodities 2413	1923	61	159	25.1	4	36	67	83	55
Sigco Sun Products Rustler	1908	61	156	24.8	3	33	58	79	56
Red River Commodities 2582	1852	68	167	25.2	7	36	63	82	57
Agway RH 3708	1802	64	158	24.0	1	47	77	88	55
Proseed C9802	1792	61	160	23.4	10	30	68	87	62
USDA 924 (check)	1554	61	160	24.2	5	21	55	80	58
Grand Mean	2173	64	162	24.0	4	45	74	88	56
LSD 5%	453	2	8	1.4	3	12	9	6	3
C.V.	14.7	2.4	3.3	4.2	58.3	18.2	8.2	4.5	3.9

Planted June 8, 2001.

Harvested October 13, 2001.

Design: Nearest neighbors in RCBD layout with 4 replications.

**Table 11. Results of the 2001 non-oil sunflower hybrid trial grown at Pukwana, SD.**

Sunflower Brand-Hybrid	Seed Yield (lbs/A)			Plant Height	Test Weight	Lodgng %	% Over Screen			Nut- meat %
	2001	2000	Mean				22/64	20/64	18/64	
Seeds 2000 X3987	2338	--	--	171	24.3	1	48	82	92	52
Seeds 2000 Grizzly	2069	--	--	171	25.4	1	44	76	90	52
Seeds 2000 Bigfoot	2020	1709	1864	154	26.4	3	41	72	89	55
Garst/Interstate F89008	1931	1589	1760	170	25.3	1	36	66	87	55
Triumph 777C	1909	--	--	167	23.8	1	56	75	88	51
Agway RH 3708	1849	--	--	168	25.1	3	49	68	82	50
Garst/Interstate IS8048	1823	1385	1604	159	26.3	2	43	79	91	55
Agway RH 118	1770	--	--	169	25.9	0	38	63	82	55
Proseed C9802	1720	1469	1595	171	25.5	3	30	67	83	59
Red River Commodities 2213	1684	--	--	159	25.3	2	32	64	86	54
Agway RH 3738	1651	--	--	159	25.9	1	38	65	84	53
USDA 924	1644	1349	1496	167	26.7	0	28	65	86	56
Sigco Sun Products Exp 396	1642	--	--	170	25.2	0	49	77	87	55
Sigco Sun Products Rustler	1590	--	--	154	26.2	0	42	69	86	55
Red River Commodities 2582	1309	--	--	176	24.9	0	48	71	86	53
Red River Commodities 2413	1226	--	--	164	25.1	3	33	65	85	54
Grand Mean	1761	1423	1592	165	25.4	1	41	70	86	54
LSD 5%	432	ns		9	ns	ns	12	8	ns	3
C.V.	17.2	16.6		3.6	4.3	155.9	19.9	8.5	5.0	3.5

Planted June 8, 2001.

Harvested October 17, 2001.

Design: Nearest neighbors in RCBD layout with 4 replications.

**Table 12. Results of the 2001 non-oil sunflower hybrid trial averaged over Miller and Pukwana, SD.**

Sunflower Brand-Hybrid	Seed Yield	Plant Height	Test Weight	Lodgng	% Over Screen			Nut- meat
					22/64	20/64	18/64	
	lbs/A	cm	lb/bu	%				%
Seeds 2000 X3987	2698	170	23.8	1	56	83	93	52
Seeds 2000 Grizzly	2344	170	24.9	3	51	81	92	53
Agway RH 118	2158	167	24.9	1	43	70	87	55
Triumph 777C	2094	167	23.1	4	61	79	89	53
Seeds 2000 Bigfoot	2088	156	25.1	1	44	73	89	57
Garst/Interstate F89008	2014	167	24.6	3	39	68	88	55
Agway RH 3738	1993	161	25.4	3	39	70	88	54
Garst/Interstate IS8048	1954	155	25.8	3	41	77	90	55
Sigco Sun Products Exp 396	1947	170	25.0	1	46	74	87	55
Red River Commodities 2213	1844	157	24.6	3	32	67	87	55
Agway RH 3708	1829	163	24.6	2	48	73	85	52
Proseed C9802	1759	166	24.5	6	30	68	85	60
Sigco Sun Products Rustler	1752	155	25.5	1	38	64	82	55
USDA 924	1603	163	25.5	2	24	60	83	57
Red River Commodities 2582	1584	171	25.1	4	42	68	84	55
Red River Commodities 2413	1578	161	25.1	4	35	66	84	55
Grand Mean	1953	164	24.8	3	42	71	87	55
LSD 5%	424	7	1.2	ns	12	11	ns	3
C.V.	17.1	3.5	4.4	87.9	19.1	8.5	4.9	4.2