

KNOW YOUR SUNFLOWER IMPROVEMENT TEAM

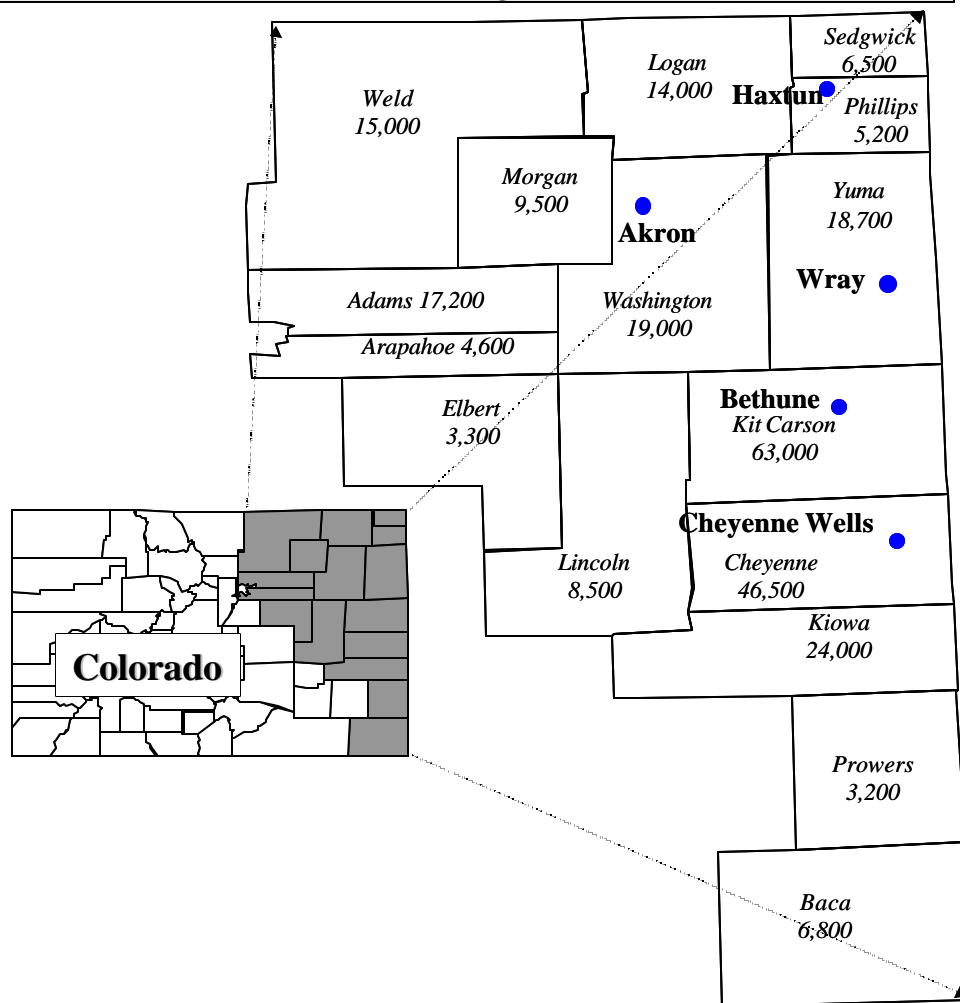
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• Five Colorado Sunflower Trial Locations in 2000 *with 1999 acreage harvested*



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2000 COLORADO SUNFLOWER PERFORMANCE TRIALS

Introduction

In ten short years sunflower have become an important crop in eastern Colorado with acreage surpassing a record 300,000 acres in 1999 and a crop value of over \$30 million. Statewide, sunflower for oil accounted for over \$17 million and confection sunflower production was valued at \$13 million. Colorado acreage in 2000 planted to sunflower is estimated to be 175,000 acres and approximately \$2.3 million was spent by Colorado sunflower producers on hybrid seed to plant this acreage. To assist Colorado sunflower producers to make the best seed decision, CSU personnel evaluate commercial sunflower hybrids at different locations in northeastern Colorado.

A randomized complete block design with three replicates was used for all trials. The center two rows of four row plots (30" spacing between rows and 40' long) were harvested for grain yield. Oil hybrids were planted at 19,000 seeds/acre under dryland conditions and at 24,000 seeds/acre under irrigation. Confection hybrids were planted at 15,000 seeds/acre under dryland conditions and at 17,000 seeds/acre under irrigation. Seed yields are reported in pounds per acre adjusted to 10% moisture content. The least significant difference (LSD) value, alpha=0.30, is reported for yield.

The 2000 Cropping Season

The results of our 2000 dryland sunflower oil and confection trials at Akron, Cheyenne Wells, and Wray are shown below. The Haxtun dryland trial was lost to poor emergence resulting from dry planting conditions and followed by mid-summer drought. The 2000 irrigated sunflower trial was moved from Bethune to four miles north of Burlington this year. The two locations are approximately 15 miles apart so the Bethune trial name was kept and results are averaged over two and three years.



Information regarding sunflower production practices and pest control can be obtained from the following source: "High Plains Sunflower Production and IPM," Bulletin No. 556A, Colorado State University Cooperative Extension, Fort Collins, 80523. Call CERC at (970) 491-6198 to order your copy.

Table 1. Cultural conditions for sunflower testing in 2000.

	Akron	Bethune	Cheyenne Wells	Wray
Soil Type	Ascalon Sandy Loam	Kieth Silt Loam	Kieth-Ulysses Silt Loam	Colby Silt Loam
Previous Crop	Corn	Corn	Wheat	Wheat
Fertilization				
N acre ⁻¹	50	11	60	0
P ₂ O ₅ acre ⁻¹	0	0	0	0
Herbicide	Prowl Spartan	Sonalan 10G Post	Spartan	Roundup
Insecticide	None	Parathion Warrior	None	None
Fungicide	None	Folicure - for rust	None	None
Irrigation	None	Sprinkler	None	None

Table 2. Dryland sunflower oil performance at Akron¹ in 2000.

Hybrid	Test		Plant		Lodging	Oil
	Yield	Weight	Height ²	Density		
	lb/ac	bu/ac	in	plants/a	%	%
Croplan CL385 NS	1847	21.4	35	11663	1	36.59
Interstate IS X74066	1664	20.5	39	11007	1	35.97
Mycogen 8468	1607	23.5	38	11363	0	36.55
Garst IS 4340	1457	20.9	36	12310	0	37.65
Triumph 652	1450	28.7	44	11455	0	36.83
Garst IS 6767	1446	24.3	43	12550	1	35.27
Garst Hysun 450	1419	24.4	33	12261	1	35.97
Pioneer brand 63M80	1331	23.2	42	11869	2	37.26
Mycogen 8377 NS	1323	24.6	45	12500	0	37.12
Triumph 562	1302	20.9	42	9941	2	35.80
Pioneer brand 63A70	1295	23.2	48	10818	2	38.55
DEKALB DK3900	1274	25.0	36	12155	0	37.30
Croplan CL345 NS	1242	24.8	46	11911	2	35.92
Pioneer brand 63M91	1205	25.6	44	12460	1	37.05
Interstate IS X74091	1203	22.7	38	13893	1	35.59
Garst IS 4049	1078	24.0	44	12813	0	36.77
DEKALB DKF31-01 NS	1036	26.3	46	12182	1	35.87
Pioneer brand 63A21	1028	25.3	44	14130	2	35.50
DEKALB DKF36-40 NS	1005	24.6	43	12115	5	37.02
Average	1327	23.9	41	12073	1	36.56
CV%	22.8					
LSD _(0.30)	259.7					

¹Trial conducted on Jason Shook farm; seeded 6/24 and harvested 10/18.²Plant height to top of crook at maturity.**Table 3. 2-yr average dryland sunflower oil performance at Akron, 1999-00.**

Hybrid	Test	
	Yield	Weight
	lb/ac	bu/ac
Triumph 562	1636	23.5
DEKALB DK3900	1594	26.0
Garst IS 4049	1183	25.5
Garst IS 6767	1547	25.2
Garst Hysun 450	1709	25.2
Pioneer brand 63A70	1265	24.4
Average	1489	25.0

Table 4. Irrigated sunflower oil performance at Bethune¹ in 2000.

Hybrid	Test		Plant		Lodging	Oil
	Yield	Weight	Height ²	Density		
	lb/ac	bu/ac	in	plants/a	%	%
Mycogen Cavalry	2351	25.3	58	13489	4	39.03
Pioneer brand 63M91	2136	27.3	60	12563	1	38.36
Kaystar 9501	1987	28.6	63	12815	9	33.84
Kaystar 9404	1983	26.2	60	13243	8	37.74
Garst IS 4049	1958	28.9	62	13178	9	38.77
DEKALB DK3900	1948	27.9	53	13113	9	38.58
Garst IS 6767	1929	26.8	60	13699	7	37.28
Interstate IS X74091	1865	25.1	56	12776	10	38.91
Mycogen 8488 NS	1855	28.2	61	12671	8	39.34
DEKALB DKF36-40 NS	1847	26.4	59	13422	4	37.33
Novartis NK brand 278	1769	22.8	56	15171	6	37.41
DEKALB DKF29-90	1763	29.5	56	13497	7	41.65
Novartis NK brand T46-R9	1753	28.8	58	14141	12	37.03
Interstate IS X74066	1730	27.6	57	12500	8	39.38
Triumph TRX9443	1714	26.9	60	11714	7	39.66
Triumph 652	1600	27.7	59	14303	16	37.17
Pioneer brand 63M80	1592	24.3	55	13730	3	40.14
Garst Hysun 450	1587	27.0	52	12893	17	38.81
Triumph 545A	1584	27.7	60	14282	13	41.57
Seeds 2000 Mustang	1544	29.2	58	14188	25	38.33
Triumph 562	1524	28.8	64	13137	9	39.54
Pioneer brand 63A70	1504	27.7	54	12270	15	41.11
DEKALB EX9918 NS	1492	25.0	57	14101	13	37.65
DEKALB EX9915 NS	1491	29.3	56	14063	7	38.05
DEKALB DK3872 NS	1456	24.2	58	12959	11	38.73
DEKALB DKF31-01 NS	1452	26.7	59	13097	6	37.36
Interstate IS K41978	1442	24.1	61	13056	12	41.17
DEKALB EX9910 NS	1420	25.3	56	15642	13	38.63
DEKALB EX9917 NS	1405	28.6	63	12563	11	38.46
Garst IS 4340	1373	30.6	51	13573	1	38.13
Seeds 2000 Maverick	1370	25.5	60	13141	24	37.31
Seeds 2000 Bronco	1126	29.2	51	12686	13	39.32
Pioneer brand 63A21	1034	26.0	40	11349	15	36.79
Average	1654	27.1	57	13304	10	38.6
CV%	18.2					
LSD _(0.30)	256.8					

¹Trial conducted on Dale Hansen farm; seeded 5/30 and harvested 10/11. Trial irrigated two times.

²Plant height to top of crook at maturity.

Table 5. Dryland sunflower oil performance at Cheyenne Wells¹ in 2000.

Hybrid	Test		Plant	Density	Lodging	Oil
	Yield	Weight	Height ²			
	lb/ac	bu/ac	in	plants/a	%	%
Seeds 2000 Bronco	1213	28.9	41	10864	7	39.20
Interstate IS X74091	1202	28.5	51	9671	13	38.73
Garst IS 4049	1191	28.8	56	12385	2	40.14
Pioneer brand 63M91	1141	28.6	48	10549	5	40.18
Triumph 562	1123	29.4	55	9962	6	39.63
Novartis NK brand 278	1113	27.1	48	12173	17	37.46
Garst Hysun 450	1105	28.6	41	11989	6	41.64
Interstate IS X74066	1089	27.7	50	9559	5	39.22
Novartis NK brand T46-R9	1088	28.3	51	10953	16	38.25
Kaystar 9404	1065	29.9	48	10606	6	37.58
Garst IS 4340	1047	28.7	46	10965	7	40.93
Croplan CL385 NS	1041	28.8	39	11995	10	39.37
Mycogen Cavalry	1036	30.5	52	10857	7	42.83
Interstate IS K41978	1036	27.0	54	11268	13	37.82
Pioneer brand 63M80	1035	28.3	51	11845	3	40.04
Seeds 2000 Mustang	975	29.0	54	12456	10	37.80
Pioneer brand 63A70	964	28.1	47	10662	12	41.28
Garst IS 6767	927	30.4	46	11017	9	39.64
DEKALB DK3900	923	29.2	46	10894	24	39.83
Kaystar 9501	902	27.6	52	11789	13	38.27
Seeds 2000 Maverick	891	28.5	47	10395	13	37.21
DEKALB DKF36-40 NS	852	29.2	45	10730	5	37.68
DEKALB DKF29-90	844	28.9	45	10323	14	41.32
Mycogen 8372	823	29.8	42	11758	14	41.50
Pioneer brand 63A21	822	27.4	35	10755	3	36.95
Triumph 540	801	28.2	46	11681	13	39.68
DEKALB DKF31-01 NS	726	28.6	53	11218	8	38.18
Average	999	28.7	48	11086	10	39.35
CV%	17.7					
LSD _(0.30)	151.2					

¹Trial conducted on Dennis Campbell farm; seeded 6/6 and harvested 10/17.

²Plant height to top of crook at maturity.

Table 6. 2-yr average dryland sunflower oil performance at Cheyenne Wells, 1999-00.

Hybrid	Test	
	Yield	Weight
	lb/ac	bu/ac
Novartis NK brand 278	1358	26.2
Kaystar 9501	1099	27.4
Pioneer brand 63M91	1115	27.4
DEKALB DK3900	1098	28.2
Novartis NK brand T46-R9	1238	27.4
Pioneer brand 63M80	1182	27.5
Mycogen 8372	1165	28.2
Triumph 562	1442	28.0
Interstate IS K41978	1180	26.1
Garst Hysun 450	1077	27.2
Garst IS 6767	1050	28.7
Garst IS 4049	1314	27.8
Triumph 540	1080	26.8
Pioneer brand 63A70	1045	26.6
Average	1174	27.4

Table 7. Dryland sunflower oil performance at Wray¹ in 2000.

Hybrid	Test		Plant		Lodging	Oil
	Yield	Weight	Height ²	Density		
	lb/ac	bu/ac	in	plants/a	%	%
Mycogen 8377 NS	1448	24.2	53	9983	2	39.64
DEKALB DK3900	1336	28.4	44	11359	5	38.66
Triumph 652	1322	29.2	52	11309	0	38.93
DEKALB DKF31-01 NS	1305	24.2	53	11417	0	36.53
Pioneer brand 63M80	1267	26.8	51	10896	2	39.22
Pioneer brand 63M91	1266	25.1	49	11676	1	39.59
Pioneer brand 63A70	1234	25.0	54	12318	3	38.75
Interstate IS X74066	1217	25.4	46	12274	1	38.40
Kaystar 9501	1163	27.7	51	12173	3	37.12
Garst IS 4340	1101	27.5	49	12975	4	39.71
Garst IS 6767	1067	27.1	51	11041	2	36.71
Mycogen 8468	1058	26.4	42	13224	17	38.32
Interstate IS X74091	1057	28.0	46	11920	7	38.42
DEKALB DKF29-90	1027	27.1	51	11600	1	38.63
Triumph 562	994	26.9	59	11191	3	38.92
Garst Hysun 450	978	25.0	38	11037	4	38.74
Kaystar 9404	973	21.1	53	14574	0	37.15
DEKALB DKF36-40 NS	959	28.5	55	13019	2	36.79
Pioneer brand 63A21	953	25.1	49	11862	8	37.09
Garst IS 4049	935	25.5	53	13524	2	38.54
Average	1133	26.2	50	11969	3	38.29
CV%	19.1					
LSD _(0.30)	186.1					

¹Trial conducted on Jim Roberts farm; seeded 6/21 and harvested 10/20.²Plant height to top of crook at maturity.**Table 8. 2-yr average dryland sunflower oil performance at Wray, 1999-00.**

Hybrid	Test	
	Yield	Weight
	lb/ac	bu/ac
Triumph 652	1930	29.6
DEKALB DK3900	1692	30.0
Pioneer brand 63M91	1525	28.2
Triumph 562	1534	28.9
Garst IS 6767	1468	28.8
Garst Hysun 450	1439	26.4
Garst IS 4049	1592	27.4
Pioneer brand 63M80	1471	28.5
Kaystar 9404	1427	24.8
Pioneer brand 63A70	1399	27.8
Average	1548	28.1

Table 9. Dryland sunflower confection performance at Akron¹ in 2000.

Hybrid	Yield	Test Weight	Plant Height ²	Density	Lodging
	lb/ac	bu/ac	in	plants/a	%
Sigco Sun EXP3993	1842	14.9	48	8943	3
Pioneer brand 63C40	1568	19.2	48	10499	2
Triumph 765C	1492	18.8	41	12211	2
Triumph 766CRT	1473	17.2	41	8969	4
Seeds 2000 X3247	1471	19.0	42	10235	0
Seeds 2000 X3988	1396	18.1	42	10142	1
Red River RRC 2582	1364	19.9	39	10696	0
Sigco Sun EXP3228	1276	19.3	42	9254	2
Agway Exp. 001	1259	16.6	43	9809	2
Sigco Sun SS-62	1181	19.3	48	11103	1
Red River RRC 2213	1176	18.3	47	11189	1
Red River RRC 2413	1126	18.0	42	11136	1
Average	1385	18.2	44	10349	2
CV%	18.6				
LSD _(0.30)	223.7				

¹Trial conducted on Jason Shook farm; seeded 6/24 and harvested 10/18.

²Plant height to top of crook at maturity.

Table 10. 2-yr average dryland sunflower confection performance at Akron, 1999-00.

Hybrid	Yield	Test Weight
	lb/ac	bu/ac
Red River RRC 2582	1716	19.8
Red River RRC 2413	1688	19.0
Sigco Sun SS-62	1662	19.8
Triumph 766CRT	1521	18.3
Red River RRC 2213	1500	19.1
Triumph 765C	1456	19.2
Average	1590	19.2

Table 11. Dryland sunflower confection at Akron in 2000, percent by seed size screen size.

Hybrid	Above 22/64	22/64 To 20/64	19/64 To 18/64	17/64 To 16/64	Below 16/64
Agway Exp. 001	32.3	27.8	22.0	11.6	6.3
Pioneer brand 63C40	16.0	33.2	29.0	13.6	8.2
Red River RRC 2582	18.6	26.3	24.6	16.6	13.9
Red River RRC 2413	20.2	22.3	25.9	20.0	11.5
Red River RRC 2213	14.7	25.0	25.6	21.1	13.2
Seeds 2000 X3247	20.6	29.8	27.2	14.7	8.0
Seeds 2000 X3988	15.2	28.8	30.1	17.1	8.7
Sigco Sun EXP3228	19.0	24.9	25.9	17.7	12.4
Sigco Sun EXP3993	14.8	20.9	29.2	21.1	13.3
Sigco Sun SS-62	7.5	17.3	26.1	28.7	20.4
Triumph 765C	20.6	29.1	24.2	14.6	11.3
Triumph 766CRT	10.4	28.2	30.3	21.1	9.6

Table 12. Irrigated sunflower confection performance at Bethune¹ in 2000.

Hybrid	Yield	Test Weight	Plant Height ²	Density	Lodging
	lb/ac	bu/ac	in	plants/a	%
Sigco Sun EXP3994	2302	20.0	68	10300	4
Sigco Sun EXP3993	2229	18.4	62	10344	6
Triumph TRX0453CRT	2029	18.9	64	9569	7
Interstate IS 8048	1996	20.9	62	10666	14
Triumph 766CRT	1926	18.4	59	8523	19
Red River RRC 2213	1910	19.8	56	15088	15
Seeds 2000 X3988	1902	20.8	62	9740	7
Red River RRC 2582	1822	19.7	61	9492	9
Triumph TRX0451CRT	1813	20.3	63	13719	9
Triumph 765C	1809	18.5	59	12985	13
Pioneer brand 63C40	1781	20.4	58	11572	9
Sigco Sun EXP3228	1755	21.9	60	14962	7
Agway Exp. 001	1720	20.6	63	13352	5
Sigco Sun SS-62	1657	18.4	53	10547	5
Seeds 2000 X3247	1561	21.7	58	11966	13
Red River RRC 2413	1335	19.8	51	12406	8
Average	1847	19.9	60	11577	9
CV%	14.5				
LSD _(0.30)	230.3				

¹Trial conducted on Dale Hansen farm; seeded 5/30 and harvested 10/11. Trial irrigated two times.

²Plant height to top of crook at maturity.

Table 13. Irrigated sunflower confection at Bethune in 2000, percent by seed size screen size.

Hybrid	Above 22/64	22/64 To 20/64	19/64 To 18/64	17/64 To 16/64	Below 16/64
Agway Exp. 001	24.8	29.1	24.9	12.4	8.5
Interstate IS 8048	26.1	28.8	21.3	13.8	9.5
Pioneer brand 63C40	13.8	39.6	27.1	12.0	7.5
Red River RRC 2213	16.1	29.3	23.8	13.8	16.6
Red River RRC 2413	20.8	32.0	23.5	9.9	6.1
Red River RRC 2582	25.4	34.0	21.4	7.6	5.1
Seeds 2000 X3247	21.3	28.3	21.3	16.1	12.8
Seeds 2000 X3988	17.0	37.4	26.2	11.4	7.7
Sigco Sun EXP3228	14.4	24.2	28.5	20.3	12.6
Sigco Sun EXP3993	15.7	21.0	28.5	24.4	10.3
Sigco Sun EXP3994	23.5	22.0	16.3	23.2	10.1
Sigco Sun SS-62	13.4	31.5	22.7	22.8	9.6
Triumph 765C	25.9	30.8	12.3	19.1	6.1
Triumph 766CRT	31.5	19.7	10.7	19.8	12.5
Triumph TRX0451CRT	10.2	29.7	32.0	11.1	6.7
Triumph TRX0453CRT	32.4	31.0	21.1	9.3	6.0

Table 14. Dryland sunflower confection performance at Cheyenne Wells¹ in 2000.

Hybrid	Yield	Test Weight	Plant Height ²	Density	Lodging
	lb/ac	bu/ac	in	plants/a	%
Sigco Sun EXP3993	1519	19.8	53	7006	6
Triumph 766CRT	1330	16.6	45	10025	5
Triumph 765C	1285	21.8	52	8419	3
Red River RRC 2213	1234	19.3	51	8901	3
Sigco Sun EXP3228	1193	17.3	44	9204	2
Red River RRC 2582	1153	18.3	48	8642	5
Sigco Sun SS-62	1110	18.9	53	9743	5
Pioneer brand 63C40	1031	19.7	44	7198	8
Red River RRC 2413	950	18.1	48	9654	5
Average	1201	18.9	49	8755	5
CV%	21.2				
LSD _(0.30)	223.1				

¹Trial conducted on Dennis Campbell farm; seeded 6/6 and harvested 10/17.

²Plant height to top of crook at maturity.

Table 15. 2-yr average dryland sunflower confection performance at Cheyenne Wells, 1999-00.

Hybrid	Yield	Test Weight
	lb/ac	bu/ac
Triumph 765C	1395	21.2
Triumph 766CRT	1315	18.5
Average	1355	19.8

Table 16. Dryland sunflower confection at Cheyenne Wells in 2000, percent by seed size screen size.

Hybrid	Above 22/64	22/64	19/64	17/64	Below 16/64
		To 20/64	To 18/64	To 16/64	
Pioneer brand 63C40	28.4	24.1	24.4	13.9	9.2
Red River RRC 2582	21.8	22.1	26.8	18.9	10.2
Red River RRC 2213	19.6	36.0	25.7	12.4	6.1
Red River RRC 2413	12.6	27.9	28.1	18.8	12.7
Sigco Sun EXP3228	17.4	25.6	26.2	16.7	14.0
Sigco Sun EXP3993	18.3	28.5	22.1	20.4	10.4
Sigco Sun SS-62	17.5	23.2	26.7	18.6	13.8
Triumph 765C	23.5	31.0	25.4	13.2	7.0
Triumph 766CRT	20.6	26.7	31.0	16.4	5.2

Table 17. Dryland sunflower confection performance at Wray¹ in 2000.

Hybrid	Yield	Test Weight	Plant Height ²	Density	Lodging
	lb/ac	bu/ac	in	plants/a	%
Triumph 766CRT	1254	22.2	51	9537	4
Interstate IS 8048	1175	22.4	52	9404	2
Triumph 765C	1061	21.3	50	10760	2
Pioneer brand 63C40	1010	22.2	56	9851	3
Red River RRC 2213	1001	21.6	55	11902	1
Red River RRC 2413	835	22.4	46	10822	1
Red River RRC 2582	707	22.7	49	10811	1
Average	1006	22.1	51	10441	2
CV%	17.7				
LSD _(0.30)	158.0				

¹Trial conducted on Jim Roberts farm; seeded 6/21 and harvested 10/20.

²Plant height to top of crook at maturity.

Table 18. 2-yr average dryland sunflower confection performance at Wray, 1999-00.

Hybrid	Yield	Test Weight
	lb/ac	bu/ac
Triumph 766CRT	1559	22.4
Triumph 765C	1544	22.5
Interstate IS 8048	1378	23.5
Average	1494	22.8

Table 19. Dryland sunflower confection at Wray in 2000, percent by seed size screen size.

Hybrid	Above 22/64	22/64	19/64	17/64	Below 16/64
		To 20/64	To 18/64	To 16/64	
Interstate IS 8048	7.1	23.3	30.3	24.6	14.7
Pioneer brand 63C40	5.4	19.5	33.0	27.4	14.8
Red River RRC 2582	2.7	13.9	28.6	28.0	26.7
Red River RRC 2213	6.2	12.3	28.7	35.3	19.2
Red River RRC 2413	5.2	14.7	28.8	30.7	20.7
Triumph 765C	10.7	18.3	29.8	28.1	13.0
Triumph 766CRT	2.1	10.3	24.6	38.4	24.1

Seed Company Entrants in the 2000 Colorado Sunflower Performance Trials

BRAND/HYBRID	ENTRANT	ADDRESS	TELEPHONE
Agway	Agway, Inc.	220 Clement Avenue, Grandin, ND 58038	(701) 484-5313
Croplan	Croplan Genetics	PO Box 1291, Minot, ND 58702	(701) 852-3556
DEKALB	Monsanto	3100 Sycamore Road, Dekalb, IL 60115	(815) 758-9323
Interstate/Garst	Interstate Seed	PO Box 338, West Fargo, ND 58078	(701) 282-3373
Kaystar	Kaystar Seed	PO Box 947, Huron, SD 57350	(605) 352-8791
Mycogen	Mycogen Seeds	1340 Corporate Center Curve, Eagan, MN 55121-1233	(615) 405-5973
Northrup King	Novartis Seeds	One North Main, Ste. 517, Hutchinson, KS 67501-5228	(316) 664-9830
Pioneer	Pioneer Hi-Bred Int'l., Inc.	210 Gateway Mall, Ste. 300, Lincoln, NE 68505-2449	(402) 467-5458
Red River	Red River Commodities, Inc.	1320 East College Drive, Colby, KS 67701	(785) 462-3911
SEEDS 2000	SEEDS 2000	PO Box 200, Breckenridge, MN 56520	(218) 643-2410
SIGCO	SIGCO Sun Products, Inc.	PO Box 331, Breckenridge, MN 56520	(218) 643-8467
Triumph	Triumph Seed Co., Inc.	PO Box 1050, Ralls, TX 79357	(800) 530-4789

Entry Forms for 2001 Trials

Entry forms for 2001 trials may be obtained from the Department of Soil and Crop Sciences, Colorado State University, Cynthia Johnson, C-4 Plant Science Building, Fort Collins, CO 80523-1170; Telephone (970) 491-1914; Fax (970) 491-2758; e-mail cjohnson@agsci.colostate.edu or web site <http://www.colostate.edu/Depts/SoilCrop/extension/CropVar/index.html>.

Additional copies of this report may be ordered from the Department of Soil and Crop Sciences, Colorado State University, Cynthia Johnson, C-4 Plant Science Building, Fort Collins, CO 80523-1170; Telephone (970) 491-1914; Fax (970) 491-2758; or e-mail cjohnson@agsci.colostate.edu.

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