

**PROPOSED SAFFLOWER CULTIVAR FOR CONSIDERATION AT THE 2002 VARIETY
RELEASE AND RECOMMENDATION MEETING**

*Submitted by
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- I. Consider for exclusive safflower variety release by the Montana Agricultural Experiment Station: 98B8459
- II. Propose naming 98B8459 as 'Montola 2004'
- III. Consider for addition to the Montana Dryland and Irrigated Safflower Recommended List as a specialty high oleic safflower variety for the safflower oil and birdseed markets.

Safflower

‘98B8459’

‘98B8459’ is a high oleic safflower cultivar intended for use in the specialty oleic vegetable oil and birdseed markets. Its release for production in Montana and other northern Great Plains states will provide a specialty high oleic / low saturate safflower oil / birdseed variety with normal white hull similar to Montola 2000 but with less than 6.5 total saturated fatty acids (C12:0, C14:0, C16:0, C18:0, C20:0, C22:0, and C24:0) when grown in Montana.

The flower color of 98B8459 is yellow in the bud and bloom stage and orange in the wilt stage. 98B8459 plants are spiny with spines on the tip and along margins of the leaves and involucral bracts. 98B8459 is similar to Montola 2000 in seed yielding ability and flowering date, has higher test weight, lower seed oil content, and greater plant height.

Origin and Breeding History of 98B8459

98B8459 was derived from a single F₈ plant selection from a 1989 multi-cross involving Arizona 9322, Sidney Selection 18-14-6, S-208, Arizona 2698, 012-251-3-6, Sidney Selection 87-42-3, AC-1, Sidney Selection 87-14-B, N-10, and Arizona pigmentless X a Montola 2000 individual plant from a half-seed selection for high oleic fatty acid.

Arizona 9322 is an experimental high oil early ripening line obtained from the Arizona Agricultural Experiment Station. Sidney Selection 87-14-6, Sidney Selection 87-42-3, and Sidney Selection 87-14-B are selections made in 1965 for *Alternaria* leaf spot (caused by *Alternaria carthami*) resistance from a 1964 bulk composite of 555 safflower introductions from the 1960 USDA-ARS safflower collection. S-208 was developed by Seedtec International, Woodland, CA, and is a normal-white hull seed cultivar. Arizona 2698 is an experimental line with the brown stripe gene backcrossed into Gila obtained from the Arizona Agricultural Experiment Station. 012-251-3-6 is a selection produced from a backcross of striped hull into VFR-1 made by C.A. Thomas, USDA-ARS, Beltsville, Maryland, in 1973, having resistance to *Fusarium*, *Phytophthora*, and some strains of *Verticillium* wilt. AC-1 is a high seed oil content cultivar with a purple-striped hull developed in Phoenix, AZ, by the Anderson Clayton Company. N-10 is a normal white hull cultivar derived from a single plant selection from accession 852 in 1946 and released in 1955 by the Nebraska Agricultural Experiment Station. Arizona pigmentless is an experimental line obtained from Dr. Dave Rubis, Arizona Agricultural Experiment Station in 1980 with the pigmentless gene (pp), which prevents the formation of the pigmented melanin layer in the pericarp of safflower seed. Montola 2000 is a normal hull high oleic safflower oil cultivar having over 80% oleic acid and was developed and released by the Montana Agricultural Experiment Station in 1991.

Recurrent selection for high oleic / low saturate fatty acid composition was practiced in the breeding of 98B8459. Individual plant selections for oil quality were made during the F₂, F₃, F₄, F₅, F₆, F₇, and F₈ generations. Gas chromatography determinations were made each generation to select for oil with less than 6.0% total saturated fatty acids (C12:0, C14:0, C16:0, C18:0, C20:0, C22:0, and C24:0). 98B8459 was developed to provide a non-GMO high oleic safflower oil with a total saturated fatty acid content of less than 6.5% and lower in total saturated fatty acid than other vegetable oils.

98B8459 Safflower Descriptors

Leaf Shape	- Lanceolate
Leaf Margin	- Entire
Leaf Spines	- Intermediate Spineless
Leaf Hairiness	- Non-Hairy
Branch Angle	- Appressed 15° to 20°
Branch Location	- Predominantly the Upper Third of the Plant
Spine Length on Outer Involucral Bract (OIB)	- 2.8 mm
Spine Location on OIB	- Tip and Few Basal
Number of Spines on OIB	- Intermediate
OIB Attitude	- Close
Diameter of Primary Head	- 28 mm (average)

1997 Dryland Safflower

Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A
Montola 2000	25.0	34.4	90.0	35.0	34.6	306	8867
Montola 2001	25.7	36.4	78.3	34.3	35.5	281	798
Montola 2003	29.7	38.5	96.7	39.5	40.0	660	1651
98B8459	25.0	37.1	92.7	39.2	35.9	482	1341
LSD (0.05)	1.87	2.00	6.69	1.54	1.12	82.00	194.56
CV (S/mean)	2.78	5.03	2.66	1.46	1.09	6.56	6.46

1998 Dryland Safflower

Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A
Montola 2000	24.7	61.7	94.3	37.7	38.2	556	1454
Montola 2001	25.7	63.0	86.7	40.7	38.9	476	1223
Montola 2003	22.7	73.1	94.3	40.8	38.2	551	1443
98B8459	25.3	68.8	93.3	41.0	38.6	675	1748
LSD (0.05)	1.02	2.37	10.20	0.72	0.86	102.92	253.89
CV (S/mean)	1.58	2.99	4.15	0.62	0.79	7.08	6.83

1999 Dryland Safflower #1

Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A
Montola 2000	25.0	68.7	85.0	41.5	38.9	812	2087
Montola 2001	26.3	72.3	81.7	41.0	38.4	649	1691
Montola 2003	26.7	75.7	91.7	43.0	36.5	662	1813
98B8459	26.3	74.0	94.3	42.0	37.4	692	1851
LSD (0.05)	1.65	6.32	7.61	0.71	0.73	100.60	280.50
CV (S/mean)	2.29	3.07	3.18	0.60	0.69	5.15	5.44

1999 Dryland Safflower #2

Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A
Montola 2000	25.3	73.7	91.7	41.2	38.3	736	1920
Montola 2001	26.3	77.0	88.3	41.2	38.1	710	1863
Montola 2003	26.3	73.0	94.3	43.0	35.7	678	1898
98B8459	26.3	78.7	85.0	42.0	37.6	805	2140
LSD (0.05)	1.45	6.00	6.06	0.55	1.00	99.61	258.40
CV (S/mean)	2.00	2.83	2.53	0.46	0.94	4.69	4.60

2000 Dryland Safflower
Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A
Montola 2000	20.0	48.7	85.0	40.0	38.4	761	1981
Montola 2001	21.7	58.9	76.7	39.5	37.3	590	1585
Montola 2003	22.0	54.0	93.3	40.5	37.6	739	1969
98B8459	22.3	54.4	86.7	41.3	37.5	669	1783
LSD (0.05)	1.38	2.77	5.76	1.00	0.59	76.80	205.8
CV (S/mean)	0.57	4.67	2.50	0.88	0.56	4.03	4.03

2001 Dryland Safflower
Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A	Disease Rating
Montola 2000	24.7	65.3	81.7	34.3	37.1	330	884	6.0
Montola 2001	26.0	67.3	71.7	35.3	40.2	244	602	5.0
Montola 2003	27.0	67.7	85.0	36.3	36.5	298	816	4.7
98B8459	23.3	70.7	86.7	32.5	34.2	265	776	7.3
LSD (0.05)	1.53	9.97	14.57	1.34	1.35	80.82	200.6	1.29
CV (S/mean)	0.70	4.85	6.06	1.33	1.30	11.98	10.95	9.05

1997 – 2001 Average Dryland Safflower
Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A
Montola 2000	24.1	58.7	87.9	38.3	37.6	584	1535
Montola 2001	25.3	62.5	80.6	38.7	38.1	492	1294
Montola 2003	25.7	63.6	92.6	40.5	37.4	598	1598
98B8459	24.8	63.9	89.8	39.7	37.0	598	1606

Relative Oil Percent (dry wt. basis) of safflower varieties when grown under dryland conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana.

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	34.6	38.2	38.9	38.3	38.4	37.1	37.6
Montola 2001	35.5	38.9	38.4	38.1	37.3	40.2	38.1
Montola 2003	40.0	38.2	36.5	35.7	37.6	36.5	37.4
98B8459	35.9	38.6	37.4	37.6	37.5	34.2	37.0
LSD (0.05)	1.12	0.86	0.73	1.00	0.59	1.35	
CV (S/mean)	1.09	0.79	0.69	0.94	0.56	1.30	

Relative Oil Yield (lbs/A) of safflower varieties when grown under dryland conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	306	556	812	736	761	330	584
Montola 2001	281	476	649	710	590	244	492
Montola 2003	660	551	662	678	739	298	598
98B8459	482	675	692	805	668	265	598
LSD (0.05)	82.00	102.92	100.60	99.61	76.80	80.82	
CV (S/mean)	6.56	7.08	5.15	4.69	4.03	11.98	

Relative Yield (lbs/A) of safflower varieties when grown under dryland conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	8867	1454	2087	1920	1981	884	1535
Montola 2001	798	1223	1691	1863	1585	602	1294
Montola 2003	1651	1443	1813	1898	1969	816	1598
98B8459	1341	1748	1851	2140	1783	776	1606
LSD (0.05)	194.56	253.89	280.50	258.40	205.8	200.6	
CV (S/mean)	6.46	6.83	5.44	4.60	4.03	10.95	

Relative Bloom Date (days from June 1) of safflower varieties when grown under dryland conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana.

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	25.0	24.7	25.0	25.3	20.0	24.7	24.1
Montola 2001	25.7	25.7	26.3	26.3	21.7	26.0	25.3
Montola 2003	29.7	22.7	26.7	26.3	22.0	27.0	25.7
98B8459	25.0	25.3	26.3	26.3	22.3	23.3	24.8
LSD (0.05)	1.87	1.02	1.65	1.45	1.38	1.53	
CV (S/mean)	2.78	1.58	2.29	2.00	0.57	0.70	

Relative Plant Height (cm) of safflower varieties when grown under dryland conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	34.4	61.7	68.7	73.7	48.7	65.3	58.7
Montola 2001	36.4	63.0	72.3	77.0	58.9	67.3	62.5
Montola 2003	38.5	73.1	75.7	73.0	54.0	67.7	63.6
98B8459	37.1	68.8	74.0	78.7	54.4	70.7	63.9
LSD (0.05)	2.00	2.37	6.32	6.00	2.77	9.97	
CV (S/mean)	5.03	2.99	3.07	2.83	4.67	4.85	

Relative Stand (percent) of safflower varieties when grown under dryland conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	90.0	94.3	85.0	91.7	85.0	81.7	88.0
Montola 2001	78.3	86.7	81.7	88.3	76.7	71.7	80.6
Montola 2003	96.7	94.3	91.7	94.3	93.3	85.0	92.6
98B8459	92.7	93.3	94.3	85.0	86.7	86.7	89.8
LSD (0.05)	6.69	10.20	7.61	6.06	5.76	14.57	
CV (S/mean)	2.66	4.15	3.18	2.53	2.50	6.06	

Relative Test Weight (lbs/bu) of safflower varieties when grown under dryland conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana.

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	35.0	37.7	41.5	41.2	40.0	34.3	38.3
Montola 2001	34.3	40.7	41.0	41.2	39.5	35.3	38.7
Montola 2003	39.5	40.8	43.0	43.0	40.5	36.3	40.5
98B8459	39.2	41.0	42.0	42.0	41.3	32.5	39.7
LSD (0.05)	1.54	0.72	0.71	0.55	1.00	1.34	
CV (S/mean)	1.46	0.62	0.60	0.46	0.88	1.33	

1998 Dryland Safflower
Williston, North Dakota

Variety	Bloom Date	Height cm	Test Wt Lbs/A	Oil Content Percent	Yield Lbs/A
Montola 2000	24.7	36.0	37.7	37.8	983
Montola 2001	25.7	43.7	39.9	38.4	1119
Montola 2003	-	-	-	-	-
98B8459	24.0	44.0	40.9	37.7	1104
LSD (0.05)	1.2	4.9	0.7	0.8	159.2
CV (S/mean)	1.4	7.3	0.9	1.1	8.4

1999 Dryland Safflower #1
Williston, North Dakota

Variety	Bloom Date	Height cm	Test Wt Lbs/A	Oil Content Percent	Yield Lbs/A
Montola 2000	24.7	48.7	41.6	37.6	2041
Montola 2001	26.7	52.7	39.6	36.1	1697
Montola 2003	26.3	49.7	42.6	35.2	1980
98B8459	25.7	50.0	41.9	35.9	2192
LSD (0.05)	1.1	NS	0.6	0.6	208.1
CV (S/mean)	1.2	9.4	0.7	0.8	6.9

1999 Dryland Safflower #2
Williston, North Dakota

Variety	Bloom Date	Height cm	Test Wt Lbs/A	Oil Content Percent	Yield Lbs/A
Montola 2000	24.7	46.7	40.8	37.6	2042
Montola 2001	26.3	51.3	39.9	36.2	1643
Montola 2003	25.3	50.0	42.8	35.3	1871
98B8459	26.0	51.7	40.8	37.0	1895
LSD (0.05)	1.2	5.3	0.8	0.6	176.9
CV (S/mean)	1.3	6.5	1.0	0.8	6.1

2000 Dryland Safflower
Williston, North Dakota

Variety	Bloom Date	Height cm	Test Wt Lbs/A	Oil Content Percent	Yield Lbs/A
Montola 2000	20.7	36.3	38.4	37.1	1533
Montola 2001	21.7	45.7	36.6	37.0	1236
Montola 2003	22.3	47.0	39.4	37.6	1457
98B8459	22.0	41.7	39.2	35.8	1348
LSD (0.05)	1.0	7.1	1.0	1.3	170.9
CV (S/mean)	0.7	9.9	1.2	1.8	7.5

2001 Dryland Safflower
Williston, North Dakota

Variety	Bloom Date	Height cm	Test Wt Lbs/A	Oil Content Percent	Yield Lbs/A
Montola 2000	21.7	49.3	38.8	36.1	1286
Montola 2001	23.0	56.0	36.2	37.4	1062
Montola 2003	22.3	59.0	39.9	35.4	1476
98B8459	19.0	53.7	37.4	32.9	1205
LSD (0.05)	1.5	9.5	0.9	0.9	169.9
CV (S/mean)	0.9	10.0	1.4	1.6	7.9

1998 – 2001 Average Dryland Safflower
Williston, North Dakota

Variety	Bloom Date	Height cm	Test Wt Lbs/A	Oil Content Percent	Yield Lbs/A
Montola 2000	23.3	43.4	39.5	37.2	1577
Montola 2001	24.7	49.9	38.4	37.0	1351
Montola 2003	24.1	51.4	41.2	35.9	1696
98B8459	23.3	48.2	40.0	35.9	1549

Relative Bloom Date (days from June 1) of safflower varieties when grown under dryland conditions at the NDSU Williston Research Extension Center, Williston, North Dakota.

Variety	1998	1999 #1	1999 #2	2000	2001	4 yr Avg
Montola 2000	24.7	24.7	24.7	20.7	21.7	23.3
Montola 2001	25.7	26.7	26.3	21.7	23.0	24.7
Montola 2003	-	26.3	25.3	22.3	22.3	24.1
98B8459	24.0	25.7	26.0	22.0	19.0	23.3
LSD (0.05)	1.2	1.1	1.2	1.0	1.5	
CV (S/mean)	1.4	1.2	1.3	0.7	0.9	

Relative Plant Height (cm) of safflower varieties when grown under dryland conditions at the NDSU Williston Research Extension Center, Williston, North Dakota.

Variety	1998	1999 #1	1999 #2	2000	2001	4 yr Avg
Montola 2000	36.0	48.7	46.7	36.3	49.3	43.4
Montola 2001	43.7	52.7	51.3	45.7	56.0	49.9
Montola 2003	-	49.7	50.0	47.0	59.0	51.4
98B8459	44.0	50.0	51.7	41.7	53.7	48.2
LSD (0.05)	4.9	NS	5.3	7.1	9.5	
CV (S/mean)	7.3	9.4	6.5	9.9	10.0	

Relative Test Weight (lbs/bu) of safflower varieties when grown under dryland conditions at the NDSU Williston Research Extension Center, Williston, North Dakota.

Variety	1998	1999 #1	1999 #2	2000	2001	4 yr Avg
Montola 2000	37.7	41.6	40.8	38.4	38.8	39.5
Montola 2001	39.9	39.6	39.9	36.6	36.2	38.4
Montola 2003	-	42.6	42.8	39.4	39.9	41.2
98B8459	40.9	41.9	40.8	39.2	37.4	40.0
LSD (0.05)	0.7	0.6	0.8	1.0	0.9	
CV (S/mean)	0.9	0.7	1.0	1.2	1.4	

Relative Oil Content (lbs/A) of safflower varieties when grown under dryland conditions at the NDSU Williston Research Extension Center, Williston, North Dakota

Variety	1998	1999 #1	1999 #2	2000	2001	4 yr Avg
Montola 2000	37.8	37.6	37.6	37.1	36.1	37.2
Montola 2001	38.4	36.1	36.2	37.0	37.4	37.0
Montola 2003	-	35.2	35.3	37.6	35.4	35.9
98B8459	37.7	35.9	37.0	35.8	32.9	35.9
LSD (0.05)	0.8	0.6	0.6	1.3	0.9	
CV (S/mean)	1.1	0.8	0.8	1.8	1.6	

Relative Yield (lbs/A) of safflower varieties when grown under dryland conditions at the NDSU Williston Research Extension Center, Williston, North Dakota

Variety	1998	1999 #1	1999 #2	2000	2001	4 yr Avg
Montola 2000	983	2041	2042	1533	1286	1577
Montola 2001	1119	1697	1643	1236	1062	1351
Montola 2003	-	1980	1871	1457	1476	1696
98B8459	1104	2192	1895	1348	1205	1549
LSD (0.05)	159.2	208.1	176.9	170.9	169.9	
CV (S/mean)	8.4	6.9	6.1	7.5	7.9	

1997 Valley Site Safflower

Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A	Disease Rating
Montola 2000	17.3	47.1	91.7	36.3	36.7	771	2103	3.5
Montola 2001	18.0	57.0	81.7	35.5	37.1	805	2169	2.3
Montola 2003	20.7	65.3	94.7	36.7	39.6	854	2152	3.2
98B8459	18.7	57.9	98.3	39.8	38.3	1335	3486	2.5
LSD (0.05)	1.71	2.18	6.30	1.02	1.49	116.74	291.61	1.05
CV (S/mean)	3.11	3.34	2.37	0.96	130	5.50	4.97	9.77

1998 Valley Site Safflower

Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A
Montola 2000	27.0	64.0	91.7	30.5	31.3	350	1115
Montola 2001	27.0	72.0	94.3	28.3	31.3	449	1437
Montola 2003	28.3	79.3	97.0	33.0	32.0	507	1582
98B8459	27.3	74.6	96.0	31.2	29.8	484	1624
LSD (0.05)	1.15	2.71	5.27	1.45	1.23	84.18	231.11
CV (S/mean)	1.50	3.58	2.06	1.62	1.36	6.64	5.84

1999 Valley Site Safflower #1

Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A	Disease Rating
Montola 2000	24.3	76.7	86.7	30.7	32.2	369	1145	6.0
Montola 2001	26.0	80.7	85.0	30.7	35.0	564	1614	4.0
Montola 2003	26.0	82.7	91.7	33.3	32.6	570	1746	4.0
98B8459	26.0	79.3	93.3	33.3	33.5	525	1571	4.3
LSD (0.05)	0.88	7.96	7.40	1.54	1.71	102.60	297.80	1.32
CV (S/mean)	1.27	3.55	3.05	1.71	1.82	7.07	6.82	2.51

1999 Valley Site Safflower #2

Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A	Disease Rating
Montola 2000	24.3	77.0	91.7	31.0	32.1	455	1414	6.3
Montola 2001	26.0	83.7	88.3	29.7	33.2	529	1590	3.7
Montola 2003	26.0	82.7	90.0	33.3	31.4	590	1873	3.7
98B8459	26.0	85.3	86.7	32.3	32.3	593	1833	4.0
LSD (0.05)	0.76	5.52	6.00	1.19	1.39	97.09	267.50	1.04
CV (S/mean)	1.08	2.44	2.51	1.32	1.50	6.42	5.82	2.08

2000 Valley Site Safflower
Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A
Montola 2000	20.0	65.0	93.3	32.5	32.2	534	1657
Montola 2001	20.7	71.3	83.3	31.5	33.4	510	1521
Montola 2003	21.3	71.7	97.0	34.3	31.7	594	1867
98B8459	21.7	69.0	91.7	32.8	30.8	496	1611
LSD (0.05)	3.96	6.90	10.27	1.52	1.34	122.9	357.4
CV (S/mean)	0.69	3.62	4.36	1.64	1.49	8.53	7.96

2001 Valley Site Safflower
Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A	Disease Rating
Montola 2000	26.3	69.7	90.0	32.3	35.4	283	804	7.0
Montola 2001	27.3	75.7	80.0	30.7	36.0	299	832	6.0
Montola 2003	28.3	80.3	93.3	33.0	33.5	374	1112	5.0
98B8459	25.3	75.7	85.0	31.5	32.5	350	1076	7.0
LSD (0.05)	1.16	9.45	7.17	1.11	1.51	91.94	250.6	1.69
CV (S/mean)	0.56	4.29	2.90	1.19	1.56	11.02	10.33	9.98

1997 – 2001 Average Valley Site Safflower
Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A
Montola 2000	23.2	66.6	90.9	32.2	33.3	460	1373
Montola 2001	24.2	73.4	85.4	31.1	34.3	526	1527
Montola 2003	25.1	77.0	94.0	33.9	33.5	581	1722
98B8459	24.2	73.6	91.8	33.5	32.9	630	1867

Relative Bloom Date (days from June 1) of safflower varieties when grown under valley conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana.

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	17.3	27.0	24.3	24.3	20.0	26.3	23.2
Montola 2001	18.0	27.0	26.0	26.0	20.7	27.3	24.2
Montola 2003	20.7	28.3	26.0	26.0	21.3	28.3	25.1
98B8459	18.7	27.3	26.0	26.0	21.7	25.3	24.2
LSD (0.05)	1.71	1.15	0.88	0.76	3.96	1.16	
CV (S/mean)	3.11	1.50	1.27	1.08	0.70	0.56	

Relative Plant Height (cm) of safflower varieties when grown under valley conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	47.1	64.0	76.7	77.0	65.0	69.7	66.6
Montola 2001	57.0	72.0	80.7	83.7	71.3	75.7	73.4
Montola 2003	65.3	79.3	82.7	82.7	71.7	80.3	77.0
98B8459	57.9	74.6	79.3	85.3	69.0	75.7	73.6
LSD (0.05)	2.18	2.71	7.96	5.52	6.90	9.45	
CV (S/mean)	3.34	3.58	3.55	2.44	3.62	4.29	

Relative Stand (percent) of safflower varieties when grown under valley conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	91.7	91.7	86.7	91.7	93.3	90.0	90.9
Montola 2001	81.7	94.3	85.0	88.3	83.3	80.0	85.4
Montola 2003	94.7	97.0	91.7	90.0	97.0	93.3	94.0
98B8459	98.3	96.0	93.3	86.7	91.7	85.0	91.8
LSD (0.05)	6.30	5.27	7.40	6.00	10.27	7.17	
CV (S/mean)	2.37	2.06	3.05	2.51	4.36	2.90	

Relative Test Weight (lbs/bu) of safflower varieties when grown under valley conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana.

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	36.3	30.5	30.7	31.0	32.5	32.3	32.2
Montola 2001	35.5	28.3	30.7	29.7	31.5	30.7	31.1
Montola 2003	36.7	33.0	33.3	33.3	34.3	33.0	33.9
98B8459	39.8	31.2	33.3	32.3	32.8	31.5	33.5
LSD (0.05)	1.36	1.45	1.54	1.19	1.52	1.11	
CV (S/mean)	1.34	1.62	1.71	1.32	1.64	1.19	

Relative Oil Percent (dry wt. basis) of safflower varieties when grown under valley conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana.

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	36.7	31.3	32.2	32.1	32.2	35.4	33.3
Montola 2001	37.1	31.3	35.0	33.2	33.4	36.0	34.3
Montola 2003	39.6	32.0	32.6	31.4	31.7	33.5	33.5
98B8459	38.3	29.8	33.5	32.3	30.8	32.5	32.9
LSD (0.05)	1.49	1.23	1.71	1.39	1.34	1.51	
CV (S/mean)	1.30	1.36	1.82	1.50	1.49	1.56	

Relative Oil Yield (lbs/A) of safflower varieties when grown under valley conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	771	350	369	455	534	283	460
Montola 2001	805	449	564	529	510	299	526
Montola 2003	854	507	570	590	594	374	581
98B8459	1335	484	525	593	496	350	630
LSD (0.05)	116.74	84.18	102.60	97.09	122.9	91.94	
CV (S/mean)	5.50	6.64	7.07	6.42	8.53	11.02	

Relative Yield (lbs/A) of safflower varieties when grown under valley conditions at the MSU Eastern Agricultural Research Center, Sidney, Montana

Variety	1997	1998	1999 #1	1999 #2	2000	2001	5 yr Avg
Montola 2000	2103	1115	1145	1414	1657	804	1373
Montola 2001	2169	1437	1614	1590	1521	832	1527
Montola 2003	2152	1582	1746	1873	1867	1112	1722
98B8459	3486	1624	1571	1833	1611	1076	1867
LSD (0.05)	291.61	231.11	297.80	267.50	357.4	250.6	
CV (S/mean)	4.97	5.84	6.82	5.82	7.96	10.33	

2001 Dryland Safflower

Southern Agricultural Research Center – Huntley, Montana

Variety	Bloom Date*	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A
Montola 2000	187.0	41.4	41.0	39.9	37.5	305	812
Montola 2001	188.0	46.2	28.4	35.9	30.9	159	514
Montola 2003	190.3	45.0	43.7	41.0	37.7	281	746
98B8459	187.3	46.5	30.1	39.1	34.6	336	970
LSD (0.05)	12.4	5.1	14.1	1.1	1.1	-	150.6
CV (S/mean)	0.53	6.39	21.84	1.75	1.81	-	12.17

* Days from January 1

2001 Continuous Crop Dryland Safflower

Sidney, Montana

Variety	Bloom Date	Height cm	Stand Percent	Test Wt Lbs/A	Oil Content Percent	Oil Yield Lbs/A	Yield Lbs/A	Disease Rating
Montola 2000	76.0	45.3	81.7	36.9	34.7	275	790	5.5
Montola 2001	77.0	49.0	70.0	36.5	36.4	176	482	4.5
Montola 2003	77.7	51.3	85.0	38.2	33.8	248	733	4.0
98B8459	72.7	47.0	85.0	35.3	31.7	246	776	7.0
LSD (0.05)	1.27	6.20	6.55	1.81	0.80	53.28	146.0	1.90
CV (S/mean)	0.59	4.19	2.85	1.71	0.84	9.00	8.39	12.77

Planted May 10, 2001 – Harvested September 5, 2001

2001 Dryland Safflower

Central Agricultural Research Center – Moccasin, Montana

Variety	Stand Percent	Flower Percent*	Height cm	Oil Content Percent	Yield Lbs/A
Montola 2000	78.3	3.7	71.3	43.4	789
Montola 2001	73.3	13.3	68.0	37.0	434
Montola 2003	50.0	25.0	66.3	39.3	587
98B8459	71.7	30.0	66.3	40.3	289
LSD (0.05)	-	-	-	2.9	-
CV (S/mean)	14.4	71.0	9.1	4.6	42.5

* Percent flower on July 28, 2001

Notes: Planted April 26, 2001, seedbed dry, emergence erratic, field effects visible

2001 Safflower Foliar Fungicide Trial
Sidney, Montana

Variety	Treatment	Flower Date ⁴⁾	Plant Height	Disease Rating	Test Wt ⁵⁾	Oil	Yield
			cm		lbs/bu	%	lbs/a
Montola 2003	Check	74.3	67.0	5.0	34.2	34.7	961
	Quadris ¹⁾	74.3	67.5	4.3	38.3	40.8	1366
	Ronalin ²⁾	74.3	69.3	5.0	34.8	35.7	1121
	Quadris + Ronalin ³⁾	74.0	69.8	4.3	38.0	40.2	1482
	LSD 5%	0.5	4.3	--	1.9	27.0	251
Montola 2000	Check	72.3	66.5	6.3	31.8	36.7	820
	Quadris	72.3	59.0	5.0	35.8	41.7	1125
	Ronalin	72.3	61.3	5.7	32.1	36.9	852
	Quadris + Ronalin	72.7	60.0	5.0	36.3	42.5	1204
	LSD 5%	0.5	5.5	--	.6	.8	115
Oleic 98B8459	Check	70.8	63.7	6.7	32.3	34.7	986
	Quadris	70.7	65.2	5.0	35.1	38.5	1268
	Ronalin	70.7	68.2	6.3	32.0	34.9	948
	Quadris + Ronalin	70.7	68.2	5.0	35.2	39.3	1244
	LSD 5%	0.3	5.1	--	.4	1.0	69
Centennial	Check	73.3	71.5	6.3	30.2	34.2	384
	Quadris	73.3	74.7	5.7	32.4	37.4	482
	Ronalin	73.3	72.2	6.3	31.0	35.0	453
	Quadris + Ronalin	73.3	74.8	5.0	32.9	38.5	588
	LSD 5%	0.0	5.6	--	.7	1.2	81
Mean Varieties	Check	72.7	66.2	6.1	32.1	35.1	788
	Quadris	72.7	66.6	5.0	35.4	39.6	1060
	Ronalin	72.7	67.8	5.8	32.5	35.6	843
	Quadris + Ronalin	72.7	68.2	4.8	35.6	40.1	1130

¹⁾ Quadris applied 0.15 lb/a. ²⁾ Ronalin applied 1.0 lb/a. ³⁾ Quadris + Ronalin applied 0.15 lb/a and 1.0 lb/a. ⁴⁾ from May 16 ⁵⁾ 9=most susceptible.
Plant: May 16 Fungicide applied: July 26 Harvest: September 21

**98B8459 (1999-2001)
Fatty Acid Composition**

2000

SAMPLE	C16:0	C18:0	C18:1	C18:2	C20:0	C22:0	C24:0	%
NAME								SAT.
Huntley	3.3	1.5	84.3	8.9	0.4	0.4	0.2	5.8

2001

SAMPLE	C16:0	C18:0	C18:1	C18:2	C20:0	C22:0	C24:0	%
NAME								SAT.
Froid	3.7	1.4	84.4	8.2	0.4	0.4	0.2	6.2
Sidney	3.6	1.5	83.1	9.5	0.4	0.4	0.2	6.0
Williston	3.7	1.2	84.8	7.9	0.4	0.4	0.2	5.9
Culbertson	3.5	1.5	82.9	9.6	0.4	0.4	0.2	5.9
AVG.	3.6	1.2	83.8	8.8	0.4	0.4	0.2	6.0

1999

SAMPLE	C16:0	C18:0	C18:1	C18:2	C20:0	C22:0	C24:0	%
NAME								SAT.
1	3.6	1.3	79.7	13.2	0.4	0.4	0.2	5.9
2	3.5	1.3	80.8	12.4	0.4	0.4	0.2	5.8
3	3.7	1.1	80.8	12.5	0.4	0.5	0.2	5.9
4	3.6	1.2	79.3	13.7	0.4	0.5	0.2	5.9
5	3.7	1.1	76.8	15.9	0.4	0.5	0.2	5.9
6	3.5	1.3	80.5	12.7	0.4	0.4	0.2	5.8
7	3.5	1.3	80.7	12.8	0.4	0.5		5.7
8	3.5	1.3	81.6	11.3	0.4	0.4	0.2	5.8
9	3.5	1.4	82.7	10.3	0.4	0.4	0.2	5.9
10	3.7	1.2	80.3	12.7	0.4	0.4	0.2	5.9
11	3.6	1.2	79.2	13.9	0.4	0.5		5.7
12	3.5	1.2	79.8	13.2	0.4	0.5	0.2	5.8
13	3.6	1.5	78.9	14.1	0.4	0.4	0.1	5.7
14	3.5	1.2	80.7	12.4	0.4	0.4	0.2	5.7
15	3.6	1.2	80.5	12.8	0.4	0.5	0.2	5.9
16	3.4	1.2	80.3	12.9	0.4	0.5		5.5
17	3.8	1.0	75.6	17.4	0.3	0.5		5.6
18	3.7	1.1	78.4	14.6	0.4	0.5	0.1	5.8
19	3.6	1.2	79.4	13.5	0.4	0.5	0.2	5.9
20	3.3	1.5	79.9	12.9	0.4	0.5	0.2	5.9
21	3.5	1.2	78.5	14.4	0.4	0.5	0.2	5.8
22	3.5	1.2	81.4	11.7	0.4	0.4	0.2	5.7
23	3.4	1.3	81.3	11.5	0.4	0.4	0.2	5.8
24	3.4	1.3	81.9	11.0	0.4	0.4	0.1	5.6
25	3.5	1.3	81.0	11.9	0.4	0.4	0.2	5.8
26	3.5	1.3	78.4	14.1	0.4	0.5	0.2	5.9
27	3.6	1.3	80.3	12.6	0.4	0.4	0.2	5.9
28	3.7	1.1	77.6	15.4	0.4	0.4	0.2	5.8
29	3.8	1.1	80.5	12.6	0.4	0.4	0.2	5.9
30	3.8	1.1	77.8	14.8	0.4	0.4	0.2	5.9
31	3.5	1.2	80.2	13.3	0.5	0.5		5.7
32	3.8	1.0	76.1	16.8	0.4	0.5	0.2	5.9
33	3.8	1.0	74.7	17.9	0.4	0.5	0.2	5.9
34	3.7	1.2	79.0	14.0	0.4	0.4	0.2	5.9
35	3.4	1.2	79.4	13.8	0.4	0.4	0.2	5.6
36	3.5	1.2	78.9	13.8	0.4	0.5	0.2	5.7
AVG.	3.5	1.2	79.5	13.5	0.4	0.5	0.2	5.8