PROJECT TITLE: Safflower Variety Performance Trial

PERSONNEL:

Project Leaders: Jerald R. Bergman - Sidney - Safflower Coordinator
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OBJECTIVES:

Safflower serves as an excellent crop component in many areas of northern Montana in flexible dryland rotations with small cereal grains; particularly in view of safflower's status in the Federal Farm Program. A significant portion of the north central cropping area has climatic conditions suitable for production of safflower. It is the objective of this study to evaluate existing commercial entries along with promising experimental lines being developed at Sidney to determine varietal appropriateness, and subsequent release and recommendation information specific to environmental conditions in northern areas.

SUMMARY:

A single trial was established on-station at Havre using standard plot techniques in a randomized complete block design. Entries were planted in 4-row plots, 20 feet in length on a 12-inch spacing utilizing a 'Rem' self propelled cone seeder equipped with 'Acra-plant' hoe openers. Plots were trimmed to 16 feet and harvested with a 'Hege 125C' plot combine. Other variables specific to the trial are listed in the data table.

At Havre, total annual precipitation was 17.96 inches or 152 percent of the average of years since 1916. May through September precipitation was 12.22 inches or, again 152 percent of the long-term average. However, extreme heat coupled with drying winds in latter July resulted in lower yields than would have been expected on the basis of the stand established.

RESULTS:

Yield, test weight and oil content data are summarized in Table 1. Test weights were very good and oil contents excellent. Eight-year yield and percent oil summaries on selected entries are presented in Table 2.

'Finch', Montana developed, currently yields very well among released cultivars on a 'Eight-year Comparable Average' basis at Havre. 'Finch', a white-hulled line, features higher test weight; and serves as a more disease-

resistant replacement for 'S-208' in the birdseed market.

'S-317', 'S-208' and 'S-541' continue to perform very well under dryland conditions in the Havre area as alternaria and/or pseudomoras disease organisms have generally not become factors limiting production.

FUTURE PLANS:

It is planned that these investigations be continued on an annual basis in on-going support of the Montana safflower breeding and variety development project.

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TABLE 1. DRYLAND FALLOW SAFFLOWER VARIETY NURSERY. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1989.

VARIETY OR SELECTION		YIELD LBS/A	TEST WT LBS/BU	OIL DRY BASIS %	OIL @ 8% MOISTURE %
12	FINCH	819.52	42.77	45.17	39.73
07	87B 1298	786.66	40.73	46.03	40.53
03	85B 1837	761.45	40.30	47.67	41.93
05	85B 4431	755.75	38.80	46.77	41.13
11	S-208	753.40	41.13	48.50	42.70
06	85B 4829	739.25	39.90	50.73	44.63
08	87B 1650	712.94	36.20	47.27	41.60
09	87B 4311	699.93	41.33	47.33	41.63
15	SAFFIRE	695.48	41.73	39.00	34.33
02	83B 1954	694.63	37.43	51.30	45.13
16	OKER	629.96	37.07	47.53	41.83
10	S-541	603.50	40.57	51.40	45.20
14	MT 3697	555.14	40.73	49.90	43.90
04	85B 3918	526.78	34.67	52.30	46.03
13	GIRARD	517.32	40.47	46.57	40.97
01	85B 3555	477.61	38.20	48.83	42.97

STATISTICAL SUMMARY	YIELD LBS/A	TEST WT LBS/BU	OIL DRY BASIS %	OIL @ 8% MOISTURE %
EXPERIMENTAL MEANS	670.58	39.50	47.89	42.14
C.V. 2: (S OF MEAN/MEAN)*100	6.26	.83	.84	.85
LSD (0.05)	121.23	.95	1.17	1.03

CLIMATIC and NURSERY MANAGEMENT DATA

Seeding Date: 05/17/89
Harvest Date: 09/26/89
Seeding Depth: 1.00 in.
Soil Series: Telstad-Joplin-Kevin
Previous Crop: Fallow
Soil Temp @ Sdg: 70F @ 2in., 62F @ 4in.
Root Penetration Depth: N/A in.
Depth to Moisture at Sdg: 0.25 in.
Probed Moist.Depth @ Sdg: 55.0 in. +
Herbicide: Trifluralin @ .75lbs/ac
Measured Soil Water on 04/14/89: 5.99 in. (sampling depth = 48 in.)
Precipitation 04/14/89 to Seeding: 3.02 in (2.50 in events > .1 in.)
Initial Stored Soil Water at Seeding: 9.01 in. (sampling depth = 48 in.)
Measured Soil Water at Harvest: 5.99 in. (sampling depth = 48 in.)
Growing Season Precipitation (Sdg.to 14 days prior to harvest maturity `HM'):
Total - all measurable events: 10.09 in.
Total - all events >.1 inches: 9.52 in.
Post Growing Season Precipitation (within 14 days of harvest maturity):
Total - all measurable events: 0.88 in.
Total - all events >.1 inches: 0.88 in.
Adj'd Residual Soil Water @ (HM-14d): 5.99 in. (sampling depth = 48 in.)
Initial Soil Analysis (NO3,P,K at 0-6 in.; NO3 at 6-24, 24-36 & 36-48 in.):
NO3(lbs/ac)= 174 , P(ppm olsen)= 20 , K(ppm)= 304 , pH= 7.9, O.M.(%) = 0.9
Fertilizer: 39#N,32#P2O5 via dual injection w/10-34-0 & 28-0-0 liquids Fall 88

TABLE 2. EIGHT-YEAR YIELD AND PERCENT OIL SUMMARY ON SELECTED ENTRIES FROM A FALLOW SAFFLOWER VARIETY PERFORMANCE NURSERY. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1982-1989.

VARIETY OR SELECTION	NO. OF YEARS TESTED 1/	YIELD (POUNDS PER ACRE) 1985	1986	1987	1988	1989	AVERAGE FOR YEARS TESTED	8-YR. COMPAR. AVERAGE YIELD 2/	PERCENT OF S-208 YIELD 3/	OIL (Percent by Weight) @ 8% MOISTURE 1985	1986	1987	1988	1989	AVERAGE FOR YEARS TESTED	8-YR. COMPAR. AVERAGE OIL % 2/	PERCENT OF S-208 OIL % 3/
S-317	3	572.7	1659.6	1940.8	-	-	1391.0	1404.7	113.1	42.2	46.4	46.4	-	-	45.0	43.9	105.9
OLEIC	3	390.6	1561.6	2029.5	-	-	1327.2	1340.3	107.9	43.4	48.2	45.7	-	-	45.8	44.7	107.8
82B1983	3	473.2	1290.3	2022.3	-	-	1261.9	1274.3	102.6	37.9	41.0	41.1	-	-	40.0	39.0	94.1
S-208	8	454.7	1365.3	1870.9	1135.9	753.4	1242.4	1242.4	100.0	40.5	43.5	43.6	44.3	42.7	41.5	41.5	100.0
FINCH	6	350.1	1622.4	1871.6	960.8	819.5	1029.8	1237.8	99.6	37.2	40.2	41.2	42.1	39.7	39.4	38.6	93.2
S-541	8	455.7	1343.7	1942.3	965.3	603.5	1236.7	1236.7	99.5	43.1	45.6	46.9	47.7	45.2	44.8	44.8	108.1
82B2364	3	467.7	1309.4	1753.4	-	-	1176.8	1188.4	95.7	41.9	44.8	43.7	-	-	43.5	42.4	102.4
REHBEIN	4	-	1677.3	-	-	-	1353.0	1174.6	94.5	-	37.1	-	-	-	35.4	36.3	87.6
81B3697	4	446.2	1148.9	1895.6	-	-	1005.0	1157.9	93.2	40.9	45.4	44.5	-	-	42.9	42.7	102.9
SAFFIRE	3	-	-	1869.0	840.2	695.5	1134.9	1124.9	90.5	-	-	36.5	36.2	34.3	35.7	34.0	81.9
HARTMAN	6	371.1	1336.9	1584.3	-	-	1174.9	1088.0	87.6	35.8	39.0	39.3	-	-	36.7	37.2	89.7
83B1954	4	-	1158.5	1736.0	521.9	694.6	1027.8	1014.3	81.6	-	44.2	44.3	44.3	45.1	44.5	42.4	102.2
GIRARD	6	338.1	1060.9	1773.8	549.8	517.3	773.2	929.3	74.8	38.0	42.2	43.2	44.3	41.0	41.2	40.4	97.4
4/ OKER	8	166.6	790.5	1557.3	115.0	630.0	718.5	718.5	57.8	41.0	43.7	43.5	44.1	41.8	41.6	41.6	100.3
MEAN (ENTRIES LISTED)		407.9	1332.7	1834.4	727.0	673.4	-	1152.3	-	40.2	43.2	43.1	43.3	41.4	-	40.7	-
5/ Grwg Ssn Ppt. (in.)		7.83	8.48	6.01	5.13	10.09	7.66										
6/ Sl PAW in. to SDGPlt		8.00	9.39	11.61	9.76	8.01	8.85										
Tot Plt Avl Water (in.)		15.83	17.87	17.62	14.89	18.10	16.56										
Soil NO3(lbs) to SDGPlt		-	198.0	94.0	122.0	174.0											
SD (Smplng Dpth inches)		-	48.0	48.0	48.0	48.0											
Fertilizer App. (# N)		40.0	43.0	43.0	39.0	39.0											
(# P2O5)		40.0	43.0	43.0	32.0	32.0											

Check variety is S-208.
1/ Only the five most recent years are shown, but the summary calculations include all the years noted.
2/ 8-yr. CA = (x/y) * z where x = average yield or oil content of the entry for years tested, y = average yield or oil content of S-208 for the same years, and z = 8-yr. average yield and oil content for the check variety S-208.
3/ Percent of S-208 yield or oil content for the same data years.
4/ 808 2793 in 1982, 808 2793-2 in 1983.
5/ Seeding to 14 days prior to harvest maturity.
6/ Depth of moist soil (ft.) * 2.00 in. PAW/ft except starting in 1986 where soil PAW values are actual gravimetric measurements.