

PROJECT TITLE: Safflower Variety Performance Evaluation

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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. A significant portion of the north central cropping area has climatic conditions suitable for production of standard oil safflower; and certain smaller, yet significant areas further possess specific climatic conditions required for production of specialty safflower lines of the high-oleic type. 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. The M.A.P.S. program is utilized to refine the definition of areas appropriate for the production of quality safflower.

RESULTS:

The 1992 safflower trials and foundation increase fields on-station at Havre were a total loss as a result of severe hail received on three occasions between early July and early August. As would be expected, safflower showed greater ability to withstand the effects of hail than did cereal grains, but due to the severity of the storms - damage to the crop was more substantial than that visually apparent immediately following each storm. The ultimate damage associated with each storm was very slow in expressing itself. In general, existing seed heads slowly died and were replaced with new ones after each damage event. The third and final production of new seed heads after the third storm still resulted in visually apparent yield potential far beyond that one would expect. However, the subsequent lateness coupled with abnormally early first frost resulted in very minimal seed fill.

Thus, the 1992 safflower stands were not harvested for seed, but were swathed and baled for livestock feed. Long-term (1982-1991) yield and percent oil summaries on selected entries are presented in Table 1.

'Finch', Montana developed, currently yields very well among released, standard cultivars on a 'Ten-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. However, the average oil content of S-208 is nearly 3 percent higher than that of Finch.

'S-317', 'S-208' and 'S-541' continue to perform very well under dryland conditions in the Havre area as alternaria and/or pseudomonas disease organisms have generally not become factors limiting production. 'Saffire' has yielded well, but its' oil content is 7 percent lower than S-208. Other named varieties among those yielding slightly less, but within 10 percent of the check are 'Rehbein' and 'Centennial.' Rehbein's oil is low while Centennial oil is 107 percent of the check, and thus equivalent to S-541.

At Havre, the high-oleic, exclusive release entry 'Montola 2000' has performed well in terms of oil quality, and yield has averaged 88 percent of the linoleic check cultivar; but Montola 2000 has not yet reached the three years of testing considered a minimum for formal inclusion in this report summary.

#### SUMMARY:

Single trials were established annually on-station at Havre using standard plot techniques in a randomized complete block design. Entries were planted in 4 or 6-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 trials are listed in the data table. Data is summarized for selected entries having been tested 3 years or more during the period 1982-1991. No data were available for 1992 due to severe hail injury.

#### 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.

TABLE 1. ELEVEN-YEAR YIELD AND PERCENT OIL SUMMARY ON SELECTED ENTRIES FROM A FALLOW SAFFLOWER VARIETY PERFORMANCE NURSERY. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1982-1992.

VARIETY OR SELECTION	NO. OF YEARS TESTED 1/	YIELD (POUNDS PER ACRE)					OIL (Percent by Weight) @ 8% MOISTURE										
		1988	1989	1990	1991 2/	1992 3/	AVERAGE FOR YEARS TESTED	11-YR. COMPAR. AVERAGE YIELD 4/	PERCENT OF S-208 YIELD 5/	1988	1989	1990	1991 2/	1992 3/	AVERAGE FOR YEARS TESTED	11-YR. COMPAR. AVERAGE OIL % 4/	PERCENT OF S-208 OIL % 5/
FINCH	8	960.8	819.5	931.9	2049.0	-	1144.9	1318.9	107.8	42.1	39.7	35.5	37.7	-	38.7	38.4	93.7
S-317	5	-	-	887.4	1264.8	-	1264.5	1292.5	105.7	-	-	39.0	41.4	-	43.1	43.2	105.4
8283555	4	1126.2	477.6	948.3	-	-	1176.2	1259.5	103.0	45.5	43.0	41.1	-	-	43.5	42.3	103.3
S-208	10	1135.9	753.4	808.6	1483.0	-	1223.1	1223.1	100.0	44.3	42.7	37.8	39.1	-	41.0	41.0	100.0
SAFFIRE	5	840.2	695.5	688.8	1732.5	-	1165.2	1177.4	96.3	36.2	34.3	31.0	33.0	-	34.2	33.7	82.4
S-541	10	965.3	603.5	838.5	1269.1	-	1164.0	1164.0	95.2	47.7	45.2	41.8	41.7	-	44.2	44.2	107.9
8781298	3	-	786.7	926.1	1172.3	-	961.7	1158.8	94.7	-	40.5	39.5	38.7	-	39.6	40.6	99.2
8581837	3	885.5	761.5	904.8	-	-	850.6	1156.8	94.6	43.8	41.9	35.8	-	-	40.5	39.9	97.4
ROBEIN	4	-	-	-	-	-	1353.0	1156.3	94.5	-	-	-	-	-	35.4	35.9	87.6
CENTENIAL	4	966.1	739.3	948.7	1239.8	-	973.5	1139.1	93.1	47.0	44.6	41.6	41.9	-	43.8	43.8	106.8
8281277	3	287.8	-	957.1	-	-	1018.7	1096.9	89.7	45.2	-	37.7	-	-	43.2	42.2	103.1
8781650	3	-	712.9	817.8	1191.2	-	907.3	1093.3	89.4	-	41.6	38.7	38.8	-	39.7	40.8	99.5
HARTMAN	6	-	-	-	-	-	1174.9	1071.1	87.6	-	-	-	-	-	36.7	36.7	89.7
8584431	4	801.1	755.8	774.2	1176.4	-	876.9	1026.1	83.9	43.2	41.1	34.5	37.3	-	39.0	39.0	95.2
8381954	5	521.9	694.6	814.4	-	-	985.1	1015.2	83.0	44.3	45.1	39.8	-	-	43.5	42.0	102.7
MT 3697	7	1043.7	555.1	-	725.7	-	906.3	1009.7	82.5	45.9	43.9	-	41.8	-	43.3	42.4	103.5
GIRARD	8	549.8	517.3	910.1	1156.0	-	838.2	965.5	78.9	44.3	41.0	38.6	39.7	-	40.6	40.3	98.3
6/ OKER	9	115.0	630.0	759.6	1549.9	-	755.0	782.7	64.0	44.1	41.8	37.5	39.5	-	41.1	41.0	100.2
8583918	3	209.7	526.8	741.6	-	-	492.7	670.0	54.8	47.7	46.0	43.0	-	-	45.6	44.9	109.6
MEAN (ENTRIES LISTED)		743.5	668.6	853.6	1334.1	-	-	1093.5	-	44.4	42.2	38.3	39.2	-	-	40.6	-
7/ Grwg Ssn Ppt. (in.)		5.13	10.09	4.92	10.27	10.19	7.88										
8/ SI PAN in. to SDBPt		9.76	8.01	7.50	10.02	7.59	8.72										
Tot PIt Avl Water (in.)		14.89	18.10	12.42	20.29	17.78	16.60										
Soil NO3(lbs) to SDBPt		122.0	174.0	232.0	204.0	252.0											
SD (Sampling Dpth inches)		48.0	48.0	48.0	48.0	48.0											
Fertilizer App. (# N)		39.0	39.0	45.0	70.0	70.0											
(# P2O5)		32.0	32.0	30.0	40.0	40.0											

Check variety is S-208.

1/ Only the five most recent years are shown, but the summary calculations include all the years noted.

2/ Stands were variable due to soil crusting following a 1.8" cloudburst 10 days after planting. Affected most were Finch, 858 3829, Oker, and Saffire.

3/ The 1992 nursery was destroyed by hail in July and frost in August.

4/ 11-yr. CA = (x/y) \* 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 = 11-yr. average yield and oil content for the check variety S-208.

5/ Percent of S-208 yield or oil content for the same data years.

6/ 808 2793 in 1982, 808 2793-2 in 1983.

7/ Seeding to 14 days prior to harvest maturity.

8/ Depth of moist soil (ft.) \* 2.00 in. PAN/ft except starting in 1986 where soil PAN values are actual gravimetric measurements.