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Utah Irrigated Safflower Variety Trial - 2005

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Safflower (*Carthamus tinctorius*), an oilseed or birdseed crop, is a member of the Asteraceae family and is a highly branched, herbaceous, thistle-like annual, usually with many long sharp spines on the leaves and flower head. It is mostly grown on arable dryland following wheat or barley because of its ability to extract water from the soil with its deep taproot. This rotation allows farm managers to mechanically and chemically control problematic weeds such as jointed goatgrass typical to some dryland wheat fields.

Safflower is also becoming popular on irrigated farmland when irrigation water is projected as being short for the growing season. Safflower is commonly grown for either the birdseed market or as edible oil and in recent years the number of safflower varieties available has increased dramatically. To identify varietal performance in Northern Utah and make some comparisons between lines, a variety trial for 12 safflower lines was completed in 2005 in Cache County. Plots were located at the Greenville Experimental Farm at Utah State University in North Logan, Utah.

The site was at 4,608 ft elevation and had a long-term average of 2,884 growing degree days (GDD, 50/86° F) per year. Varieties from breeding programs and seed marketers were seeded with a small-plot drill on May 20 at a rate of 25 lbs/ac. Spring of 2005 was an unusually wet spring which delayed the planting of many crops in Northern Utah. Plots were 6.5 feet wide (10 rows at 7-inch row spacing) by 30 feet long in four randomized complete blocks.

Plots were fertilized according to soil test results at 110 lbs N/acre and 15 lbs S/acre. No

potassium was applied as the soil test showed we had 118 lbs available. Sonalan® (*ethalfluralin*) herbicide was used as pre-emergence weed control. After the safflower was planted, rainfall was above average through the middle of June. The plots received two irrigations prior to flowering.

Plots were harvested with a research combine on October 17, 2005, and harvest weights were obtained with laboratory scales. Sample dry matter (DM) concentration was determined by drying a sample at 105° C for 24 hours in a forced-air drying oven. Bulk density (test weight) was determined by using a Seedboro filling hopper that meets the



USDA-FGIS (GIPSA) specifications for bulk density measurements. The percent oil content shown in Table 1 is the amount of oil relative to the total seed weight. The percent oil content is determined by measuring seed that has been cleaned and is at 0% moisture after drying at 105° C for 24 hours in a forced-air drying oven. We note that this results in higher oil content than is usually seen in the field-run safflower that is unclean, contains dockage, and is not at 0% moisture concentration. The color score is a visual rating from 0 to 10+ (0=whitest). When reviewing color score and oil content be aware that the varieties entered in this trial have different end use purposes from birdseed to edible oils to an energy source for livestock. Brief variety descriptions that indicate the intended end use of each variety can be found at the end of this publication.



Varieties are ranked in decreasing order of production in Table 1. There are significant differences between varieties in seed production, lbs/bu, gross income per acre, seed color, oil content and plant height. To find significant differences between two varieties for a trait listed in Table 1, take the two numbers and subtract the smallest from the largest. The difference between the two numbers must be greater than the LSD for there to be a high probability that the difference is truly due to variety effects, rather than to chance. For example, safflower yields of the top variety and the bottom variety are different at the 5% probability level, because they vary by more than the LSD of 305 lbs/ac.

Table 1. 2005 Safflower Variety Production at Logan, Utah (Cache Co.).

Planted May 20, 2005, harvested Oct. 17, 2005. Elevation 4,608 ft., 2,884 GDD^a, Soil Type: Millville Silt Loam. Applications: 110 lb N, 15 lb S and Sonalan herbicide at planting. Previous crop: fallow.

Variety	Seed Production lb DM/ac	Test Weight lb/bu	Color Score	Oil Content %	Plant Height inches	Gross Income/acre ^b
0158	2052	42.4	4.4	36.7	21.2	\$ 267
9262	1950	44.5	0.9	37.7	27.5	\$ 253
S-208	1943	42.4	1.0	39.0	26.9	\$ 253
4409	1934	44.9	0.6	39.3	28.5	\$ 251
5244	1885	45.2	2.4	38.3	28.3	\$ 245
Finch	1802	47.0	1.9	35.9	29.4	\$ 234
S-719	1801	43.3	3.5	40.6	26.7	\$ 234
2104	1771	42.7	1.3	36.9	25.6	\$ 230
S-541	1746	43.2	3.3	41.1	30.6	\$ 227
Hybrid 9022	1676	44.0	4.0	32.7	29.4	\$ 218
Montola 2003	1536	43.1	1.0	37.6	25.9	\$ 200
Nutrasaff	1440	39.0	10+	45.3	29.3	\$ 187
Mean	1795	43.5	2.0	38.4	27.4	\$ 233
Significance of F test	0.01	<0.01	<0.01	<0.01	<0.01	
LSD (0.05)	305	0.6	1.0	0.6	1.9	
LSD (0.30)	158	0.3	0.5	0.3	1.0	
CV (%)	11.8	0.9	23.8	1.0	4.8	

^a Growing Degree Days per year.

^b Based on birdseed market price of \$13.00 per 100 lb for 2005.

Brief Variety Descriptions

When selecting seed sources, be aware that safflower is approximately 10% cross pollinated and seed for replanting should be produced only with the appropriate seed production practices. In order to insure varietal purity, Certified Seed should be used.

S-208 is the standard safflower variety grown for birdseed use and has good linoleic acid content. It is a midseason line with a white seed hull. S-208 has been available for over 20 years and performs well under local growing conditions.

S-541 is grown for the birdseed market and has high oil content. It matures midseason and has a good white hull seed color. It has performed extremely well in the Northern U. S. for many years both as an oil line and as a birdseed line.

S-719 is a new line with potential for both oil and birdseed markets. S-719 blooms and matures midseason and performs well in a variety of growing conditions.

0158 is an experimental line for the birdseed market with low oil content and a thick hull. 0158 is extremely early, blooming one week and maturing two weeks before most midseason lines.

4409 is an early-maturing experimental line with potential as both an oil and a birdseed variety. It has an attractive white seed coat, making it especially viable for the birdseed market and it blooms 4-6 days before most midseason lines and matures 7-12 days earlier. In early testing 4409 has yielded very well, but further testing will be required before determining if it can be released as a variety.

2104 is also an early-maturing experimental line with potential for both oil and birdseed markets. It also blooms 4-6 days, and matures 7-12 days before midseason lines. 2104 will need more yield testing before determining its value as a safflower variety.

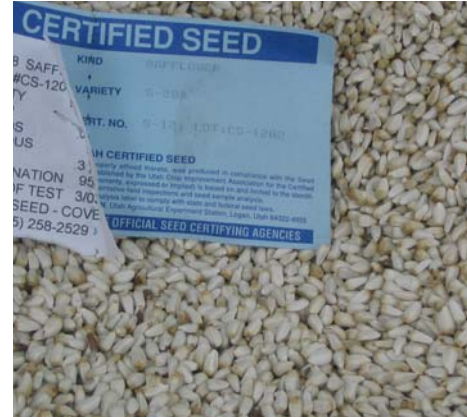
9262 is another early-maturing experimental line that has potential for oil and birdseed markets. 9262 blooms a few days earlier than midseason lines and matures one week earlier. 9262 is in late stages of testing; its value as a commercial line will be made once yield tests are completed.

5244 is a midseason line with potential for the birdseed market. 5244 is a vigorous line with many heads per plant. It is in the very early stages of yield testing.

Montola 2003 is a safflower variety with white normal hull developed for the oleic safflower oil and birdseed markets. Montola 2003 has moderate resistance to the *Pseudomonas* bacterial blight and *Alternaria* leaf spot diseases. The variety was developed and released by Montana State University in 1999.

Nutrasaff is a high protein, high oil, low fiber specialty safflower for high-end nutrition supplement to enrich birdfeed, livestock, dairy, fish and pet food diets. It was released by Montana State University in 2005. Nutrasaff has improved disease resistance to *Alternaria* leaf spot when compared to other safflower varieties.

Finch is a safflower with very high test weight, white normal seeds developed for the birdseed market. Finch has improved disease resistance to *Alternaria* leaf spot and *Pseudomonas* bacterial blight.



Hybrid 9022 is a hybrid safflower variety with high yield potential. Recommended seeding rate is 15 lbs per acre to allow multiple branching and greater density of flower heads to maximize full yield potential.

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