

Dual Purpose Safflower Seed

produces drying oil for the paint industry
and seed meal for livestock and poultry feed

P. F. Knowles

Safflower seed oil is a useful type of drying oil and its principal use has been in the paint and varnish industry where it competes directly with linseed oil. Its nonyellowing properties would make it appear to be superior to linseed oil for some interior finishes.

The seed meal remaining after the extraction of the oil is useful as feed for livestock and poultry. The protein content of safflower seed meal varies between 20% and 55%, depending upon the amount of hull removed prior to processing.

About 15,000 acres of safflower were grown in the Northwest and Western Plains regions of the United States in 1948 for the plant's oil bearing seeds.

Investigations with the crop in California have not been extensive but from time to time it has been grown under test by the University and by interested individuals.

All the data contained in this progress report were obtained during the growing season of 1947-48, and must not be considered as giving the average performance of this crop.

Safflower, *Carthamus tinctorius* L., belongs to the thistle family. It is an annual, being planted about the same time as small grains in California, and maturing about one month later than wheat. During the cool winter weather it remains in a low-growing rosette stage, but with

warmer spring temperatures the plant produces a central stem which grows rapidly. The mature plant has several branches, the number varying with different varieties.

Like many other thistles, the so-called flower actually consists of several small individual flowers grouped to form a head. Each small flower, which may vary in color from yellow to orange, gives rise to a white or cream-colored seed. From the farmer's standpoint the most disagreeable feature of commercial varieties of safflower is the presence of spines on the leaves and head. Fortunately there are strains which are spineless, and plant breeders are attempting to combine the spineless character with the good agronomic and quality characteristics of some spined types.

Experiment at Davis

A California spineless strain of safflower was compared with Punjab flax at Davis. One seeding was made December 10, 1947, and has been termed as an early test. A second late test was sown April 1, 1948. Both tests were grown in the same location on preirrigated land. The late test was irrigated once. The results of the test are given below:

Crop	Date ripe	Height in inches	Yield lb./A
Early Test			
Flax	6-24	20	1,716
Safflower	7-23	53	3,463
Late Test			
Flax	7-6	16	1,218
Safflower	8-9	42	1,945

Because both flax and safflower grow slowly during the cool winter weather, weeds became a problem in the early sown

test. Yields of this test would have been seriously reduced had the weeds not been removed. In the late sown test many more weeds were removed from the flax than from the safflower; growth of the safflower was vigorous enough to stifle many weeds.

Yields of safflower were distinctly higher than those of flax, the difference being greater in the early test. Both crops were higher yielding in the earlier seeding. Safflower matures about one month later than Punjab flax, and grows more than twice as high.

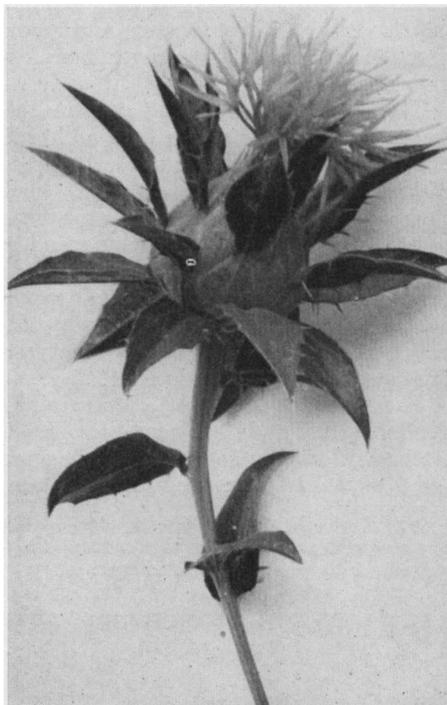
For these experiments the University of California was supplied with seed of several safflower materials by the University of Nebraska. These materials included the variety Indian, at present the common commercial variety, and five superior strains produced in Nebraska. These were sown January 30, 1948, at Davis in comparison with the California spineless strain referred to above. The test was located on preirrigated land and was irrigated once. The results of the test are given:

Strain or variety	Date ripe	Height in inches	Yield lb./A	% oil
Indian	8-7	43	3,157	28.9
N-852	8-8	45	3,022	32.7
N-472-2	8-9	54	3,304	30.8
N-514-2-10*	8-10	50	2,977	29.7
461-1*	8-8	49	2,878	27.7
N-804-21*	8-11	58	2,729	29.8
Calif. strain*	8-1	46	1,952	23.2

* Spineless—the others are spined

Yields of safflower were high in this test, the Nebraska materials being dis-

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Left, Safflower head, shown in actual size. The variety illustrated is spined, although others are smooth and free from any spines.

Center, Seeds of safflower plant, actual size.

Right, Mature safflower plants, showing variability among varieties in the height and the amount of branching. Tallest plant here is 5'.



SAFFLOWER

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tinctly superior to the California strain. It is interesting to note that the spined materials have a higher oil content than those without spines. Weeds were never a problem in this test; the safflower grew ahead of them.

Cultural Practices

From the results presented in this report, safflower would appear to be a promising crop. However, more data must be obtained to properly evaluate it. Experience with the crop for one year in California and results obtained in other states would suggest that the crop should be grown under the following described conditions and cultural practices:

1. Climatic conditions should be the same as those required for barley. Dry weather after blossoming favors high seed-setting. The crop will stand frosts down to 10°F.

2. Soils should be fertile. Compared to other crops safflower makes poorer growth on soils lacking in fertility or moisture supplies.

3. Seed of this crop will be difficult to obtain. Processors of oil bearing seeds may have seed supplies. The only seed available on a commercial scale will be spined.

4. Before seeding the seed should be treated with a fungicide at the same rate used for barley.

5. The seeding date should be the same as for small grains. Weeds may be a problem with early seedings because of the slow growth of safflower in cool weather. Seedings after about the middle of January will not mature until August.

6. Rows may be spaced from six to 36 inches apart with little difference in yield. Wider spacings probably will require cultivation to control weeds.

7. For row-spacings up to 18 inches a seeding rate of 15 to 35 pounds per acre should be satisfactory. Above a row-spacing of 18 inches the rate should be eight to 20 pounds per acre.

8. Seed should be sown one to 1½ inches deep. Ordinary grain drills may be used.

9. Combine harvesting is preferred, and is essential with spined varieties. Because the crop will not shatter or lodge seriously, harvesting may be delayed 10 days to two weeks. If the straw is too brittle it will break up into small segments that are difficult to separate from the seed. Less cracking of the seed will occur if the cylinder speed is reduced to about 500 revolutions per minute. At this speed the clearance between the cylinder and concaves should be about one quarter inch.

A market for safflower has not been firmly established. Because of this, any-

one interested in growing the crop should make previous arrangements for disposal of the seed. The entire crop in the past has been bought by processors of oil-bearing seeds. During the past two years safflower has sold for approximately three quarters of the price of flax seed on a poundage basis.

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The above progress report is based upon Research Project No. 1041.

EGGS

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For the present time all eggs that have ever been dirtied can be considered only as potential sour eggs and should be kept out of storage, and no washed eggs should be mixed with clean eggs during the storage season. All washed eggs should be cased and labeled separately, or better, washing should be discontinued entirely during the months that eggs are being stored.

F. W. Lorenz is Assistant Professor of Poultry Husbandry and Assistant Poultry Husbandman in the Experiment Station, Davis.

Phoebe Betty Starr is Senior Laboratory Technician, Davis.

The above progress report is based upon Research Project No. 1356.

TURKEYS

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needed be included in the breeding mash. In some cases in which free choice supplements have been depended upon to supply the necessary vitamins, poor results have been observed. By including the necessary factors in the mash the variable intake of free choice supplements will not cause some hens in the flock to receive deficient amounts of the nutrients.

F. H. Kratzer is Assistant Professor of Poultry Husbandry and Assistant Poultry Husbandman in the Experiment Station, Davis.

The above progress report is based upon Research Project Nos. 677H4, and 677H3.



NEW PUBLICATIONS

A copy of the publications listed here may be obtained without charge from the local office of the Farm Advisor or by addressing a request to Publications Office, College of Agriculture, University of California, Berkeley 4, California.

WHAT ABOUT FISH? By Hilda Faust and Vera Greaves Mtrak, Circular 144, November, 1948.

How to buy, to prepare and to cook fish are explained simply and adequately in this circular. Recipes for broiled, fried and baked fish are included, as well as recipes for sauces to be served with fish.

HOME VEGETABLE GARDENING. By John H. MacGillivray. Cir. 26, November, 1948.

It is not difficult to grow vegetables. It is all a matter of following a few simple rules which apply whether in a small city lot or a ranch garden. Differences in the gardening techniques will be mainly in the amount and kind of vegetables chosen.

The answer to many specific garden problems will be found in this revised circular. It explains what and when to plant, how to plant and what harvest may be expected if the rules given are followed.

Every step in home gardening is explained in detail—from location and arrangement of vegetables in the garden plot, through soil preparation, irrigation and temperature requirements, to harvesting and storage.

It contains pictorial illustrations of seeding and transplanting techniques, drawings concerning irrigation problems, comparative pictures of soils and photographs illustrating the appearance of healthy plants.

This circular includes a complete chart of planting dates for sections of California and a list of vegetables with special tips on how to grow them successfully.

DONATIONS FOR AGRICULTURAL RESEARCH

Gifts to the University of California for research by the College of Agriculture accepted in December, 1948

BERKELEY

DuPont de Nemours Company 25 pounds Parzate

DAVIS

California Committee on the Relation of Electricity to Agriculture \$3,625.00

Dow Chemical Company \$2,640.00

Messrs. Hart, Cole and Goss \$2,531.73

For research fellowship in Animal Husbandry

Julius Hyman & Company \$1,250.00

For investigations of a new insecticide

LOS ANGELES

Old Orchard Turf Nurseries One bag stolons—C52 Old Orchard creeping bent grass, and one bag stolons—C19 Congressional creeping bent grass