

UCSU 20/6.22/0.111
C.2

SERVICE

RECEIVED

Safflower production in Colorado

IN ACTION

APR 12 1990

COLORADO STATE LIBRARY
State Publications Library

R. L. Croissant, D. L. Johnson
and J.F. Shanahan¹

COLORADO STATE UNIVERSITY COOPERATIVE EXTENSION

no. 111

COLORADO STATE PUBLICATIONS LIBRARY
UCSU20/6.22/0.111 c.2 local
Croissant, Robert L/Safflower production



3 1799 00013 0062

Quick Facts

Safflower is well adapted to eastern Colorado's non-irrigated agricultural conditions and is best adapted to medium to clay soils that hold moisture well. When moisture is not limiting, safflower responds well to high soil fertility levels. Safflower production can be achieved by using standard equipment designed for the small grain or row crops system. Safflower is a deep rooted crop and is capable of utilizing moisture and nutrients to a depth of 6 feet or more.

Safflower is a deep rooted, long season annual that usually grows 1½ to 3 feet in height. It is in the thistle family and is adapted to both dryland or irrigated cropping systems. The plant does not tiller but does form numerous branches, each producing eight to 10 heads. Each head produces 20 to 100 seeds depending on variety, soil fertility and soil moisture. A safflower head starts to flower approximately four weeks after the bud first appears. This continues over a period of two to three weeks. Maturity occurs four weeks after the last buds are in flower. Safflower requires dry atmospheric conditions during the bloom period, a condition unfavorable for disease occurrences and favorable for good seed set. At maturity, the bracts surrounding the head are heavily spined providing protection from birds and other predators. Production practices and equipment requirements are similar to small grains with the exception of a recommended pre-emergent herbicide. The seed is used as an oilseed for vegetable oils, as a diesel substitute and as an olive oil substitute.

Crop Rotation

Safflower in a rotation can be beneficial if planted when winter wheat fields become infested with grass-type weeds. This interruption decreases weed pressure along with the possible disruption of small grain insects and disease cycles. Because

of its tap root, safflower is capable of drawing moisture and nutrients to depths of 6 to 8 feet.

A major concern of safflower is how it is best used in a crop rotation. While information in Colorado is limited, the following dryland rotations are suggested:

1. winter wheat—safflower—fallow,
2. winter wheat—safflower—barley or millet—fallow,
3. spring wheat—safflower—barley—fallow.

Cropping following safflower is limited by available moisture. Safflower removes moisture and residual fertilizers to a depth of 7 to 8 feet. When conditions are extremely dry, field residue levels after harvest may be low. Applications of 2, 4-D on fallow after safflower can be substituted for some tillage operations reducing the probability of soil erosion. Planting winter wheat immediately after safflower is not recommended. Safflower should never follow safflower, dry beans or sunflowers in a rotation as a disease preventative measure.

Variety Selection

Variety performance data on safflower is limited. Varieties are changing rapidly at the present time because of new improved releases by plant breeders. Be sure to check with your contractor to determine seed supply, adaptability of varieties to soil conditions, varietal characteristics and adaptability to irrigated or dryland culture. Varieties currently available include the following:

Varieties	Remarks
S-208	Poor disease resistance. High oil content, high yields, normal hull.
S-541	Very high in oil content. High yields.
Hartman	Good disease tolerance, average oil, average yields.
Rehbein	Good disease tolerance, average oil, average yields.
A-24	Colorado yields and oil content unknown, normal hull.
Saffire	Colorado yields and oil content unknown, normal hull.
S-317	Colorado yields and oil content unknown, oleic type.

¹R. L. Croissant, CSU Cooperative Extension specialist and associate professor; D. L. Johnson, associate professor and J. F. Shanahan, assistant professor; CSU department of agronomy (4/86)

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U. S. Department of Agriculture, Kenneth R. Bolen, Director of Cooperative Extension, Colorado State University. Cooperative Extension programs are available to all without discrimination.

To simplify technical terminology, trade names of products and equipment occasionally will be used. No endorsement of products named is intended nor is criticism implied of products not mentioned.

Weed Control/Fertility

Safflower is a poor weed competitor during the three to four weeks it remains as a rosette. Consequently, the most critical weed control must be during the first few weeks. Trifluralin (Treflan), profluralin (Tolban), EPTC (Eptan) Metolachlor (Dual) and barban (Carbyne) are all effective herbicides. Check with your extension agent or dealer for the correct herbicide for your situation. Treflan is commonly used to control volunteer wheat, foxtail, pigweed, Russian thistle, kochia, lambsquarters, purselane, cheatgrass, barnyard-grass and knotweed. Granular herbicide forms of these compounds are available for trashy soil surfaces. Special applicators may be needed for uniform distribution of granules. About 7 to 11 inches of rainfall between planting and fall freezing are needed to break down 0.75 and 1.0 lbs/A of Treflan and Tolban respectively. Wheat, oats, sorghum, millet and corn are susceptible to these herbicides. If safflower is planted in wide rows, shallow cultivation will kill many weeds between the rows. If weeds emerge before the safflower emerges, light harrowing may be beneficial, but damage to the emerging safflower can occur if soil is ridged and some plants are buried too deep. Care must be taken not to move too much soil and damage the seedlings.

Safflower has been shown to effectively use carryover nitrogen from prior cropping to depths of 7 feet. Maximum yields of safflowers can be obtained when 100 to 120 lbs N/A are available. Similarly, 40 to 60 lbs/A of phosphorus applied to low testing soils is recommended. A reliable soil test is recommended to help determine soil nutrient requirement.

Seeding/Pests

Safflower seed should be drilled (15 to 25 lbs/A) in 6 to 16-inch rows in late April to early May and usually requires 8 to 15 days to emerge. It also can be planted in 30-inch rows, cultivating for weed control and irrigated if desired. Safflower does not begin to germinate until soil temperatures exceed 40° F. As a seedling, it tolerates frost to 20° F. Early planting gives larger plants that are more tolerant to insect and disease damage. Seed 1 to 1½ inches deep and not more than 2 inches deep in a moist firm seedbed. Safflower seed is about the same size as barley seed and has a test weight of 42 pounds per bushel. Drill settings for safflower often correspond to settings for similar rates of barley.

Seedling insects (wireworm and seed corn maggot cutworm) are easily controlled by seed

treatment. Later, pests such as thrips, grasshoppers, lygus bugs and sunflower moth should be controlled only if they reach extreme levels, since bees will be strongly attracted to the crop in bloom. Severe insect attacks early in the flowering period may cause early head senescence (bronzeheds). Extreme losses would be 20 to 30 percent bronzeheds.

Bacterial blight (*pseudomonas syringe*) and alternaria leaf blight (*alternaria carthami*) could be serious diseases in years of above normal rainfall. Root rots have been noted on fields reseeded to safflower. At least two crop years should intervene between safflower on the same land.

Yields/Marketing

Colorado yields of safflower have ranged from 738 to 2453 lbs/A in dryland trials. Recent trials have averaged 1800 lbs/A following fallow. Following wheat, yields of 1200 lbs/A are expected providing adequate weed control is used.

Safflower is usually harvested with a grain header on a combine. Cylinder speeds should be 400 to 550 rpm for a 22-inch cylinder. Reel speed should be 25 percent faster than ground speed. Suggested concave clearance is ⅝ inch at the front and ½ inch on the back. Shaker speeds should be greater than for small grain to prevent trash buildup and clogging the machine. Air should be adjusted to remove most of the empty or unfilled seeds. Safflower seed must be below 8 percent moisture for safe storage.

Trials in Montana and North Dakota indicate safflower will out-yield most other alternative crops by 10 to 30 percent. Other crops used in the study were sunflower, mustard, soybean, crambe, flax and rapeseed.

Safflower is usually contracted for oilseed. Contract price should take into account storage payments, premiums, acreage limits and distance to delivery point.

Contracts are usually made on an acre basis, thus, the contractor will take all the production for a given year. The following marketing conditions are common but can vary from year to year or contractor to contractor.

Market Conditions

1. Seed bought on a clean basis—oil content 34 percent.
2. One percent premium paid for every 1 percent oil content over 34 percent.
3. One percent dock for every 1 percent oil content under 34 percent.
4. Two percent dock for each 1 percent seed moisture over 8 percent.