



PRODUCTION

Safflower Production

no. 0.111*by R.L. Croissant, D.L. Johnson and J.F. Shanahan ¹*

Quick Facts...

Safflower is well adapted to eastern Colorado's nonirrigated agricultural conditions and medium to clay soils that hold moisture well.

With adequate moisture, it responds well to high soil fertility levels.

Use standard equipment designed for the small grain or row crops system.

Safflower is a deep-rooted crop that can use moisture and nutrients to a depth of 6 feet or more.

Safflower is a deep-rooted, long season annual that usually grows 1 1/2 to 3 feet tall. A member of the thistle family, it is adapted to both dryland and irrigated cropping systems.

The plant does not tiller but does form many branches, each with 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 about four weeks after the bud first appears. This continues over 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 pro-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 and possibly disrupts small grain insect and disease cycles. Because of its tap root, safflower can draw moisture and nutrients from depths of 6 to 8 feet.

A major concern of safflower is how to best use it 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, or
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 chance of soil erosion.

Do not plant winter wheat immediately after safflower. To reduce disease, never plant safflower after safflower, dry beans or sunflowers.

Variety Selection

Variety performance data on safflower is limited. Varieties are changing rapidly at present because of new improved releases by plant breeders. Check

Table 1: Safflower varieties for Colorado.

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.

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 are listed in Table 1.

Weed Control and Fertility

During its three- to four-week rosette stage, safflower is a poor weed competitor. 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 local Colorado State University Cooperative Extension agent or chemical dealer for the correct herbicide for your situation.

Treflan is commonly used to control volunteer wheat, foxtail, pigweed, Russian thistle, kochia, lambsquarters, purslane, cheatgrass, barnyard-grass and knotweed. Granular herbicide forms 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 per acre 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. Damage to the emerging safflower can occur if soil is ridged and some plants are buried too deep. Take care 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 nitrogen per acre are available. Similarly, 40 to 60 lbs per acre of phosphorus applied to low testing soils is recommended. A reliable soil test is recommended to help determine soil nutrient requirement.

Seeding

Drill safflower seed (15 to 25 lbs per acre) in 6- to 16-inch rows in late April to early May. It usually requires eight 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 degrees F.

As a seedling, it tolerates frost to 20 degrees. Early planting gives larger plants that are more tolerant to insect and disease damage. Seed 1 to 1 1/2 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 lbs per bushel. Drill settings for safflower often correspond to settings for similar rates of barley.

Pests

Seedling insects (wireworm and seed corn maggot cutworm) are easily controlled by seed treatment. Later, control pests such as thrips, grasshoppers, lygus bugs and sunflower moths only if they reach extreme levels, since bees will be attracted to the crop in bloom. Severe insect attacks early in the flowering period may cause early head senescence (bronzeheads). Extreme losses would be 20 to 30 percent bronzeheads.

Bacterial blight (*Pseudomonas syringae*) 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 and Marketing

Colorado yields of safflower have ranged from 738 to 2,453 lbs per acre in dryland trials. Recent trials have averaged 1,800 lbs per acre following fallow. Following wheat, yields of 1,200 lbs per acre are expected, if adequate weed control is used.

Safflower usually is harvested with a grain header on a combine. Set cylinder speeds to 400 to 550 rpm for a 22-inch cylinder. Reel speed should be 25 percent faster than ground speed. Suggested concave clearance is 5/8 inch at the front and 1/2 inch on the back. Shaker speeds should be greater than for small grain to prevent trash buildup and clogging the machine. Adjust air 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 usually is 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:

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.

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