



## International safflower production – an overview

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### **Abstract**

Safflower is most certainly a crop with unexploited potential and world adaptability. It can be grown in most cropping regions in the world between the latitudes of 50 degrees and 23 degrees in both the northern and southern hemispheres. Safflower's ability to forage for sub soil moisture with its vigorous tap root, improved oil content and its versatility to produce Linoleic and Oleic oils makes it an obvious alternative to current crops grown in the more marginal cropping areas around the world. This paper describes safflower's role in various cropping systems around the world and compares the performance and management of the crop in those systems.

### **1) Safflower's role in international farming systems**

Safflower is grown in around 60 countries around the world. Although safflower is considered a minor crop with less than 1 million hectares planted, producing around 500,000mt each year, it plays an important role within the farming systems.

Because of its minor status, accurate production statistics are difficult if not impossible to acquire. Suffice to say that India produces approximately half the world's annual production of safflower followed by the USA of which California is the biggest producing State.

Important Safflower Producing Regions:





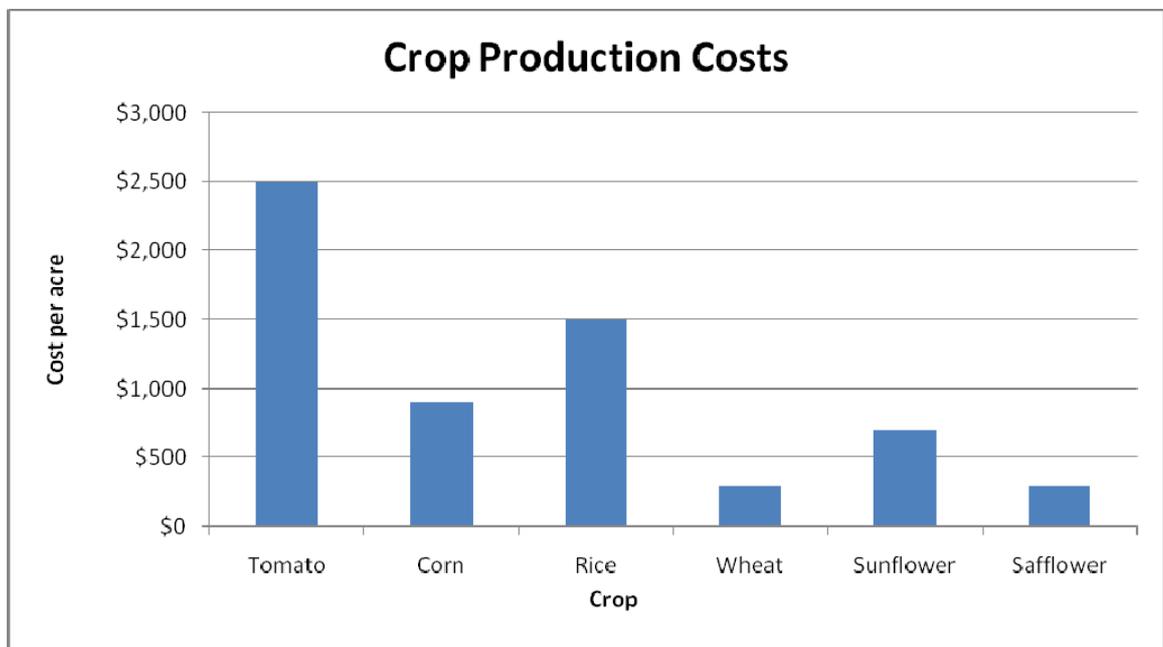
A.) India

1. Largest safflower producer in the world;
2. Consumes most of its own production;
3. Safflower is grown with other Rabi crops such as wheat and barley during the winter dry season.

B.) United States of America

i. California

- a. Second largest safflower producer in the world;
- b. Used as a rotational crop with rice, tomato, wheat, corn, sunflower seed and alfalfa;
- c. Helps soil structure by deep tap root system. In sandy to clay soils it helps to break up hard pan and compaction layers caused by machinery and will dry out wet soils causing cracking and aeration;
- d. Viable summer crop with low input and water needs. Following figures and graph show the relative production costs of competing crops in California:
- e. Tomato: \$2500/ac, Corn: \$900/ac, Rice: \$1500/ac, Wheat \$300/ac, Sunflower Seed \$700/ac, Safflower \$300/ac. This is California production cost numbers.



- f. Used in organic rotation for soil development and weed control;



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- g. Californian safflower produces the highest yields and oil content in the USA.  
Yields – up to 4.5mt/ha and oil contents – as high as 45%;
  - h. Consistent yield for the producer;
- ii. Northern United States
- 1.) Used mainly for bird seed production;
  - 2.) Mostly grown under dry land conditions;
  - 3.) Low fertilizer and water needs. Input costs in Montana are approximately \$100/ac with a gross return of around \$300/ac;
  - 4.) Rotational crops are wheat, barley and canola.
- C.) Mexico and Argentina
- 1.) Used to reclaim new soils;
  - 2.) First choice crop on reclaimed soil;
  - 3.) Low input and water needs;
  - 4.) Used mainly for oil with some for bird seed;
- D.) Australia
- 1.) Used as an alternative crop;
  - 2.) Low input and water needs;
  - 3.) Alternative crop to wheat;
  - 4.) Mainly used for oil production;
  - 5.) Grown in wide range of areas, dry land to irrigated.
- II) **Planting and harvesting times in major producing countries**
- a. India
    - i. Planted October/November
    - ii. Harvested March/April
  - b. United States
    - i. Planted February/May.
    - ii. Harvest August/September
  - c. Mexico



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- i. Planted November/December
- ii. Harvest April/May
  
- d. Argentina
  - i. Planted February/April. Same as USA.
  - ii. Harvest July/ August. Same as USA.
  
- e. Australia
  - i. Planted June/August
  - ii. Harvest December/January
  
- f. China
  - i. Planted April
  - ii. Harvested August/September
  
- g. Africa
  - i. Planted March
  - ii. Harvested Aug

International Safflower Growing Calendar

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>India</b>			Harvest							Plant		
<b>United States</b>		Plant						Harvest				
<b>Mexico</b>				Harvest							Plant	
<b>Argentina</b>		Plant						Harvest				
<b>Australia</b>	Harvest					Plant						Harvest
<b>China</b>				Harvest				Plant				
<b>Africa</b>			Harvest					Plant				

a) **Rotational crops for various countries**

- a. Can be used as rotational crop in any system;
- b. Safflower grows best in heavy soils with high water holding capacities;
- c. Large tap root to forage for water;
- d. Grows well under no irrigation with high water table;
- e. Responds well to irrigation in lighter soils;

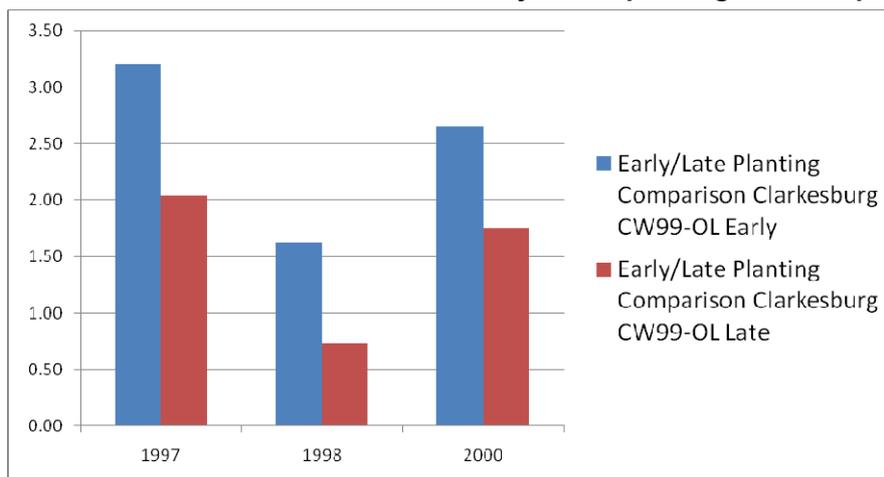


- f. Maximum yields can be achieved under dry land and irrigated conditions;
- g. Safflower is suited to lower rainfall and lower input farming and due to these properties is favored by some of the poorer agricultural countries;
- h. Climate change may present opportunities for safflower as an oilseed as it can grow on less rainfall than other major oilseed crops such as canola, sunflower and soybeans.

**b) Growing process**

- a. Safflower matures in 110-150 days. Maturity is comparable all over the world based on day length;
- b. Daylength sensitive crop, needs long days to initiate flowering;
- c. Safflower requires good seed bed preparation for proper placement into moisture;
- d. Planting can be solid stand for dry land conditions and in rows on beds for irrigated conditions;
- e. After emergence, safflower goes through rosette stage, then stem elongation, branching, flowering and seed development;
- f. Harvesting is with conventional grain combine;
- g. Storage of crop is with conventional grain handling facilities.

**Performance of safflower in Californian- early to late planting date comparison**



**c) Effect on following crop**

- a. Deep tap root breaks up soil for good aeration;



- b. Safflower doesn't require high levels of nutrients;
- c. Doesn't have soil diseases that affect following crop;
- d. May dry out the soil profile too much to allow double cropping.

**d) Irrigation versus dryland**

- a. Highest yields can be achieved under both systems;
- b. Dryland requires less expense and time to grow crop;
- c. Irrigated requires higher input cost and labor;
- d. Type of soil and farming system dictate which system to use.

**e) Yields**

- a. Highest yields I have experienced are in California. The highest yield achieved in California is 4.94mt/ha compared to Australia 2.8mt/ha and Mexico 2.5mt/ha;
- b. Other areas do not have resources or desire to achieve top yield;
- c. Best yields are grown in California with row crop farming systems;
- d. Other countries use as fill in crop with cheap inputs.

**f) Basic safflower production**

- a. Easy crop to grow;
- b. Lower inputs;
- c. Lower risk;
- d. Widely adapted to various soil types;
- e. Widely adapted to various growing regions in the world. Montana 50 deg N to Mexico 23 deg N, sea level to 4000 ft Tanzania, Queensland 23 d S to Victoria 35 deg S;



- f. Competes well with weeds;
- g. Harvest under normal grain system;
- h. Storage under normal grain system.

**g) How to manage yield**

- a. Good fertile soil with high water holding capacity;
- b. Create good seed bed for optimum plant population;
- c. Adequate soil moisture through flowering and seed set;
- d. Warm days, cool nights for best pollination. Hot day temperatures can cause sterilization of pollen, > 100 F.

**h) Safflower in Australia**

- a. Suited to lower rainfall;
- b. Later sowing and later harvest;
- c. Improve soil structure;
- d. Effective in crop rotation;
- e. Useful weed and disease control measures;
- f. Lower inputs, lower risk;
- g. The need for a drought tolerant oilseed crop that can be grown in the lower rainfall area's where canola and sunflower are not adapted.