



Aphids



Caterpillar



Gujhia weevil

- ❖ For controlling safflower caterpillar, spray Indoxacarb 15 EC @ 0.3ml/l or Spinosad 45 SC @ 0.15 ml/l as soon as larvae are noticed.
- ❖ To reduce gujhia weevil damage, apply Phorate 10G to soil @ 10 kg/ha and foliar spray with chlorpyrifos @ 2 ml/l two to three times depending on level of infestation.

**Management of diseases:** The major diseases of safflower are wilt, root rot and leaf spot.

- ❖ For management of wilt, grow resistant hybrid NARI-H-15 and varieties A-1, PBNS-12 and NARI-6 in endemic areas along with seed treatment with *Trichoderma harzianum* @ 10 g/kg seed. Seed treatment with Thiram or Mancozeb @ 3g/kg seed effectively controls root rot disease.
- ❖ Spray Mancozeb @ 2.5 g/l or Carbendazim @ 1g + Mancozeb @ 2g/l for management of *Alternaria* leaf spot.
- ❖ Spray the crop with Copper oxychloride @ 3 g/l or Mancozeb @ 2.5 g/l to give satisfactory control of *Cercospora* leaf spot.



Ramularia leaf spot



Alternaria leaf spot



Wilt

**Bird damage:** Safeguard the crop from bird damage during the period from seed filling to physiological maturity.

**Harvesting and threshing:** Harvest the crop preferably in the early hours. Cut plants with the help of sickles at the base or uproot (black soils) by pulling and stack them in the field in the form of small and well pressed heaps until they are fully dried. Thresh either by beating with sticks or with the help of bullock drawn stone rollers or tractor and the resulting material is winnowed to clean seeds. The threshing and cleaning operation can also be done with power operated thresher used for other crops such as wheat. Combine harvesters used in wheat could also be used for harvesting and threshing of safflower.

**Yield potential:** The seed yield potential ranges from about 800 to 1200 kg/ha under scanty moisture conditions and about 1500 to 2000 kg/ha under favorable moisture conditions. Under minimal irrigation, yield levels of 2000 to 2800 kg/ha could be achieved.



In addition to seed yield, under well managed conditions the non spiny safflower cultivars are expected to yield 75-100 kg/ha petals. Presently, the petals are being sold at Pune, Phaltan and Tandur @ Rs 800-1000/kg. Manual petal collection costs around Rs 500-600/kg petals.

Compiled  
by

K. Aivelu, P. Padmavathi, P. S. Srinivas, R. D. Prasad,  
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# Safflower Management Practices



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## Safflower

Safflower commonly known as Kardi (Marathi), Kusube (Kannada), Kusum (Hindi) and Kusuma (Telugu) is one of the important *rabi* oilseed crops of the country. India stands in first place in terms of area and production in the world with an area of 1.53 lakh ha and production of 0.98 lakh tonnes (2012-13). It is mainly grown in Maharashtra, Karnataka, Gujarat, Andhra Pradesh, Orissa and Bihar. The present productivity of 640 kg/ha is very low as compared to the demonstrated productivity of 1258 kg/ha. Poor crop management under input starved conditions is the most important reason for such low productivity. However concerted research efforts made under the AICRP on Safflower and DOR, Hyderabad have resulted in development of hybrids, improved varieties, production and protection techniques capable of boosting the productivity levels of safflower. The following are the improved production practices recommended for different safflower growing areas of the country.

**Soils:** Safflower requires moderate to high fertile, fairly deep, moisture retentive and well drained soils with neutral pH reaction. Water logging due to poor drainage or prolonged rains even for relatively short periods predispose the crop to damage from root rot and wilt and cause substantial yield loss. Heavy soils with poor drainage must be avoided for growing safflower especially under irrigated conditions. The crop is fairly tolerant to saline conditions.

**Seed bed preparation:** In monocropped black soils of *rabi* areas, harrowing 3 to 4 times during the kharif season is as effective as deep ploughing or sub soiling to keep fields weed free.

**Sowing time:** The optimum time of sowing is second fortnight of September to second fortnight of October.

**Hybrids/Varieties:** Suitable hybrids and varieties for important safflower growing states are given below

State	Hybrids	Varieties
Maharashtra	NARI-NH-1, NARI-H-15	Bhima, AKS-207, NARI-6, PKV Pink, Parbhani kusum (PBNS-12), Phule kusuma, PBNS-40, SSF-708.
Andhra Pradesh	NARI-NH-1, NARI-H-15	Manjira, NARI-6, Parbhani kusum (PBNS-12), Phule kusuma, PBNS-40, SSF-708, TSF-1.
Karnataka	NARI-NH-1, NARI-H-15	A-1, A-2, NARI-6, Parbhani kusum (PBNS-12), Phule kusuma, PBNS-40, SSF-708.
Madhya Pradesh	NARI-NH-1, NARI-H-15	JSF-97, JSF-99, JSI-7, JSI-73, Parbhani kusum (PBNS-12), Phule kusuma, PBNS-40 NARI-6, JSF-1.

**Seed rate and spacing:** 7.5 to 10 kg/ha with a spacing of 45x20 cm

**Seed treatment:** Before sowing, the seed should be treated with Thiram 3 g or Captan 2 g or Carbendazim 2 g/kg seed to protected from soil borne diseases.

**Thinning and Inter cultivation:** Thin the excess seedlings within 10-15 days after emergence and maintain the desired plant to plant spacing. Give one or two hand weedings and hoeing/harrowing at 25 to 30 and 45 to 50 days after planting depending on the length of rosette period and the severity of weed infestation

**Fertilizers:** For adequate and balanced fertilization, incorporate 5 t/ha of well decomposed FYM/compost 2-3 weeks prior to sowing. It is desirable to apply fertilizer based on soil test values. The recommendation of inorganic fertilizer (kg/ha) for different states is as follows

State	N		P <sub>2</sub> O <sub>5</sub>		K <sub>2</sub> O	
	R*	I*	R	I	R	I
Andhra Pradesh	40	-	25	-	0	-
Karnataka	35	75	50	75	25	35
W.Maharashtra	50	-	25	-	0	-
Marthwada	40	60	20	40	0	0
Vidarbha	25	50	25	50	0	0

\*R-Rainfed, I-Irrigated

Dual inoculation of *Azospirillum* or *Azotobactor* (25g/kg seed) along with 50% of recommended N can save up to 50% (20 kg N/ha) requirement and provide higher profits under rainfed conditions. 15-30 kg S/ha gives higher seed and oil yield in Sulphur deficient soils.

**Water management:** Give a light pre-sowing irrigation if the soil moisture in the seed zone is not adequate for germination. In soils that crack, apply irrigation well before cracks develop for better control of water. If there is provision for only one irrigation, provide it before soil moisture becomes very critical for crop growth.

**Intercropping systems:** Some of the remunerative intercropping systems for rainfed situations are coriander + safflower (3:1) and chickpea + safflower (6:3) in Karnataka, Andhra Pradesh and Maharashtra; linseed + safflower (3:1) in Maharashtra, Madhya Pradesh, Chattisgad and eastern Uttar Pradesh.



**Management of Insect pests:** The major insect pests of economic importance are aphids, leaf eating caterpillars in Karnataka and gujhia weevil in Akola region of Maharashtra.

- ❖ Avoid late sowing and sow moderately aphid resistant varieties like A1 or Bhima.
- ❖ Spray Dimethoate 30 EC @ 2ml/l or Acephate 75 SP @ 1.5 g/l or Imidacloprid 17.8SL @ 0.4 ml/l or Thiamethaxam 25 WG @ 0.25g/l or clothianidin 50 WDG @ 0.2 ml/l or Acetamaprid 20 SP @ 0.2g/l at 15 day interval depending up on aphid infestation.

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Safflower aphids Safflower caterpillar Gujhia weevil

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**Management of diseases:** The major diseases of safflower are wilt, root rots and leaf spot.

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- ❖ Spray mancozeb 2.5 g/l or Carbendazim 1g + Mancozeb 2 g/l for management of Alternaria leaf spot,
- ❖ Spray the crop with copper oxychloride 3 g/l or Mancozeb 2.5 g/l to give satisfactory control of Cercospora leaf spot.



Alternaria leaf spot Ramularia leaf spot Root rot

**Bird damage:** Safeguard the crop from bird damage during the period from seed filling to physiological maturity.

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**Seed bed preparation:** In monocropped black soils of *rabi* areas, harrowing 3 to 4 times during the monsoon is as effective as deep ploughing or sub soiling to keep fields weed free.

**Cropping season:** The optimum time of sowing for coastal and Rayalseema region is October and for Telangana region is second fortnight of September or first week of October.

**Hybrids/Varieties:** Suitable hybrids and varieties for important safflower growing states are given below

State	Hybrids	Varieties
Maharashtra	NARI-NH1, NARI-H-15	Bhima, AKS-207, NARI-6, PKV Pink, Parbhani kusum (PBNS-12), Phule kusuma, PBNS-40, SSF-708.
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**Water management:** Give a light pre-sowing irrigation if the soil moisture in the seed zone is not adequate for germination. In soils that crack, apply irrigation well before cracks develop for better control of water. If there is provision for only one irrigation, provide it before soil moisture becomes very critical for crop growth. During irrigation, avoid contact of above ground parts with irrigation water to minimise the spread of diseases.

**Intercropping systems:** Although safflower sole crop is more profitable, some of the suggested intercrop combinations which are more feasible, productive and profitable for different regions under rainfed conditions.

Remunerative intercropping systems are safflower + coriander (1:3) and safflower + chickpea (3:6) in Karnataka, Andhra Pradesh and Maharashtra; safflower + linseed (1:3) in Maharashtra, Madhya Pradesh, Chattisgad and eastern Uttar Pradesh.



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