SAFFLOWER

Recommended varieties:

Variety/hybrid	Duration (days)	Yield (q/a)	Characters
Manjira	115-120	3.0-4.0	Yellow flowers; 27-30 % oil content
Sagarmutyalu	115-125	5.0-6.0	Yellow flowers; 27-32% oil content; Rust resistant
DSH-129	130	7.0	Wilt tolerant; 32 % oil content
TSF-1	120	7.0-8.0	Resistant to Alternaria leaf spot

TSF-1

Manjira

DSH-129

1. Suitability of the Variety for the area (Recommended area for which variety has been released/recommended) : The above all varieties/hybrids are recommended for entire Andhra Pradesh

2. Selection of Field/land preparation (Type of Topography, soil condition, tillage operations for seed bed etc.):

1) As crop is grown during post rainy season under receding soil moisture conditions, well drained deep black soils with fairly good moisture storage capacity are most suitable. The crop can come up well even in light textured soils provided irrigation facility is available. Acidic reaction favours wilt disease.

2) When crop is sown in single rotation, a deep ploughing to favour maximum moisture storage during *kharif* season, followed by 2 or 3 harrowings before sowing of the crop provides an ideal seed bed.

3) When safflower is to be planted after short duration cereal or legume during *kharif* season, avoid too deep or repeated tillage after the harvest of *kharif* crops as it would result in loss of conserved moisture and consequently poor plant stand.

3. Seed treatment(Recommended chemicals with dosages) : Some of the important diseases of safflower like Fusarium wilt and Alternaria leaf spot can be transmitted through seeds. Therefore, it is always advisable to treat the seeds with appropriate fungicide like Thiram, Captan @ 1g/ kg seed or with Carbendizim @ 1g/kg seed.

4. Sowing Time(Optimum Sowing period) : Telangana region: September 2nd fortnight to October 1st fortnight

Coastal Andhra Pradesh and Rayalaseema regions: Entire October month.

5. Seed rate/sowing method-line sowing with row to row and plant to plant distance

Seed rate

1) For sole crop a seed rate of 10 kg/ha is required.

2) Whenever safflower is taken as a sequence crop after short duration cereal and pulses, increase the seed rate by about 50% to obtain satisfactory yields. 3) When safflower is raised under intercropping conditions, the seed rate of main and intercrop are adjusted depending upon their row proportion.

Planting method

1) The seeds are to be placed not more than 5 cm deep. Deeper placement results in poor plant stand. Small seeded non spiny variety viz., NARI-6 requires shallow planting for obtaining optimum plant population.

Spacing:

1) For sole Safflower crop, 45 cm between the rows and 20 cm between the plants within the row is optimum.

6. Fertilizer Doses & Time of fertilizer application (Type and quantity of fertilizers):

1) A pure crop of Safflower requires 40 – 20 – 0 kg N, P and K / ha.

2) For intercrop, the recommended fertilizers of base crop and intercrop are to be applied based on the proportion of area occupied by the component crops for obtaining higher yields.

3) Under rainfed conditions, the entire recommended fertilizers are to be applied as basal. Whereas, under irrigated conditions, 50% of rec. N + entire P should go as basal and remaining N to be applied to the crop after 5 weeks after sowing along with 1st irrigation.

4) In double cropped areas, the recommended dose of nitrogen to safflower can be reduced by 50% if the preceding crop is grain legume viz., mungbean receiving its full complement of fertilizers.

5) In the traditional single cropped *rabi* tracts of the state, application of recommended fertilizers 2-3 weeks prior to optimum planting time is recommended for maximum efficiency under receding soil moisture.

7. Weed Control (Name of weedicide(s) with dosages and timing of mechanical weeding, if any).

1) First 20 to 35 days are critical for crop – weed competition.
2) Alachlor 50% or Pedimethalin 30% @ 2.5 Lit./ ha. as pre-emergence is recommended.
3) Harrowing at 25 DAS and 45 to 50 DAS not only controls the weeds, but also conserves the soil moisture.

Importance of Interculture

In black soil areas, cracks begin to appear in December onwards with the loss of sub-soil moisture. To delay cracking, close them superficially with dust mulch as and when they appear and thereby minimize moisture losses. It is essential to give one additional interculture or hoeing using bullock drawn hoes/harrows/ sweeps in December before the crop canopy is closed and the spines become problematic.

8. Major disease and pest control(Type of pest and disease with name of chemicals and dosages and time of application

Insect Pests:

1. Aphids (*Uroleucon compositae* Theobaid)

a. **Nature of damage:**

During pre-flowering stage both nymphs and adults suck the cell sap from shoot apices, peduncles, leaves and stem, secret a honey dew like secretion on upper surface of the leaves and plant parts forming a black sooty mould which hinder photosynthetic activity resulting in stunted growth. Finally plants dry and die.

b. Control method by agronomic management: avoid delayed planting

c. Chemical control: Spray Dimethoate (0.05%) or Methyle parathion (0.05%) or Monocrotophos (0.05%)or Chloropyriphos (0.05%) or alternatively dust Quinalphos (1.5%) or Methyle parathion (2.5%) or Malathion (5%) at 40 and 60 DAS. Use 500 litres of spray mixture and 20 kg dust formulation per ha. Further, spraying on the field borders (1.8 m around the field) is as effective as complete spray coverage of the field.

2. Capsule borer (*Perigea Spp.*)

a. Nature of damage: During early stages of crop growth, it damages leaves and shoot apices. Then it often noticed on capitula on later stages. Typical symptoms are perforated leaves and involucral bracts, partially or completely eaten capitula. Dried black excreted pellets are seen on the infested parts and the larva is seen on the hole of the capsule.

b. Control method by Agronomic management: avoid chickpea as intercrop. Hand pick and destroy caterpillars.

c. Chemical control: Spray Chloropyriphos (0.05%) or Quinalphos (0.05%) using 500 litres of spray mixture per ha.

3. Stem fly

a. Nature of damage:

During early stages of crop growth, the maggots of stem fly enter into the stem by boring it. They damage the conducting tissues and result in wilting of the plants. Further, it is often noticed on capitula on later stages.

Typical symptoms are perforated leaves and involucral bracts, partially or completely eaten capitula. Dried black excreted pellets are seen on the infested parts and the larva is seen on the hole of the capsule.

b. Chemical control: Spray Dimethoate (0.05%) or Endosulfan (0.05%)

Diseases:

1. Alternaria Leaf spot (*Alternaria carthami* Choudhary)

a. Nature of damage: Severe in irrigated crop and in warmer areas particularly under frequent showers of cyclonic cloudy weather. Seed may rot and damping off of seedlings may occur. Brown discolouration appears on the stem, dark brown spots with concentric rings upto 1 cm in diameter appear on the leaves which later develop into large lesions. Later holes formed at the spotted patches.

b. Control method by agronomic management: Sow the crop at recommended time. Avoid growing in low lying areas and flooding under irrigation. Avoid continuous growing of Safflower. Remove and destroy the infected plants. Do not delay irrigation till the crop exhibits moisture stress symptoms.

c. Chemical control: Spray Mancozeb (0.25%) immediately after disease is noticed and repeat the spray 15 days later depending on the intensity of the disease.

2. Cercospora Leaf spot (*Cercospora carthami* Sundararaman and Rama krishnan)

a. Nature of damage:

Symptoms on the leaves characterized by formation of circular to irregular brown sunken spots measuring 3 to 20 mm in diameter. The spots have a yellowish ting at the border and in advance stages; the leaves turn brown and distorted. Under moist conditions, the spots have a velvety grayish-white appearance caused by sporulation of the fungus. All parts of plant are affected by the disease. The flower buds turn brown and dry. The entire capitulum may also be affected without formation of the seed.

b. Control method by agronomic management: avoid Safflower cultivation in low lying waterlogged areas. Avoid continuous cropping of Safflower in in the same plot and follow recommended crop rotations. Late planting encourages spread of Cercospora leaf spot hence, timely sowing is essential.

c. Chemical control: Spray the crop with Copper oxychloride (0.30%) or Mancozeb (0.25%) to give satisfactory control of the disease.

3. Ramularia leaf spot (*Ramularia carthami* Zaprometov)

a. Nature of damage:

Minor disease in our state. More prevalent in irrigated areas of western Maharashtra and transitional belt of Karnataka. Round and regular spots of 100 mm or more in diameter occur on both sides of leaves, whitish dense mass of conidia remain at the centre which reflects light, dry spots that are brown in colour.

b. Control method by agronomic management: Sow the crop at the recommended time. Avoid growing in low lying areas and flooding under irrigation. Avoid continuous growing of safflower. Remove and destroy the diseased plants. Do not delay irrigation until the crop exhibits moisture stress symptoms.

c. Chemical control:

Spray mancozeb (0.25 %) immediately after disease is noticed and repeat the spray 15 days later depending upon the intensity of disease

4. Rust (*Puccinia carthami* Corda)

a. Nature of damage:

Seedling infection causes twisting towards one side. Chestnut brown pustules are formed on hypocotyls leading to collapse of seedling. On older plants grinding and hypertrophy of the stem base may occur. Small powdery chestnut brown pustules of 1-2mm in size develop on leaf surface which later turn black.

b. Control method by agronomic management: Sow the crop at the recommended time. Avoid growing in low lying areas and flooding under irrigation. Avoid continuous growing of safflower. Remove and destroy the diseased plants. Do not delay irrigation until the crop exhibits moisture stress symptoms.

c. Chemical control: One or two sprays Calixin (0.05%) or Dithane M -45 (0.25%) at 15 days interval

5. Wilt (*Fusarium oxysporum f.sp carthami*)

a. Nature of damage:

Yellowing of leaves on one side of plant starts particularly from lower leaves followed by wilting that progress upwards. Lesion at soil line is the first symptom noticed which extends inside and affects the vascular system. Plants start to wilt, dropping more often. Infected heads have aborted seeds.

b. Control method by agronomic management: Seed the crop at the recommended time. Avoid growing in low lying areas and flooding under irrigation. Avoid continuous growing of safflower. Remove and destroy the diseased plants. Do not delay irrigation until the crop exhibits moisture stress symptoms.

c. Chemical control: Treat the seed with Carbendazim @ 0.12 to 0.2 %.

6. Root rot (*Rhizoctonia bataticola*)

a. Nature of damage:

Dark cortical lesions occur slightly below or at the soil level on the stem, which later extends upwards. Lesions frequently girdle the stem. Root development is reduced and finally seedling dies.

b. Control method by agronomic management: Sow the crop at the recommended time. Avoid growing in low lying areas and flooding under irrigation. Avoid continuous growing of safflower. Remove and destroy the diseased plants. Do not delay irrigation until the crop exhibits moisture stress symptoms.

c. Chemical control: Treat the seed with Thiram / Dithane M – 45 @ 0.2 %.

9. Irrigation Schedule(Critical Stages for irrigation and method of irrigation)

1) As an irrigated crop, it is advisable to plant the crop on flat beds and then form irrigation furrows after every 2 or 3 rows at the time of first irrigation. This will save water as well as help to minimize contact of water with above ground parts to avoid diseases.

2) Under scanty moisture conditions, safflower yield can be boosted by 40 to 60% by providing just one life saving irrigation of 5-8 cm depth at critical stages of crop growth (early stem

elongation or flowering) or before when soil moisture becomes limiting for crop growth.

10.Harvesting(Approximate days of harvestable maturity): Depending on the genotype, Safflower comes to harvest in 115 to 135 days. Undertaking harvesting operation in the early hours is recommended which facilitates easy harvesting due to low shattering and soft spines. Threshing can be done by either trampling with tractor or manually by beating with sticks.

11. Quality characteristics of the variety (Prominent characters of the variety):

1) Var. Manjira :

- Yellow flowers turns to orange after fertilization,
- White seeded,
- Oil content is 27 to 30%

2) Var. Sagara mutyalu :

- Yellow flowered variety, tolerant to rust disease
- Small and bright white seeded, Oil content is 27 to 32%·
- Good response to higher levels of Nitrogen

3) Var. TSF - 1 :

- Creamy white flowered variety, tolerant to aphids, wilt and Alternaria leaf spot diseases·
- Oil content is 28 to 30%·
- High Yielding

12. Expected yield of the variety / acre (q)(Yield subject to use under area of adoption and the recommended climatic conditions and adoption of package of practices)

Yield Range

4) Var. Manjira : 3.0 to 4.0 quintals per acre.

5) Var. Sagara mutyalu : 4.0 to 5.0 quintals per acre.

6) Var. TSF - 1 : 6.0 to 7.0 quintals per acre.