

Improved Cultivation Practices for Sunflower Crop

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Sunflower (*Helianthus annuus* L.) crop belongs to the family Asteraceae, is one of the most important edible oilseed crops in the world. In India, this crop was introduced in 1969 and the commercial cultivation was started in 1972. The release of early maturing variety 'Morden' in 1978 and the first hybrid (BSH-1) in 1979 were revived the interest in sunflower cultivation. Low saturated fatty acid content (22%) and the high levels of linoleic acid (66%) in sunflower oil making it a perfect choice for healthy edible oil. The crop has gained significance in India, due to its wide adaptability, short growing season (80–130 days), drought resistance and its ability to provide profitable returns to farmers, even under the challenging conditions.

Climatic Requirements

Sunflower plants were highly adaptable to different agro-climatic conditions. It requires 12 hours sun light and 500-750 mm rainfall. The optimum temperature during germination is 20–25°C, whereas, for vegetative growth and flowering, 25–30°C is considered as best for the growth and development of plants. A temperature above 40°C during flowering notably reduces seed formation due to pollen desiccation and poor stigma receptivity. This crop can be cultivated from tropical to temperate zones and up to the height of 2500 m above mean sea level, although the oil content decreases above 1500 m altitude. The crop is day-neutral and sensitive to photoperiod.

Hybrids information:

Hybrids	Crop Duration	Yield (Kg/ha)	Oil %	Salient characters
NDSH-1012	90-95	1500-1800	40-41	High yield and high oil content
LSFH-171	90-95	1600-1800	34-35	High yield and tolerant to powdery mildew disease
DRSH-1	90-95	1300-1600	42-44	High oil content
KBSH-44	92-95	1400-1600	36-38	High yielder

Soil Requirements

Crop can be cultivated in wide range of soils i.e. from sandy soils to heavy black soils. However, it performs well on well-drained sandy loams to clay loams with good moisture-holding capacity. A soil pH of 6.5–8.0 is ideal. The soils

having acidic conditions coupled with poorly drained facility are not suitable. Sunflower is moderately tolerant to salinity and alkalinity.

Land Preparation

Sunflower seed required fine tilth for germination and establishment. The field should be ploughed once with a mouldboard plough, followed by 2–3 harrowings or cultivator for attaining fine tilth. The field should be leveled and weed-free. Earthing up at knee height stage is essential to provide anchorage and reduce lodging, especially under irrigated conditions with high winds.

Seed Rate, Spacing, Depth and Sowing Methods

- Seed rate: Hybrids: 5kg/ha.
- Spacing: Heavy soils: 60 × 30 cm and Light soils: 45 × 20 - 25 cm
- Sowing depth: 3–4 cm depending on soil moisture.
- Sowing Method: Line sowing on ridge and furrow method or flat bed method is suitable for sunflower crop. However, ridge and furrow method of planting is ideal, especially under heavy soils, irrigated conditions with high winds. Place 2–3 seeds per hill and thinning can be done later to maintain optimum plant population.

Seed Treatment

Seed treatment with combination of Iprodione 25% + Carbendazim 25% or combination of Carbendazim 12% + Mancozeb 63% @ 2g/kg seed will control Alternaria leaf spot in sunflower crop. To control the necrosis virus disease, seed treatment should be done with Thiamethoxam @4g/Kg seed or Imidacloprid @ 5g/Kg seed.

Time of Sowing

Sunflower crop can be sown throughout the year under Indian climatic conditions. The recommended sowing windows are as follows:

- Kharif: Light soils: June–July; Heavy soils: August II FN
- Rabi: November– December
- Summer: January II FN – February I FN (under irrigated conditions)

Optimum time of sowing ensures better seed filling, high oil percentage, improves the quality of oil and avoids terminal drought or heat stress.

Nutrient Management

Incorporation of 7-8 t/ha of farmyard manure (FYM) or compost at final land preparation enhances soil carbon, nutrient availability, improves soil structure and microbial activity. Apply NPK fertilizers basally as per soil test recommendations. If soil test recommendations are not available, follow the crop recommendations.

Condition	N (kg/ha)	P ₂ O ₅ (kg/ha)	K ₂ O (kg/ha)
Rainfed conditions	60	60	30
Irrigated Conditions	75	90	30

The nitrogen fertilizer should be applied in two splits (half of the nitrogen dose during sowing and remaining half nitrogen fertilizer after 30 DAS) in rainfed conditions and three splits (50% of the nitrogen dose during sowing, 25% N fertilizer during 30 DAS and the remaining 25% nitrogen fertilizer after 50 DAS) in irrigated conditions. The entire phosphorous and potassium fertilizers should be applied as basal only.

- Biofertilizers: Soil application – Apply 2kg/ha of Azospirillum and 2kg/ha of Phosphobacteria mix with 25 kg FYM and 25 kg soil, before sowing.
- Apply Sulphur @ 20 kg/ha through Ammonium Sulphate or Single Super Phosphate, otherwise apply Gypsum@ 150 kg/ha as basal.
- Spray Borax @ 0.2 % (2g/l of water) to capitulum at ray floret opening stage to improve seed set and seed filling.

Irrigation Management

The critical stages for irrigation in sunflower are bud initiation, flower opening and seed filling. First irrigation should be given immediately after sowing, second at 4-5 DAS, followed by irrigations at 7-10 day intervals depending on soil and climate. Waterlogging must be

avoided. A total of 5-6 irrigations may be required under irrigated conditions.

Weed Management

Weed infestation is a major constraint causing lower sunflower yield. Uncontrolled weeds in sunflower caused yield loss of up to 62%. Heavy weed infestation in sunflower is mainly due to wider spacing, slower crop growth during early stages, higher fertilizers use and frequent irrigation. Sunflower is highly susceptible to weed competition during the first 40 DAS. Two hoeing or hand weedings at 15 and 30 DAS is effective in controlling weeds. Under labour scare situations herbicides are effective in controlling weeds. Pre-emergence application of Pendimethalin (30 % EC) @ 5ml/lt. of water within 48 hours is effective in weed management. Post emergence application of quizalopofop ethyl or Fenoxaprop-p-ethyl @1.25 ml/lt. of water is effective for controlling grassy weeds in sunflower.

Pollination Management

Sunflower plants are highly cross-pollinated (80-90%) and it will depend on insect pollination, especially honeybees. Honey bee hives 5 /ha during flowering enhances the pollination, which in turn higher seed set and yield. Mild rubbing of the capitulum with the hand covered with soft cloth or by face-to-face rubbing of two heads during mid-flowering (45-60 DAS) improves pollination efficiency.

During the crop growth period, regular monitoring of pests and disease incidence and proper plant protection measures should be taken for better crop yields.

To avoid bird damage, install reflective ribbons in North and South direction in the field, apply different sounds using bird scaring equipment etc.

Harvesting

The crop is ready when the back of capitulum turns lemon yellow, bracts dry, and seed moisture reaches 20-25%. Heads are cut and dried in sun for 3-4 days before threshing. Seed should be separated from heads by beating with sticks or threshers and dry. Seed can be stored in bags when the seed moisture content reaches 9-10%.
