

COMPREHENSIVE GUIDE TO SUNFLOWER CULTIVATION: FROM SEED SELECTION TO HARVEST

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Abstract

Sunflower (*Helianthus annuus*) is a vital oilseed crop known for its high nutritional value, with seeds containing 35-45% oil and 40% protein. It has adapted well to India's diverse agro-climatic conditions and is grown across Kharif, Rabi, and Zaid seasons. Sunflower cultivation plays a significant role in crop diversification, contributing to sustainable farming practices. This paper explores various aspects of sunflower production, including suitable soil, climate, and land preparation. It highlights the importance of selecting appropriate varieties, seed treatment, sowing methods, and fertilizer application. Effective management of pests, diseases, irrigation, and weed control is also discussed. Special practices, such as pollination enhancement, are suggested for optimal yields. The article further addresses common pests like birds, leaf hoppers, and capitulum borers, as well as diseases such as root rot and head rot. Harvesting techniques and yield expectations are also outlined. The findings aim to promote sustainable sunflower cultivation, improve food security, and boost farmers' income.

Keywords: Sunflower, Sunflower pest, Birds, Sunflower variety, Hybrid sunflower, KVK Bastar

Introduction

Sunflower (*Helianthus annuus*) is one of the world's most important oilseed crops, ranking fourth in global oilseed production. Originally native to eastern North America, it has gained immense popularity due to its adaptability, nutritional value, and diverse uses. Among the 65 species in the *Helianthus* genus, 14 are annuals, including the cultivated sunflower.

In India, sunflower gained commercial significance after the edible oil crisis of 1969–70. It was introduced from the Soviet Union for trials and variety development at Pantnagar Agricultural University, which paved the way for its extensive cultivation across the country. The crop is versatile, thriving in all three growing seasons—Kharif, Rabi, and Zaid—and is well-suited for multi-cropping and intercropping systems. Its short growth duration of 80–120 days, combined with photo-insensitivity and wide agro-climatic adaptability, makes sunflower a valuable crop for Indian farmers.

Sunflower seeds contain 35–45% oil and 40% protein, making them an excellent source of nutrition. The oil, known for being light, digestible, and heart-friendly, contains unsaturated fatty acids and minimal cholesterol.



Figure: Cluster front line demonstrated sunflower crop (KBSH-44), KVK, Bastar

Its high-density lipids help reduce cholesterol buildup in blood vessels, making it beneficial for heart patients. Beyond its nutritional value, sunflower oil has medicinal properties and is widely consumed worldwide, with 90% of its production used for human consumption.

In India, about 33% of sunflower cultivation occurs during the Kharif season, while the remaining is divided between Rabi and Summer seasons. Maharashtra and Tamil Nadu are the leading contributors, accounting for 90% of the area and 80% of the country's sunflower production. The crop plays a vital role in crop diversification due to its adaptability and economic returns, offering sustainable solutions for both irrigated and rainfed agricultural systems. Sunflower continues to gain importance as a key crop in improving food security, income generation, and sustainable farming practices.

Soil and Climate

Sunflowers thrive in well-drained soils, with loamy and sandy loam soils being ideal. The preferred pH range is 6.5-8.5, and optimal temperatures range between 26°C and 30°C

Land Preparation. Light tillage followed by deep ploughing should make the soil loose and levelled. Apply recommended FYM (Farmyard Manure) before the final ploughing. Create ridges for planting at appropriate distances using ridge.

Varieties and potential

Variety	Maturity Days	Yield (kg/ha)	Oil Content (%)
Early			
Modern	70-80	600-800	40-44
SS-56	60-70	500-700	38-40
B a d s h a h 2025	80-85	1800-2000	40
Medium			
Surya	90-95	800-1000	42-45
APSH-11	90-95	1000-1500	42-45
Jwalamukhi	90-95	2000-2500	-
Late			
Sunrise	120-130	1000	-
Ravikiran	105-112	-	-

Seed Rate

Seed Type	(Irrigated (kg/ha)	(Rainfed (kg/ha)
Hybrid	kg 4	kg 5
Other	kg 6	kg 7

State wise recommended variety

State	Varieties
All India	DSC 107 (Non lodging non shattering)
Karnataka	DSFH-3, KBSH-41, KBSH-53, RSFH-1, RSFH-130
Andhra Pradesh	PAC-334, Prabhat (NDSH-1012)
Maharashtra	LSFH-35, MLSFH-47, Phule Raviraj, Phule Bhaskar (SS-8808)
Tamil Nadu	COH-3, CO-2, Olisun 3794 (PAC-3794)

Haryana	KBSH-1, PAC-36, HSFH-878
Punjab	PSFH-118, PSFH-569, PAC-36, PAC-1091
Bihar	DCS-107, Kaveri Champ
MH, Karnataka, TN, AP, TS, Odisha, Bihar, WB	LSFH-171

Seed treatment

Treat seeds with either Thiram or Captan at a concentration of 3 g/kg of seed to protect against seed-borne diseases. In regions with a known incidence of downy mildew, treat the seeds with metalaxyl at 6 g/kg of seed. Additionally, treating the seeds with GA3 (500 ppm) has been found effective in enhancing germination rates. Or before sowing, soak seeds in a 20 g/L zinc sulfate solution for 12 hours. Dry them in shade until moisture content is 8-9%. Treat seeds with 2 g/kg of Thiram followed by PSB (200 g/kg). Let the treated seeds dry for 24 hours.

Sowing Method

For hybrids, sow at 60x30 cm spacing, and for others, at 45x30 cm. Ensure the depth is 30 cm, and avoid sowing during heavy rain or waterlogging.

Fertilizer

Type	N (kg/ha)	P ₂ O ₅ (kg/ha)	K ₂ O (kg/ha)
Hybrid (Irrigated)	60	90	60
Hybrid (Rainfed)	40	50	40
Other (Irrigated)	50	60	40
Other (Rainfed)	40	50	40

Thinning: Excess seedlings to retain only one seedling per hill, done 10–15 days after germination, is crucial. This practice ensures higher yield potential, facilitates easier intercultural operations, and helps in effective management of insect pests and diseases.

Irrigation : Irrigate immediately after sowing. Subsequent irrigations should occur at 7-8 day intervals, especially during critical stages: emergence (day 1), bud formation (30-35 days), flowering (40-55 days), and seed filling (65-70 days). Avoid waterlogging during these stages.

Weed Management

- * Apply pre-emergence Fluchloralin (2 L/ha) 4-5 days after sowing.
- * Manually remove remaining weeds 30-35 days later.

Special Practices: To enhance pollination, gently rub flowers with a soft cloth wrapped around your hand between 8:00-11:00 AM for 10-15 days post-blooming. Perform this for early-maturing crops at 45-48 days and for late-maturing crops at 58-60 days.

- * Pests
- * Birds

Different species of birds, including parakeets, doves, cockatoos, sparrows, crows, and blackbirds, can cause damage to sunflowers. This typically happens once the ray petals fall off from the ripening sunflower heads, and the seeds (achenes) start to form. It can severely damage flower heads and seeds during the milk-filling

stage.

Management

- * Planting decoy crops like millet nearby can divert birds' attention,
- * Use reflective radium plates around the field.
- * Install scarecrows strategically.
- * Spray neem kernel extract (10 g/L water) on flower heads.
- * Use sound-emitting devices effectively.

Leaf hopper - *Amrasca biguttula biguttula*

Both nymphs and adults suck the sap from the under surface of leaves. Leaves become crinkled and cup shaped, growth gets stunted, brownish red colour develops on the edges of leaves and the condition is known as "hopper burn". They also attack brinjal, bhendi, cotton and potato. Adult is a small, slender green insect. Eggs are laid singly in the leaf veins. Egg period is 4-11 days. Nymphs green, wedge shaped. Nymphal period is 7 days. Breeding is noted throughout the year.

Management

- * Setup light trap to monitor the broods of leaf hopper and to attract and kill
- * Release predators viz., *Chrysopa carnea*

Capitulum Borer (*Helicoverpa armigera*) : Pest that attacks sunflower crops during the flowering stage, with its larvae feeding on the developing flower heads and seeds, resulting in poor seed development and reduced yields. It can destroy the capitulum completely. Adult moth is greenish to brown with a 'V' shaped speck on forewings and dull black border on the hind wings. Eggs are laid on the host plants singly. The egg period is 7 days. Fully grown larva is 2" long, greenish with dark brown grey lines and dark and pale bands. It shows colour variation from greenish to brown. The larval duration is 14 days. It pupates in soil for 10 days.

Management

- * Spray NPV (250 LE/ha).
- * Install bird perches @ 50/ha
- * Set up light trap to monitor, attract and kill the moths
- * Spray NSKE 5% twice followed by triazophos 0.05%.
- * Apply Profenofos (2 mL/L water).

Diseases

Root rot or charcoal rot (*Rhizoctonia bataticola*) : The seed-borne pathogen causes seedling blight and collar rot initially, with symptoms appearing later in mature plants. Infected plants show drooping leaves, death in patches, and shredded bark on the lower stem and roots.

Management

- * Avoid close planting of seedlings and ensure optimum nutrition to maintain plant vigour.
- * Irrigate when the soil becomes dry and temperatures rise.
- * Treat seeds with a *Trichoderma viride* formulation at 4 g/kg and with Carbendazim or Thiram at 2 g/kg.
- * In areas with frequent outbreaks, follow a long crop rotation. Additionally, perform spot drenches with Carbendazim at 500 mg/liter to help control the pathogen.

Head rot (*Rhizopus* sp.) : The affected sunflower heads show water-soaked lesions that turn brown and may spread to the stalk. The damaged areas become soft and pulpy, with insects feeding on the decaying tissue. The fungus invades the inner head and seeds, turning them into a black powder. Eventually, the head wilts and droops, covered in fungal mycelium.

- * Treat the seeds with 2 g/kg of Thiram or Carbendazim.
- * Control caterpillar infestations on the heads.
- * Apply Mancozeb at 2 kg/ha to the heads during the rainy season and reapply after 10 days if humid conditions persist.

Rust: Symptoms are small, round white to yellow spots that turn black on the underside of leaves.
Management

- * Spray Mancozeb (0.2-0.3%) or soluble Sulfur (0.2%).

Harvesting and Yield : Harvesting at the right time is crucial for economic returns. Harvest when the back of the capitulum turns yellow and the front hardens. Cut and dry capitula under sunlight for two days, then thresh the seeds carefully. The yield is 15-20 quintals/ha. The extracted oil cake (60-79%) is used as poultry feed.

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