

# SUNFLOWER

A wide-angle photograph of a sunflower field. The sunflowers are in full bloom, with bright yellow petals and dark brown centers. The field stretches to the horizon under a sky with a vibrant sunset. The sun is low on the left, casting a warm glow over the clouds, which transition from orange and red near the horizon to a clear blue at the top.

**Dr. Ashirbachan Mahapatra**

Assistant Professor

Agronomy, MSSSoA, CUTM

## IMPORTANCE

- It is an important oilseed crop contributes 14% of the total oilseed production from nine major oil seed crops.
- The genus *Helianthus* (Helio=Sun, anthus= flower).
- Sunflower is known as a “suryamuki” as it is grown for ornamental purpose.
- It is the third most important oilseed crop after Soybean and Rape seed & Mustard in India.
- The area and production of sunflower crop significantly increased due to following merits of the crops.
- Short duration (90-100 days) as it is fit well in multiple and intercropping systems.
  - Wide adaptability: it comes well up in any type of soils.
  - Drought and saline tolerant: suitable for the best component crop in dry land farming.
  - High productivity per unit area per unit time with respect to yield of oil.
  - High seed multiplication ratio (1:80) with low seed rate requirement.
  - It is the best substitute for groundnut crop in contingency crop planning.
  - Due to cross pollination nature, there is a great scope for evolution of high yielding composites and hybrids.

- Good quality oil with high level of poly unsaturated fatty acids (PUFA) content i.e. linoleic and oleic acids. **Linolenic** acid is absent.
- Availability of good quality of hybrid seeds and varieties.
- It is the best catch crop when the land is left otherwise fallow between two seasons.
- The oil content varies from 48-53% and it is premium oil with pale yellow in color used for cooking and margarine.
- Sunflower is a rich source of **linoleic acid** (40-67%) which helps in reducing the cholesterol deposition in the coronary arteries of the heart.
- Sunflower oil is used as industrial feed stock for manufacturing cosmetics, soaps and pharmaceuticals. Most of 90% fat is good for human.
- Oil contains high level of **alpha tocopherol**, a form of **vitamin E**.
- Oil cake contains 40-50% high quality protein and it is ideally suited for poultry and livestock.
- The roasted kernels are used as food for human beings.
- Sunflower is grown as green manure, fodder crop.
- The best fibre of the stem is source for making rough quality paper.
- Recently sunflower oil is recognized as an alternative source for fuel.

## Origin, History, Area and Distribution

### Origin and History

- The origin of the sunflower is from **Southern USA (Peru) & Mexico**.
- From Peru and Mexico it was introduced into Spain by early explorers and merchants before the middle of sixteenth century.
- Sunflower was brought to England from Spain in the Colonial period.
- In the nineteenth century, the cultivation of sunflower as an oilseed crop began in the Soviet Union and the majority of the present day varieties grown all over the world trace back their origin to the USSR.
- Sunflower as an oil seed crop was introduced into India in 1969.

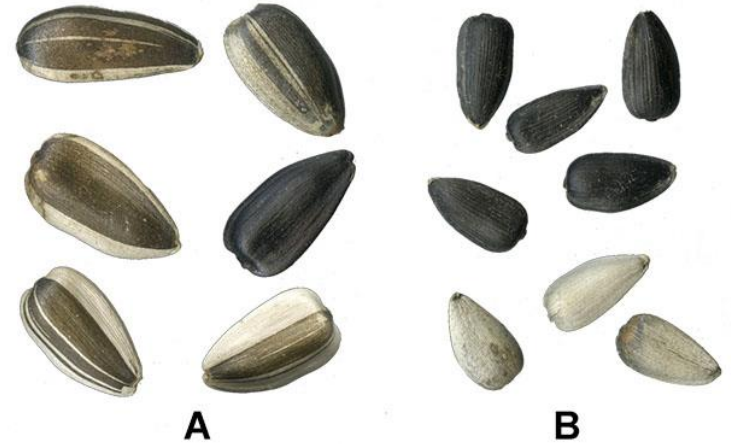
### Area and Distribution

- It is mainly grown in USSR, USA, Argentina, France, Italy and China.
- India covers 0.59 million ha of sunflower with productivity of 0.43 million t and yield of 736 kg/ha.
- Leading states are Karnataka, AP, Telengana, Bihar, Haryana, Maharashtra and UP.

## Classification

- There are about 264 species of in Helianthus genus. All the varieties grown in USSR and India are grouped into three main groups.
  1. Large white seeded type: Having high oil content.
  2. Small black seeded type: Best for eating.
  3. Intermediate type with striped seeds: Good for both eating and oil purposes.
- Some of the workers have divided all the varieties into two distinct groups according to habit of growth:
  - *Group I*: Having tall, unbranched single headed types with well-developed achenes.
  - *Group II*: Having comparatively shorter, branched growth and with many heads.

### SUNFLOWER SEED



A. Confectionery Type. Black and white striped, thick-hulled, seed of the non-oil variety of sunflowers.

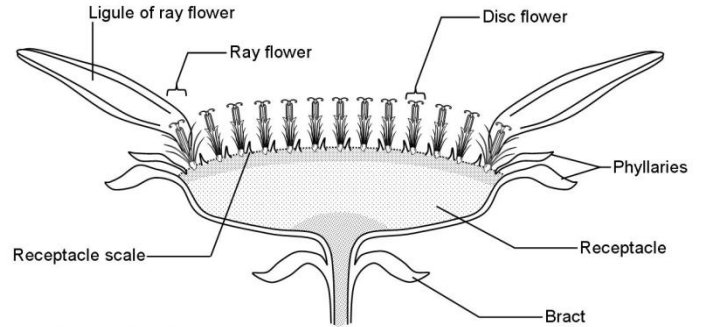
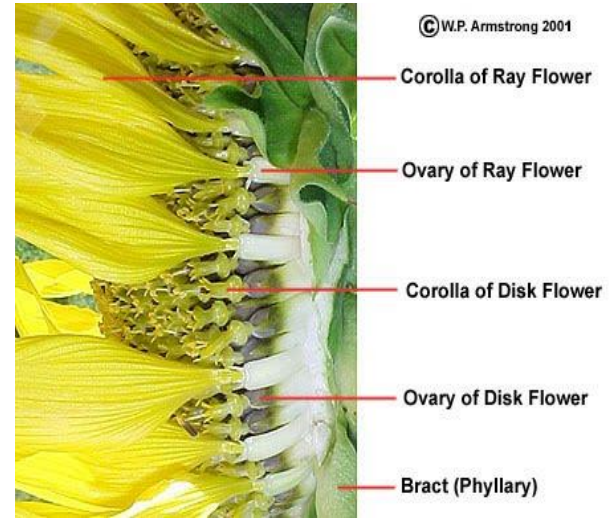
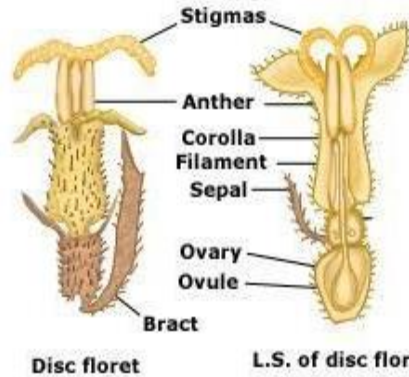
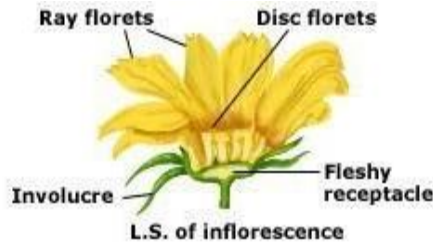
B. Oilseed Type. Black (some specialty varieties may be gray), thin-hulled, fairly large sized seed of the oil-producing variety of sunflower plant

## Botany of the Crop

- Sunflower belongs to the family **Compositae** and genus *Helianthus*.
- It is an annual, erect herbaceous plant growing to a height of 1.5 to 6.0 m.
- Stem is 2.5 to 7.5 cm in diameter, rough, hairy or hispid, usually without branches terminating in a capitulum.
- Sunflowers (*Helianthus* spp.) have a **single taproot and smaller, hairy secondary roots**. Sunflower roots usually grow 1 to 3 feet deep.
- Leaves are simple, alternate with stout petioles, somewhat lanceolate in shape and about 5 to 25 cm long and about two-thirds as wide. Leaves are rough on both surfaces and irregularly toothed on the margins.



➤ The inflorescence is a typical of Compositae family. Sunflower is protandrous, in which the male and female parts mature at different times. There appears to be a time lag of 18-24 hours in maturity of male and female parts. Therefore, it is, essentially a **cross pollinated** plant. Flowers are **yellow** in colour. Heads are 10-15 cm in diameter with 40-80 rays and brown or black discs. A single head produces 350 to 2000 seeds. Seeds are generally less than 1.5 cm long pointed at base and round at end. Colour of the seed may be white, black or black with white strips.



Composite Inflorescence  
e.g. *Chrysanthemum*

## Sequence Cropping

### Where rainfall is 700 – 800 mm

- Maize – Sunflower
- Sorghum – Sunflower
- Sesame –Sunflower
- Mungbean – Sunflower

### Scarce Rainfall Zone

- Green gram – Sunflower
- Sesame – Sunflower
- Soybean– Sunflower



## Varieties

- **Karnataka:** Morden, TANUSAF 7, DRSF 108, DRSF 113
- **Hybrids:** MSFH 8, BSH 1, KBSH 1, Jwalamukhi, Sun-gene 85, PAC 36, PAC 1091, DSH 1, KBSH 41, KBSH 44, Pro-Sun 09
- **Maharashtra:** Morden, TANUSAF 7, Surya, SS 56, LS 11, LSF 8, DRSF 108, TAS 82, DRSF 113
- **Hybrids:** MSFH 8, MSFH 17, KBSH 44, Sun-gene 85, PAC 36, PAC 1091, Pro-Sun 09, MLSFH 47
- **AP/ Telengana:** Morden, TANUSAF 7, DRSF 108, DRSF 113
- **Hybrids:** APSH 11, MSFH 8, KBSH 1, Jwalamukhi, Sun-gene 85, PAC 36, PAC 1091, DSH 1, KBSH 41, KBSH 44, Pro-Sun 09, MLFSH 47, SH 416, DRSH 1
- **Tamilnadu:** Morden, TANUSAF 7, CO 1, CO 2, COSFV 5DRSF 108, TAS 82, DRSF 113
- **Hybrids:** MSFH 8, MSFH 17, KBSH 1, KBS 44, Sun-gene 85, PAC 36, PAC 1091, Pro-Sun 09, DRSH 1
- **Haryana:** Morden, DRSF 108, DRSF 113
- **Hybrids:** DRSH 1, KBSH 1, Jwalamukhi, Sungene 85, PAC 36, PAC 1091, KBSH 44, Pro-Sun 09
- **Others:** Morden, TANUSAF 7, DRSF 108, DRSF 113
- **Hybrids:** KBSH 1, KBSH 44, Sun-gene 85, PAC 36, PAC 1091, Pro-Sun 09, DRSH 1

## Soil and Climatic Requirements

### Soil

- Sunflower can be grown in a wide range of soils (Vertisols, Alfisols, Inceptisols and Entisols) with texture varying sandy-loam to deep clay.
- pH 6.5-8.0, moderately tolerant to alkalinity and salinity, but crop fails below the pH 4.6 on sandy loam soil

### Climatic requirement

- It is a day neutral plant, Optimum temperature requirement 20-25<sup>0</sup>C. Temperature beyond 38-40<sup>0</sup>C may cause desiccation of pollen and drying of stigma.
- Rainfall 500-700 mm.

## Cultivation Practice

### Seed bed

Sunflower requires well prepared deep and friable soil. After primary tillage, the soil should be brought to fine tilth by harrowing and leveling. Fine bed should be prepared. Soil should be thoroughly tilled up to a depth of 20-25 cm.

### Seed rate

The seed requirement for sunflower is 5 - 7.5 Kg/ha

### Seed dormancy

Freshly harvested seeds have dormancy of 40-50 days. After this period the seeds will be ready for sowing. To overcome dormancy, seeds may be treated with ethryl solution (25ppm), seeds are soaked for 6 hours.

### Seed treatment

The seeds may be treated with Captan/Thiram @ 2.5-3.0 g/ kg of seed.

Recent Threat: Necrosis, caused by sucking pests. To manage sucking pest problem at initial stage (up to 30 days), seeds may be treated with Imida-chloroprid @5g/kg seed.

## Sowing depth

The depth should not exceed above 3-7 cm.

## Spacing

45cm X 30 cm = 74074 plants/ha

60cm X 30cm= 55555 plants/ha (Thinning should be done, if over-crowded)

## Sowing time

State	<i>Kharif</i>	<i>Rabi</i>	<i>Summer</i>
<b>Karnataka</b>	June-July (R)	Sept-Oct (R)	Dec-Jan (R)
	June-July (I)	September (I)	Mid Jan- Feb (I)
<b>AP/TG</b>	June-mid July (light soil)	Sept-Nov	Mid Jan-Feb
	Late August (heavy soil)		
<b>MS</b>	Last wk June- 1 <sup>st</sup> wk July	1 <sup>st</sup> week Oct	1 <sup>st</sup> week Feb
<b>TN</b>	June-July (R)	Oct-Nov (I)	Dec-Jan
<b>UP &amp; others</b>	July last wk-2 <sup>nd</sup> wk Oct (R)		Mid Feb-last March

## Nutrient management

- The application of inorganic nutrient is N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O: @ 80-60-40 kg/ha , 50% N+ total of P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O as basal and remaining 50% of N @ 30DAS.
- **S:** Elemental sulphur @ 20-40kg/ha
- **Ca:** 20 kg Gypsum (beneficial to saline soil)
- **B:** foliar spray @ 0.2%
- **Zn:** Foliar spray @0.5%

## Water management

The water requirement for the crop is not more than 25-30 cm.

### Critical Stages

- Seedling (30 DAS)
- Bud initiation (Bottom stage)
- Flowering
- Bud development

## Harvesting

- The harvest should be done by sickle and cutting the head portion.
- Moisture content of seed during harvesting: 30-40%. Moisture @ storage: 8-10%.

## Yield

- The average yield is nearly 20 q/ha

Thank You...

