From Seed to Oil: The Journey of Sunflower

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Abstract

Sunflower is one of the best edible oil which has high oil percentage among oilseeds (40%). It has wide adaptability under different agro-climatic zones. It is the best cooking oil as it contains MUFAs, PUFAs which are best for heart patients. It is also very much useful in skin and hair problems as it has vitamin E. This oil is best for immune system, arthritis, cancer *etc.* problems. In the journey of extracting this much important oil from seed includes many stages during cultivation. Understanding the different stages will help producers and consumers to appreciate the benefits and importance of sunflower in agriculture and further the area under cultivation. Hence, this article mainly focusses from sunflower cultivation to oil extraction.

Introduction

Sunflower is one of the important edible and cooking oil across the world. It occupies third position in the world production wise and fourth position in India among total oilseeds consumption wise. Hence, the consumption is even more than India's production, which balanced our consumption by heavy imports from Ukraine, Russia. Sunflower can be cultivated in wide range of regions and seasons under favourable climatic conditions. It belongs to Asteraceae family. Sunflower originated from North America and later iit spreads worldwide, even to India. It is majorly cultivated for its oil, which is healthy and beneficial than the other oils. Because it is having polyunsaturated fatty acids, monounsaturated fatty acids, Vitamin E, nutrients *etc.* It is also used for confectionary purposes, food processing and industrial purposes.

Benefits of sunflower to opt for cultivation

Sunflower is short duration crop with 90-110 days. It can be grown in any cultivable farms. It is drought tolerant and also performs best under irrigated conditions. It produces healthy oil and has by-products *viz.*, residual material after oil extraction and the sunflower seed shells/hulls can be used in preparation of oil cake/ oil meal for poultry/ sheep farms/ as organic manure. The sunflower stalks, heads after harvest also can be utilized in compost preparation, fuel/ bio mass energy production, cattle feed, organic matter to improve soil health *etc.*

Steps in sunflower seed to oil journey: The journey from seed to oil begins with sunflower cultivation. Present sunflower production includes adoption of hybrids in farmers fields. The hybrids which were under cultivation are not useful for further production in next year due to segregation. Hence, these hybrids will be produced by crossing female (male sterile) CMS/A line and male fertile R line in 3: 1 row every year for effective pollination and seed setting. For getting better uniform hybrid seed, isolation distance from other sunflower cultivars should follow for avoiding unwanted pollination. This seed production is essential to get good quality seed and can be share with farmers for cultivation, and further oil extraction. Good quality seed has the characters of uniform germination, high vigour & viability, high productivity.

Sowing:

Farmers prepare the land well and sow seeds at recommended spacing 60 cm between rows and 30 cm between plants to maintain optimum plant population (55,555 plants per hectare). 2kg hybrid seed is sufficient to sow in one acre of land.

Fertilizers:

The recommended 60:60:30 kg/ha of N:P:K fertilizers under rainfed conditions. During flower opening, application of boron is essential and phosphorus fertilizer can be applied in the form of single super phosphate (SSP) tto meet the micro nutrients like calcium and sulphur requirements too.

Irrigations:

Irrigations are required for every 20 days once in heavy soils and 15 days once in light soils. Irrigation is compulsory in critical stages and avoid heavy/ excessive irrigation during seed development stage, when it may leads to lodging under heavy growth as sunflower requires moisture but not water stagnation.

Weeding:

After sowing, within 48 hours, pendimethalin 1.5litres/acre will protect crop from weeds for 30 days. After 30 days of sowing farmers should form earthing up and intercultivation operations simultaneously after 2nd irrigation to ensure support to the plant and ease for irrigation and other operations.

Plant protection measures: Sunflower should be free from pests, especially sap sucking pests and diseases in early stages.

Timely plant protection measures required for better seed production.

Flowering:

Sunflower starts flowering 50-60 days and matures in 85-90 days. Dyring the reproductive stage, growing honey bees helps to improve pollination and yields, as it is highly cross pollinated crop. Flowering continues for 30 days in different rows in each plant head. If it is seed production plots, synchronization of flowering between A and R lines is very important to get good quantity seed.

Harvesting:

Harvesting should be done after 110 days when the capitula back side is turns to yellow in colour, leaves become dried, seeds become mature and fully developed. The capitula are dried for 2 days and threshed to separate seed from heads. The seed is ready to sale or oil extraction after its moisture content reached to 9%.

Oil Extraction:

Oil can be extracted in oil mills through machines, where the seeds crushed by oil expellers and obtain crude oil. Otherwise, large scale industries use the bulk quantity of seed, use solvents like hexane to extract more oil from seeds. This oil is subjected to refine processes like degumming, neutralization, bleaching, deodorization *etc.* to improve the colour, smell, quality, clarity, fine oil with good shelf life.

Future Prospects:

Sunflower oil consumption helps for balanced nutrituons esp. for heart patients due to its PUFA and MUFA, vitamin E and nutrients. Hence, with improved agronomical practices, farmers can produce good amount of seed. If the demand of edible oil is increased, sunflower has good potence for its expansion by both development of best hybrids, best management practices. In this way, strengthening of oilseed production will reduce the dependency on imported oils.

Conclusion:

The journey of sunflower seed to oil shows the urgency of this crop cultivation in agriculture due to its high dependency and low production. Hence, understanding the steps in cultivation practices, seed production increases availability of good quality seed to farmers intime and further the production of oil and increasing in area under oilseeds in India. Promoting the cultivation through different production technologies also will help famers to raise the area and oil production and support oilseed farmer's livelihoods.

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