Supplemental pollination

Bees play a very important role in increasing seed set in sunflower more particularly in open pollinated populations. Maintaining 5 hives/ha provides optimum requirement besides yielding valuable honey.

Wherever, bee activity is low, resort to supplemental hand pollination on alternate days preferably in the morning hours between 8 and 11 a.m. for about 2 weeks. For this purpose, cover the hands with muslin cloth and gently rub the heads with fingers and also touch the heads of neighboring plants.

Bird damage

Birds, particularly parrots, pose serious problem to sunflower. Safeguard the crop from bird damage during the period from seed filling to harvesting through effective bird scaring particularly in the morning and evening hours. Tying bright reflector ribbons above the crop will support to scare away the birds. In addition to this manual watch to scare these birds ensures good crop stand establishment.

Harvesting and Threshing

In Sikkim Rabi sunflower crop matures in 125-135 days. Sunflower can be harvested at physiological maturity when the back of the head turns to lemon yellow colour and the bottom leaves start drying and withering. For convenience of safe drying and handling, the crop can be harvested at harvest maturity when all leaves dry. Further, delay in harvesting causes reduction in yield due to lodging, breakage and termite and/or red ant attack. Mature heads are cut with a sickle and dried in sun for 2-3 days to facilitate easy separation of seed. Thresh the harvested heads either by beating with sticks or rubbing or through manual or power operated threshers. The seed is cleaned by winnowing. Cleaned seed is dried for a day or two to bring the seed moisture content to less than 10 percent for safe storage.

Yield

Improved agronomic practices can produce about 2000-2200 kg/ha seed yield of sunflower in Sikkim condition.

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SUNFLOWER : A NEW OIL SEED POSSIBILITY IN SIKKIM

NICRA
National Initiative on Climate Resilient Agriculture

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In Sikkim, oil seed crops occupies 5.42 thousand ha area and having the production of 4.34 thousand tonnes. Among the total oil seed crops cultivated in state, rapeseed and mustard occupies prime position (99% of total area). Due to low productivity of rapeseed and mustard, there is deficit of 3500 MT of oil seed in the state considering the resident and floating population. It is, therefore, necessary to exploit domestic resources to maximize production to ensure edible oil security for the state. Sunflower (Helianthus annuus L.) has the high yield potential and oil content as compared to mustard hence, it can play an important role in meeting out shortage of oilseeds in the state. It is popularly known as Surajmukhi and belongs to family Compositae, a familiar plant in India newly introduced in Sikkim. Since, it contains 45-50 per cent good quality oil and quality protein in cake; it has good scope in mountain agriculture.

Climatic requirement

Sunflower can be successfully grown under varying conditions of day length provided temperature is favourable. The crop requires cool climate during germination and seedling growth, warm weather from seedling stage up to flowering and non-cloudy sunny days during flowering to maturity. A temperature of 15-20?C during the growing period and the temperature of 20-25?C during grain filling period are the ideal for harvesting good crop yield. For germination a minimum temperature ranges from 3-6?C, optimum of 20-26?C and maximum of 40?C. Temperature below 10?C generally retards germination and above 38-40?C cause desiccation of pollens and drying of stigmas, resulting in poor seed set and yields.

Soils

Sunflower can be grown on a wide range of soils from sandy loams to deep clays. However, good drainage is more important than basic fertility because it is more susceptible to high moisture content and soil compaction. Sunflower grows well on neutral to moderately alkaline soils, with pH range of 6.0-8.0 but dislikes acute acidic conditions. Hence, aapplication of 1 t/ha limestone or dolomite/ha is recommended to neutralized the soil acidity.

Seedbed preparation

Sunflower requires a well prepared deep, friable seedbed for better germination, establishment and growth. The poor plant stand and performance of the crop is often encountered with poor seedbed conditions. Sunflower has an extensive root system with a combination of thick and thin roots and is adapted for low soil moisture conditions by way of explorative rooting. For aiding this, the soil should be thoroughly tilled to a depth of 25-30 cm and sub-surface hard pans, if any, should be broken. After the primary tillage the soil should be brought to fine tilth by power tilling

Varieties/hybrids

Surya, Pro Sun 09, KBSH44, KBSH1, Jwalamukhi

Sowing depth and spacing

Firm seed- soil contact in moist soil is essential for good stand establishment. In situations where the top soil dries quickly or where the soil is sandy increased seedling depth may be necessary. Sunflower seed should be placed in soil at 4 -5 cm depth with the spacing of 60 cm between rows and 30 cm within the row for hybrids and long duration populations.

Season and sowing time

Sunflower is considered as day-neutral plant physiologically because of its low photoperiod sensitivity although; in Sikkim it is

recommended for cultivation in Rabi season after harvesting of rice. Zaid/Kharif season may not be suitable for its cultivation because grain filling/harvesting will coincide with heavy rainfall.

Seed rate

- Varieties: 8-10 kg/ha
- Hybrids: 4-5 kg/ha

Thinning

Sunflower is highly susceptible for intra-species competition and lack of thinning is the most common reason for poor yields. Hence, maintenance of optimum population by judicious thinning at 10-15 days after germination to maintain single healthy plant per hill is essential for obtaining higher yields, besides easy interculture and crop management.

Nutrient management

Sunflower is a fast growing and high oil-yielding crop and thus, it is expected to absorb more nutrients. Incorporate 5-6 tonnes of well decomposed FYM+2 t vermicompost/ha 2-3 weeks prior to sowing and mixed well in soil before sowing of the crop.

Weed management

Weeds compete with sunflower for moisture, nutrients and depending on species for light and space resulting in economic loss to growers through reduced yields as well as lower efficiency of other inputs used. Clean cultivation free from weeds in and surrounding sunflower field is essential for raising good crop of sunflower. Timely weeding and interculture is a must for checking weed growth and obtaining full benefits from applied nutrients and soil moisture. Provide two hoeing's followed by one hand weeding at an interval of 15 days commencing from 15-20 DAS.

Water management

In general, irrigation may be given once in a week to the crop on light soils and once in 20 days on heavy soils. Avoid excessive and too frequent irrigation as such practice predisposes the crop to attack of wilt and root rots. Whenever, irrigation water is a constraint, provide irrigation at the three critical crop growth stages mentioned below for realizing optimum response from the scarce input of water. Avoid moisture stress at these sensitive crop growth stages, as it adversely affects seed set, filling and consequently the yield.

Stage	Short duration cultivars	Long duration cultivars
Bud initiation	0-35	35-40
Flowering opening	45-50	55-60
Seed filling	55-80	65-90

Flower opening period is the most sensitive to water deficit. Seed filling is the next important stage for soil water deficit.

Crop sequences

Sunflower can be rotated with any kharif season crop which will be harvested by November. However, rice-sunflower, beans-sunflower cropping system may be more suitable for mid hills of Sikkim.

Moisture conservation practices

Since sunflower is recommended for cultivation in Rabi season, soil moisture conservation techniques play an important role in achieving higher yields under rainfed conditions. Mulching of crop residue/locally available weed/forest biomass @ 5 tonnes/ha is recommended after crop emergence at the time of thinning for conserving the soil moisture.