

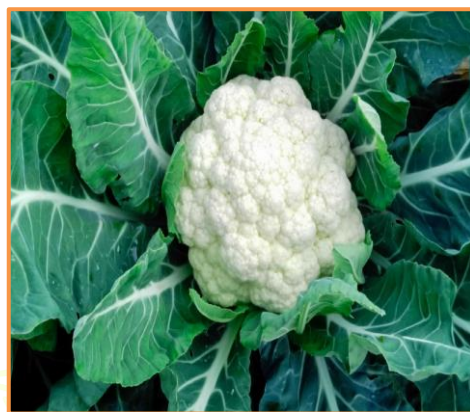
Production Technology of Early Season Cauliflower in Haryana

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Cauliflower (*Brassica oleracea* var. *botrytis*) is most popular vegetable among cole crops. It has small, thick stem, bearing whorl of leaves and branched tap root system. The main growing point develops into a short shoot system whose apices make up the convex surface of curd so the curd is a pre-floral fleshy apical meristem. The edible part, i.e. curd colour is generally white and may be enclosed by inner leaves before its exposure. Curd colour varies with the variety and environment. It may be white or cream-white. The curd contains an appreciable amount of vitamin B, vitamin C, folate, calcium and protein. India ranks first in cauliflower production in the world. It is grown on an area of 491.5 thousand hectares with a production of 9548 thousand metric tonne.



Scientific Name: *Brassica oleracea* var. *botrytis*

Family: Brassicaceae

Chromosome Number: $2n = 18$

Origin: Mediterranean region

Soil

Cauliflower thrives best in various soil types, from sandy loam to clay. The soil must be well-drained and nutrient-rich. In light soils, the plants are particularly sensitive to drought, so proper watering is necessary. Light soils are ideal for early crops, while loamy and clay loam soils are better for mid- and late-season crops. The best soil pH for cauliflower is between 6 to 7 and, if the pH is below 5.5, liming is needed. Cauliflower is sensitive to high acidic conditions. Cauliflower is more sensitive to deficiency of boron and molybdenum resulting in browning and whiptail disorders, respectively.

Climate

Cauliflower is a thermo-sensitive crop, meaning that temperature significantly affects its vegetative, curding, and reproductive stages. Temperature affects vegetative, curding and reproductive phase of cauliflower. It can grow at an average temperature of 5-8°C to 25-28°C. During vegetative growth, some may withstand temperature as low as 10°C and as high as 40°C for a few days. The optimum temperature for the growth of young plants is around 23°C and 17-19°C in later stages. In temperate region, growth of young seedlings may cease when temperature slightly above 0°C, while early varieties in plains and other tropical regions can grow well up to 35°C.

Early varieties

Early Kunwari: A very early variety for growing in Punjab, Haryana, Himachal Pradesh and Delhi. Ready for harvest from mid-September to mid-October. Curds are semi-spherical with even surface.

Pusa Katki: It is a high yielding variety of early maturity group of Indian cauliflower. The curds are semi-dome shaped, white and compact with average weight of 650-750 g. It attracts consumers and has curd characters which can fetches higher market prices. It is suitable for sowing during second fortnight of June and transplanting during second fortnight of July to first week of August under north Indian plain conditions. Its maturity period is end of October to 1st fortnight of November and marketable yield potential is 20-22 t/ha.

Pusa Early Synthetic: Plants erect with bluish green leaves, curd small to medium in size, flat, creamy white and compact. Average yield 11.7 tonnes/ha.

Pant Gobhi 2: Recommended for cultivation in the northern plains of the country. Curds are medium compact and yellowish. Yield potential is 10 tonnes/ha available in October in the plains.

Pant Gobbi 3: A synthetic variety combining inbred lines. Plants with long stem, semi-erect leaves and hemispherical creamy white, medium compact, non ricey curds. Yield 12 tonnes/ha. Curds are ready for harvest in September.

Pusa Deepali: Recommended for cultivation in entire north Indian plains. Plants medium tall, erect, bluish green and waxy leaves, curds compact, retentive white and medium in size.

Nursery practices, seeds and sowing

Seeds should be sown in well-drained and carefully prepared nursery beds. The soil in these beds should be finely tilled before sowing and not heavily fertilized. The nursery beds should be thoroughly prepared by adding well rotten FYM or compost.

Seeds Rate: For early season variety seed rate of 300-500 g/acre is required whereas for late and mid or main season variety seed rate of 250-300 g/acre is required.

Seed treatment: Seed should be treated with Thiram @ 2g/kg seed. Crop grown in sandy soils are more prone to stem rot. To prevent it do seed treatment with Carbendazim 50%WP @ 3 g/kg of seeds.

Method of sowing: Sow seeds in nursery at a depth of 1-2 cm and apply irrigation with rose cane. Seedlings are ready to transplant within 30-35 days after sowing. For transplantation use three to four weeks old seedlings.

Preparation of field: The soil should be well-prepared and finely tilled. Manure and fertilizer should be applied as a basal dose during field preparation.

Transplanting: For early cultivars, sturdy seedlings that are 4-5 weeks old should be chosen for transplanting. Seedling should be transplanted during evening hours followed by irrigation. The seedlings for September and October maturity are transplanted in mid-July and August, respectively. Transplanting distance varies according to variety and time of planting. Transplanting of September maturity is recommended on raised beds at a spacing of 45 cm x 30 cm for early season crop whereas for mid and late maturing crop use spacing of 60x45 cm.

Manure and Fertilizer management:

Apply well decomposed FYM@10 tonnes per acre in soil along with Nitrogen @ 50 kg, Phosphorus @20 kg and Potash @ 20 kg in form of Urea@110 kg, Single Superphosphate @120 kg and Muriate of Potash@32 kg. Apply whole quantity of FYM, SSP and MOP and half quantity of Urea before transplanting. Apply remaining quantity of Urea four week after transplanting as top dressing.

Irrigation

Maintaining a proper soil moisture level is crucial for achieving a good cauliflower yield. Immediately after transplanting, seedlings should be irrigated to establish a strong crop stand. Early and mid-season crops typically need only protective irrigation, depending on rainfall.

However, consistent moisture throughout both growth and curding stages is essential for uniform growth and proper development of the curd. However, depending upon soil, climatic condition, apply irrigation at interval of 7-8 days in summer season and 10-15 days during winter season.

Weed control

Weed management is a critical issue in cauliflower cultivation due to wide spacing, frequent irrigations, and generous use of manure and fertilizers. Failure to control weeds can lead to a significant reduction in curd yield. To prevent these losses, the crop requires a weed-free period of four weeks after transplanting. Therefore, two hoeing and weeding and earthing up after 4 weeks are required for better growth. Traditionally, hand weeding using a *khurpi* is the primary method of weed control in cauliflower, although it is labor-intensive and costly. Alternatively, using black polythene film has shown promising results, with reported increases in yield by up to 40%. This method helps retain moisture, preserve soil structure, and minimize temperature fluctuations, contributing to improved cauliflower growth and yield. It has been found that pre-planting spray of 2-2.5 litre Basalin (alachlor) or 3.3 litres of pendimethalin per hectare in the finally prepared field control dicot weeds for about 45 days.

Harvesting

When harvesting cauliflower, it's crucial to cut the curd promptly when it reaches its peak maturity. If there's uncertainty about its readiness, it's advisable to harvest earlier rather than later. Delayed harvesting can lead to the curd loosening due to the emergence of flower stalks, resulting in leafy, ricey, or fuzzy curds. During the harvesting process, the stalk should be cut above the soil surface using a large and sharp knife or *khurpi*. Next, trim the large leaves, leaving just enough jacket leaves to safeguard the curd from bruising and other mechanical damage during transportation. When transporting loose cauliflower, more jacket leaves should be retained compared to when packed in crates. In crates, trim the jacket leaves to leave a fringe projecting 2-3cm above the curds.

Physiological disorders

Browning or brown rot: This is caused by Boron deficiency. It appears as water soaked areas and later changes into rusty brown. Spray one kg of Borax in 200 lit of water per acre 30 days after planting.

Browning



Whip tail: This results from the deficiency of Molybdenum. It is more pronounced in acidic soil. The leaf blades do not develop properly. In severe cases only the midrib develops and it can be corrected by spraying 100 g of Sodium molybdate in 200 lit of water per acre, 30 days after planting.

Whiptail



Buttoning: The term buttoning is applied to the development of small curds or buttons. The plants do not develop normally and leaves remain small and do not cover the developing curds. Deficiency of Nitrogen and planting the early varieties late may cause these symptoms. Avoid transplanting aged seedlings.

Buttoning



Blindness:

Blind-cauliflower plants are those without terminal buds. The leaves are large, thick, leathery and dark green. It is due to the prevalence of low temperature when the plants are young or due to damage to the terminal bud during handling the plants or due to injury by pests.

Blindness

Riceyness: It manifests in the elongation on peduncle wearing flower buds, rendering curds, granular, loose and somewhat velvety. A premature initiation of floral bud is characterized by riceyness in cauliflower and is considered to be of poor quality for marketing. It can be controlled by cultivation of genetically pure seed and appropriate varieties with recommended cultural practices.

Riceyness

Fuzziness: It appears as the flower pedicels of velvety curds elongate. The anomaly is both hereditary and non-hereditary. Cultivation of cauliflower, out of their normal season encourages fuzziness. Sowing good quality seed in right season under proper cultural practices, minimized fuzziness.

Fuzzy curd

Leafiness: This disorder is commonly seen by formation of small thin leaves from the curd which reduces quality of curd. Extremely small green leaves appear in between the curd segment due to inheritable or non-hereditary factors. Prevalence of high temperatures during curding phase aggravates leafiness. Certain varieties are more sensitive to leafiness or bracketing than other. It can be controlled by selection of varieties according to their adaptability.

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