

## Post-Harvest Management Protocols

# CAULIFLOWER

Cauliflower is one of the most important winter vegetables grown in India. In India, cauliflower is being cultivated in almost all the states, but the main states where it is grown are West Bengal, Bihar, Madhya Pradesh, Odisha, Assam and Uttar Pradesh.

Cauliflower produces best quality curds in cool and slightly moist climatic conditions. The optimum monthly average temperature for its cultivation ranges from 15 to 20°C. The early varieties require higher temperatures and longer day lengths. **Total production of cauliflower for the year 2019-20 was 8844 ('000 MT).**



Varieties of cauliflower cultivated in India are:

- Early Kunwari
- Early Synthetic
- Pusa Katki
- Pant Gobhi-2
- Pant Gobhi-3
- Pusa Synthetic
- Pant Shubhra
- Punjab Giant-26
- Punjab Giant-35
- Pusa Snowball-1
- Pusa Snowball-2
- Sonwball-16
- Dania Kalimpong

Some new varieties released from ICAR-Indian Institute of Vegetable Research, Varanasi are Kashi Kunwari, Kashi Agahani and Kashi Gobhi 25. Recently, many improved varieties of cauliflower have been also been released from ICAR-Indian Agricultural Research Institute, New Delhi which are as follows: Pusa Kartiki, Pusa KesariVIT-A-1, Pusa Ashwini, Kartik Sankar, Pusa Meghna, Pusa Sharad, Pusa Shukti, Pusa Paushja, Pusa Hybrid 2 and Pusa Snowball KT-25.

## MATURITY INDICES OF CAULIFLOWER

The cauliflower curd is an inflorescence consisting of many florets. The maturity indices of cauliflower curd can be ascertained by the number of days for harvesting specific to the variety sown depending on the early, mid or late maturity group, the curd size and colour typical of the cultivated variety and the curd compactness. The curd, if allowed to over-mature will exhibit 'Riceyness' with the appearance of tiny black specks typical of florets undergoing opening. 'Riceyness' in cauliflower is a sign of over-maturity and poor quality.

The appropriate time to harvest is late morning to early afternoon. There is a need to allow the excessive moisture inside the curd to evaporate quickly.

During manual harvesting, a cutting tool (such as sickle) is used to detach the cauliflower curd from plant. The curd should not be touched by the hand or by the cutting tool in order to minimize any physical damage to it. Minimal handling helps to maintain quality & reduce the impact of compression or bruising injuries

### GRADING

Field sorting of cauliflower curds should be done on farm to cull out unmarketable curds i.e. diseased, insect-infested or rat-damaged ones. On farm sorting also minimizes transportation costs. Sorting and grading must be done in a packing area equipped with sorting tables, weighing scales or a sorting device. Grading must be done in a location that is done well-lit.

The grading of cauliflowers as per the UN Food and Agriculture Organization (FAO) is given overleaf

Characteristic	Premium Grade	Grade 1	Grade 2
Weight (g)	500 g-1.5 kg	1.5 kg-2.5 kg	Less than 500g or more than 2.5 kg
Color defects: Maximum % by weight	White or Creamy White only	5%	10%
Maximum Wrapper leaves:	4	4	4
Maximum Length of Stem:	10 mm	10 mm	10 mm
Freshness required	100% Fresh, no wilted leaves or curd	Very slightly wilted leaves permitted. Curd firm	Slightly wilted leaves and curd permitted.
Bruise/cuts: Maximums % weight	5%	10%	15%
Insect damage: Maximum % weight	0%	2%	5%
Pack Size	10 kg crate with paper lining	15 kg crate	20 kg plastic bag
Total Defects permitted (Maximum% by weight)	5%	10%	15%

Source: FAO

## PACKAGING

In many countries, the curd is harvested by cutting the stem with about 6 to 8 leaves still attached. The attached leaves protect the curd from physical damage during packing and transportation. The harvested curds should directly be placed inside collection baskets with liners or in a plastic-crates for transportation.

The best container for cauliflower curds is the plastic crate because of its smooth inside finish, ease of cleaning and the fact that it can be used over a long period (10 yrs approx). For best results, the layers of curds inside the plastic crate should be lined with plastic sheet liners so as to minimize abrasion damage to the curds during transit.

## STORAGE

Cauliflowers have few storage reserves and little protection from moisture loss, so need to be cooled below 5°C as soon as possible after harvest. Hydro-vacuum cooling and forced air systems for pre-cooling can be effective.

Storage life is maximised at close to 0°C with over 90% RH. Under these conditions cauliflower can remain in good condition for up to 4 weeks. At warmer temperatures cauliflowers deteriorate rapidly, becoming soft and discoloured within only a few days at 10°C or higher.

## STORAGE PARAMETERS

Recommended Temperature (degree Celcius)

**0**



Recommended Relative Humidity (%)

**95-100**



Shelf Life

**3 to 4 weeks**



Product Loading Density (in Pound/cu.ft)

-

Initial Freezing Point (in degree celcius)

**-0.8**

Specific Heat Above Freezing Point in (kJ/Kg.K)

**3.92**

Specific Heat Below Freezing Point (in kJ/Kg.K)

**1.99**

Latent Heat of Fusion (in kJ/Kg)

**307**

### Thermal properties of Cauliflower

Initial Freezing Point (in degree celcius)

**-1.1**

Specific Heat Above Freezing Point in (kJ/Kg.K)

**3.65**

Specific Heat Below Freezing Point (in kJ/Kg.K)

**1.89**

Latent Heat of Fusion (in kJ/Kg)

**278**