

## Post-Harvest Management Protocols

# POMEGRANATE

India is one of the leading countries in pomegranate production. Over the last one decade, the country has registered sizeable increase in area and production, respectively. In the year 2016-17 India exported 51,000 ton of pomegranates to various countries. There has been marked shift towards the consumption of pomegranate worldwide owing to its several nutritive, nutraceutical and medicinal properties. Pomegranate is majorly exported to UAE (43%), Bangladesh (16%) & European Countries (14%) A few tons also go to Saudi Arabia, Russia, Thailand, Nepal, Kuwait etc. **Total production for the year 2017-18 was 2844.52 ('000 MT)** and major producing states are Maharashtra, Gujarat, Karnataka, Andhra Pradesh and Madhya Pradesh.



### Important pomegranate varieties cultivated in India

- Alandi or Vadki
- Dholka
- Kandhari
- Kabul
- Muskati Red
- Paper Shelled
- Spanish Ruby
- Ganesh (GB I)
- G 137, P 23, P 26
- Mridula, Aarakta
- Jyoti
- Ruby
- IIHR Selection
- Yercaud 1
- Co 1.

## MATURITY INDICES

Pomegranate is a non-climacteric fruit and should be harvested when fully matured. It takes around 4-5 years for pomegranate trees to bear fruits. The fruits become ready for harvest in 120-130 days of fruit setting, maturity symptoms of the fruit are: They turn yellowish red in color and get suppressed from the sides, the calyx at distal end of the fruit gets closed.

The fruits are generally harvested when fully ripe with a waxy shining surface of red or yellow peel colour, depending on the cultivar. The fruits must be picked before over maturity when it tends to crack open if rained upon or under certain conditions of atmospheric humidity, dehydration by winds, or insufficient irrigation. At the same time early harvesting in order to avoid fruit cracking will lead to poor quality of pomegranate. Generally, the fruits will be ready for harvesting after 5-7 months of flowering. The maturity can be judged based on

- External dark red or yellow colour skin (depending on cultivar) without any greenish tinge.
- Red colour of arils/juice
- TSS content of juice around 15 to 16 %
- Sweet Taste
- Weight: > 250 g



Immature fruits with green peel colour

Reddish Yellow Peel in Mature Fruit



Bright Red Waxy Peel in Mature Fruit

## SORTING/GRADING

Fruits are graded based on their weight, size, and color. The various grades are super, king, queen and prince sized. Besides that, pomegranates are also graded into two grades- 12 - A and 12 - B. Fruits of 12 - A grade are generally preferred in southern and northern region. Based on fruit weight, they are graded into the following 3 grades.

Grade	Fruit weight (grams)
Grade A	350 and above
Grade B	250 to 350
Grade C	< 200

## PACKAGING

Corrugated fibre board (CFB) boxes are used for packaging since they are light in weight, cause less or no damage to fruits, are easy to handle. CFB cartons of a standard size (40x20x24cm) are used for packaging. The white colour boxes having 5 plies are generally used for export purpose, whereas red coloured ones having 3 plies are used for domestic markets. Boxes made of light wood; bamboo basket are also used for packaging. Dry grass, rice straws, or paper are used as cushioning material at the bottom and top of box or basket. For export market the fruits should be wrapped with tissue paper and packed in two rows in CFB boxes of 40 x 24 x 20 cm size or in a single row of 40 x 24x10 cm size boxes. Newspaper shreds, bubble sheets or polyester foam sleeves can be used as cushioning material. Package inserts like moulded pulp or plastic trays and cells to isolate individual fruit can also be used to avoid any kind of mechanical damage.





## STORAGE

The major storage problem is desiccation of the fruit resulting in a brownish coloured tough peel and browning of arils. The optimum storage temperature for pomegranate is 6 to 8°C. The fruits are susceptible to chilling injury when stored at a temperature of below 5°C. The normal chilling injury symptoms include brown discoloration of the skin, pale colour of the arils, brown discoloration of the white segments separating the arils and increase susceptibility to decay. Pomegranates are highly susceptible to water loss resulting in drying of the peels. The optimum RH to prevent water loss is 90 – 95 %. Storing fruit in plastic liners and waxing can reduce water loss, especially under conditions of lower relative humidity. Post-harvest treatment of pomegranate with wax emulsion helps in extending storage life both at room and low temperatures.

### Quality Indices for export

- Freedom from growth cracks, cuts, bruises and decay
- Attractive skin colour and smoothness
- Good Flavour (depends on sugar/acid ratio).
- TSS of above 17 % is desirable
- Tannin content below 0.25 % is desirable

### Storage Parameters

Recommended Temperature  
(in degree Celcius)

**3-8**



Recommended Relative  
Humidity (in %)

**90-95**



Shelf Life

**5 days @ chilled  
Temperature, 3 days @  
Ambient Temperature**



Product Loading Density (in Pound/cu.ft)	-
Initial Freezing Point (in degree Celsius)	<b>-3</b>
Specific Heat Above Freezing Point in (kJ/Kg.K)	<b>3.58</b>
Specific Heat Below Freezing Point (in kJ/Kg.K)	<b>1.86</b>
Latent Heat of Fusion (in kJ/Kg)	<b>274</b>

### Thermal properties of Pomegranate

Initial Freezing Point (in degree celcius)	<b>-1.1</b>
Specific Heat Above Freezing Point in (kJ/Kg.K)	<b>3.65</b>
Specific Heat Below Freezing Point (in kJ/Kg.K)	<b>1.89</b>
Latent Heat of Fusion (in kJ/Kg)	<b>278</b>

