

Punjab Horticultural Postharvest Technology Centre Punjab Agricultural University, Ludhiana

PHPTC Newsletter

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Postharvest Handling of Summer Fruits and Vegetables

The fruits and vegetables grown during summer season are highly perishable in nature and need to be handled carefully after harvesting for maintaining adequate quality during marketing.

1. Some typical characteristics of maturity indices for fruits and vegetables

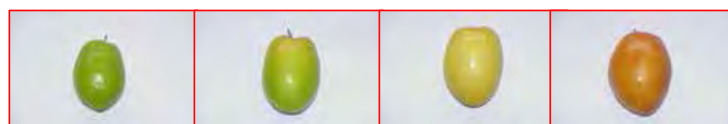
Fruits	Maturity indices or characteristics
Grapes	TSS-acid ratio of 20 or higher or when berries near the tip are sweet enough to eat
Peaches	Ground color change from green to yellow (varies with cultivars)
Pears	Skin color change from green to yellowish green
Plums	Reddish colour on $\frac{1}{4}$ - $\frac{1}{2}$ of surface
Guava	Colour break stage
Litchi	Bright red colour
Mango	Change in shapes (increased fullness of checks or bulge of shoulder), change of flesh colour to yellowish-orange
Ber	Colour break stage
Vegetables	
Bhindi (Okra)	Pods not fibrous, tips of pods pliable
Brinjal	Immature, glossy skin before hardening of seeds
Cucumber	Attained marketable size but still tender
Muskmelon	For distant markets harvest at $\frac{1}{2}$ to $\frac{3}{4}$ th slip stage. For local market harvest at full slip stage.
Bell pepper	Fruits fully developed still green and shining
Hot Pepper	For dry chilli powder allow to turn deep red
Tomatoes	For local market harvest when red ripe, for medium distance markets at pink stage and for distant market at breaker stage. For processing tomato should be harvested when fully red ripe



Judging maturity of plum by colour



Judging maturity of peach by colour



Judging maturity of ber by colour



Judging maturity of mango by colour



Judging maturity of tomato by color

2. Harvesting: The fruits and vegetables are highly susceptible to surface damage from bruises or abrasions to the skin. Pickers are advised to use padded clean buckets or baskets



Harvesting techniques and containers

lined with newspaper or soft jute bags for harvesting fruits to avoid fruit injury. The fruits should be picked gently by hands or using secateurs. In case of pear, the fruits should be picked by giving upward twist to the fruits so that spurs are not damaged. The number of handling steps should be minimized and as far as possible field packaging should be practiced. The fruits should be kept in shade during any delay between harvest and transport.

3. **Pack-house operations:** Immediately after harvesting, the fruits and vegetables should be transported to pack-house. These should be sorted to eliminate visual defects. The produce should be pre-cooled immediately to remove the field heat. Common methods of pre-cooling include (a) Forced air cooling (b) Hydro cooling (c) Room cooling.
4. **Grading:** The grading of fruits and vegetables play an important role in domestic and export marketing of fruits in order to fetch better price in the market. The fruits should be graded according to their size or weight and may be categorized as large, medium or small. The different grades recommended by DMI are as under:

Grapes

Grade	Size of berries	
	Large bunch weight (g)	Small bunch weight (g)
Extra class	200	150
Class I	150	100
Class II	100	75

Mango

Grade	Weight (g)
A	200-350
B	351-500
C	551-800

Peach

Size Code	Dia (mm)
Special	55-63
Grade I	46-55
Grade II	<46

Plum

Size Code	Dia (mm)
Special	>42
Grade I	36-42
Grade II	<36

Litchi

Grade	Dia (mm)
Extra class	33
Class I	28
Class II	23

Water Melon

Size Code	Weight (Kg)
A	1.25 to 2.50
B	2.51 to 5.00
C	Above 5 Kg

Beans

Size Code	Width (mm)
Very fine	6
Fine	9
Medium	12

Chillies

Size Code	Length (cm)
A	less than 2.6
B	2.6 – 4.0
C	4.1 – 7.0
D	7.1 – 10.0
E	10.1 and above

Sweet pepper

Size Code	Dia (mm)
Elongated (pointed)	20
Square (blunt)	40
Flat (tomato pepper)	55

Okra

Size Code	length (mm)
A	40.1 – 65.0
B	65.1 – 90.0
C	90.1 – 115.0
D	115.1 and above

Gherkin

Size Code	Weight (g)
A	< 5
B	6-10
C	11-20
D	21-35
E	36-50
F	51-70
G	71-100
H	101-150
I	150 and above

5. **Packing:** Proper packing of produce will ensure safe transportation from the farm to the storage and consumer centre, while reducing the damage during transportation. The produce should be packed in such a way that they do not collide with each other during transportation. A wide variety of containers such as wooden boxes, plastic crates, corrugated fibre board boxes are used in the transportation and distribution of fruits and vegetables. All the packages must have some amount of ventilation in order to prevent physiological break down. Corrugated fiberboard cartons (CFB) are comparatively new and making significant entry into this field. These have many advantages such as light in weight, cause much less damage to the fruits, easy to handle & print and improve product image. The packing of produce in gunny bags or wooden baskets tied with jute cloth should be avoided as these lead to bruising and result in huge postharvest losses. For retail marketing, the fruits and vegetables should be properly packed in consumer packs using paper moulded trays followed by wrapping with shrink film or cling film.



- 6. Storage:** The bruise and infection free fruits packed in plastic crates or corrugated fibre boxes can be stored successfully in cold stores. The optimum conditions for storage of these fruits are as under:

Name of the produce	Temperature (°C)	Relative Humidity (%)	Expected storage life (weeks)
Peach	0-1	90-95	2-3
Plum	0-1	90-95	2-3
Grapes	0-1	90-95	6-7
Pear	0-1	90-95	7-8
Mango	12-13	90-95	2-3
Litchi	2-3	90-95	1-2
Okra	8-10	90-95	1-2
Cucumber	8-10	90-95	1-2
Chillies	8-10	90-95	2-3
Capsicum	8-10	90-95	1-2
Bitter gourd	12-13	90-95	1-2

- 7. Marketing:** India is a huge market of fresh fruits and vegetables, however, proper marketing strategies needs to be explored for proper distribution of fresh produce throughout the country to the consumers. Many agencies like APEDA and Punjab Agro Industrial Corporation (PAIC) are promoting and facilitating distant marketing of fresh produce. The desirous farmers should contact these agencies along with Department of Horticulture of Punjab and Punjab Agricultural University, Ludhiana for help and guidance. The farmers are advised to make their own association for marketing their quality produce. It will help in minimizing their exploitation in the hands of traders. Various schemes are available for creation of postharvest infrastructure such as integrated pack house, cold storage etc under National Horticulture Mission (NHM) programme. The farmers and traders can contact or visit the offices of Punjab State Department of Horticulture at block or district level for further information and guidance.

Home Storage of Fruits and Vegetables

- Always take out fruits and vegetables from plastic carry bags. Remove damaged and bruised fruit/vegetables and store only clean and healthy produce.
- Do not place produce in sealed polythene bags. This may increase off-odors and decay due to accumulation of carbon dioxide and depletion of oxygen inside the sealed bag or closed bags.
- Green coriander, mint leaves can be stored in refrigerator. Cut and remove the root portion and remove the grass and other damaged leaves. Wash them properly and spread on paper under shade or fan to remove the surface moisture. Wrap coriander and mint leaves in tissue paper and store in refrigerator.
- Most of the fruits and vegetables should be stored only at room temperature because refrigerator temperatures prevent them from ripening to good flavour and texture. For example, bananas stored in refrigerator develop black skin and do not gain sweetness. Similarly, tomatoes do not turn red and even red tomatoes kept in the refrigerator lose their flavour.
- Onion, sweet potatoes and pumpkins, if stored on shelves or slatted crates, keep better than if spread over the floor. Stringing of onion, garlic and hanging of the strings in a well-ventilated dry location is a very effective storage method.
- Greens like palak, methi, dhania can be kept fresh by dipping stem bases in water in jug or glass to maintain their freshness.

New Recommendations

PAU Research Evaluation Committee approved two recommendations:

- 1. Plastic crate (10 Kg) and CFB box (5 Kg) for packaging of tomato:** The plastic crate of internal size 465 mm x 290 mm x 140 mm can hold about 10 kg of tomato, while corrugated fiber board box of internal size 335 mm x 215 mm x 185 mm (3-5 ply) can carry 5 kg tomato for distant and domestic marketing with minimum losses.



- 2. Technology for drying of bitter gourd:** Bitter gourd slices of 1-2 cm thickness can be optimally dried with acceptable quality at 65 °C/2 h; 55°C/8 h followed by equilibration at ambient conditions (35-40°C).



**SPECIALIST IN POTATO, ONION, GARLIC SORTING, GRADING,
HANDLING AND PACKAGING MACHINES**



GRADING CAPACITY

**5 TONS/HOUR
TO
50 TONS/HOUR**



RETAIL PACKAGING

0.5KG TO 5 KG

BULK PACKAGING

5KG TO 50 KG BAGS



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