Practical 3

HARVESTING, SAFE PLUCKING AND STORAGE OF FRUITS

EXERCISE

3.1 : Learn about harvest maturity, safe plucking and storage of fruits

OBJECTIVES

- To learn the maturity indices of fruits
- To practice safe plucking of fruits
- To learn and practice safe storage methods of different fruits

Delivery schedule: 03 periods

Student expectations/learning objectives

- Importance of maturity index in harvesting of fruits
- Importance of safe plucking of fruits
- Importance of storage of fruits

Pre-learning required: Acquaintance with different kinds of fruits, their maturity and different types of storage structures.

Handouts/material/equipment's & tools required: Paper sheet and pen to note down the instructions, different tools for harvesting of fruits, clipper, secateurs, refracrometer, and availability of storage structures, etc.

INTRODUCTION

Maturity index and harvesting

All fruits require certain period for attaining maturity. Fruits should be harvested when they are fully mature. Fruits transit different signals for maturity, which are called as maturity indices. Harvesting of

fruits at optimum maturity will produce the best quality fruits in terms of size, colour, flavour and shelf life than those not harvested at appropriate maturity. Harvesting when fruit is cool (early morning) and cooling the fruit as soon as possible promotes quality and shelf life.

Harvest most of the fruits by twisting and lifting the fruit up, not by pulling straight down from the spur or branch. Proper technique for harvesting of fruits is important for minimizing bruises and injuries. Place fruits gently in your harvesting container. Do not just drop them on the ground. Softer fruits require more careful handling to avoid bruises, but firmer fruits at harvest require more careful handling to avoid skin punctures.



Secateur for safe harvesting of fruits



Refractometer for TSS determination

Harvesting terminology

- **Mature:** the stage that will ensure ripening after the fruit is harvested.
- **Optimum maturity:** that point of maturity when fruit has reached its best quality for harvest.
- **Ripe:** the point where fruit will start to deteriorate if not eaten.

Maturity

There are many measures of maturity. Some require specialized instruments and are not always practical for the home orchardist. The following chart lists a variety of measures (maturity indices) of maturity for different fruits.

Measures of maturity for fruits		
Maturity index	Used For	
Days from full bloom	Pears, apples	
Size	Characteristic of a variety, most fruits	
Shape (fullness)	Stone fruits	

External color	All fruits (e.g. ground color changes in Golden Delicious, over color changes in red or purple fruit)
Internal Colour	
Flesh	Stone fruits
Seeds (darkening)	Pome fruits
Firmness	Pome and stone fruits
(pressure tests)	
Flesh Composition	
Soluble solids	Pome, stone, kiwifruit
Starch	Pome fruits
Sugar/acid ratio	Citrus
Acid	Pomegranate
Tannin	Persimmons
Ethylene	Pome fruits
Taste	Many fruits

Safe plucking

Depending on the type of fruit, harvesting should be done with harvesting tools such as secateurs or knives, and hand held or pole mounted picking shears.

When fruits are difficult to catch, such as mangoes or avocados, a cushioning material is placed around the tree to prevent damage to the fruit when dropping from high trees. Harvesting bags with shoulder or waist slings can be used for fruits with firm skins, like citrus and avocados. They are easy to carry and leave both hands free. The contents of the bag are emptied through the bottom into a field container without tipping the bag. Plastic buckets are suitable containers for harvesting fruits that are easily crushed, such as tomatoes. These containers should be



Mango harvester for safe plucking of fruits



Clipper for safe plucking of fruits



Safe plucking of Kinnow fruits with clipper

smooth without any sharp edges that could damage the produce. Commercial growers can use bulk bins with a capacity of 250-500 kg, in which crops such as apples are placed, and sent to large-scale packinghouses for selection, grading, and packing.

Harvesting containers must be easy to handle for workers picking fruits and vegetables in the field. Many crops are harvested into bags. These containers are made from a variety of materials such as paper, polyethylene film, sisal, hessian or woven polyethylene and are relatively cheap but give little protection to the crop against handling and transport damage. Sacks are commonly used for crops such as potatoes, onions, cassava, and pumpkins. Other types of field harvest containers include baskets, buckets, carts, and plastic crates. For high risk products, woven baskets and sacks are not recommended because of the risk of contamination.



Harvested apples in Kilta



Agricultural apple baskets, pear and corncob carriers

Storage of fruits

When production of fruits is high and it is difficult to sale the fruits at a stretch, it is better to store them for future use. However, we should have adequate knowledge about safe storage of fruits. For example, all the fruits can't be stored in one chamber because all may not have similar requirements





Teachers: Attention please

- Teachers are advised to take the students to orchards of different fruits and demonstrate the importance of maturity indices (colour, shape, size, TSS etc.) and safe plucking with secateurs or clippers.
- Determine TSS of some fruit samples and co-relate it with maturity of different fruits.
- Show some storage structures and their importance.
- If possible, arrange to construct, Zero Energy Cool Chamber in your school. Keep some fruits inside and some outside the chamber. Compare the differences in weight loss, colour and quality of stored fruits.

for safe storage. Optimum temperatures to ensure longer storage life vary among commodities. Important storage principles are:

• Fruit stored at higher temperatures respire more than at lower temperatures. Heat/ respiration generated 0°C may be 1/10 of that generated at 15.5°C.



Walk-in-chamber for storage of fruits



CA Storage system

- Time-temperature effects are dramatic: apples ripen in 3 days at 21°C and 30 days at-1°C.
- High relative humidity usually promotes storage life and fruit quality.
- There are many methods for providing fruit storage. The goal is to do whatever is possible and practical to meet optimum storage requirements and ensure high fruit quality. Methods include:
- Refrigeration (large or small)
- Cellars, basements
- Store outside (protect from sun, rain, rodents, etc.)

- Air conditioners, swamp coolers, under tarps
- Process, freeze, can, and/or dehydrate for home use
- Controlled atmosphere storage (commercial)

STUDENT'S ACTIVITIES/EXERCISES

- 1. Harvest the fruits of different maturities (immature, mature and ripe) and observe the differences between them, both physical and biochemical.
- 2. Harvest some fruits and determine their TSS (total soluble solids). Note down on your notebooks and compare, which fruit is ready for harvesting on the basis of TSS.
- 3. Harvest some fruits with hand and others with clipper or secateurs. Keep them at room temperature. Observe the differences and note down in your notebooks.
- 4. Observe the postharvest behaviour (moisture loss, respiration and ripening rate) of fruits stored at ambient and cold storages.
- 5. Visit some research institute having some advanced storage structure. Note down the components of such storage structures.
- 6. Store some fruits in a storage structure and some outside (at ambient conditions). Compare them and note down the differences in weight loss, TSS, colour and eating quality in your notebooks.

RESOURCE MATERIAL

- Sharma, S.K. and Nautiyal, M.C. (2009). Postharvest technology of horticultural crops. New India Publishing Agency, New Delhi.
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- Srivastava, R.P. and Kumar, S. (2001). Fruit and vegetable preservation: Principles and practices. International Book Distributing Co., Lucknow, India.
- Verma, L.R. and Joshi, V.K. (2000). Post harvest technology of fruits and vegetables. Volume 1 and 2. Indus Publishing House, New Delhi.

