SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF FOOD TECHNOLOGY

19FTT305-FRUIT AND VEGETABLE TECHNOLOGY

UNIT 2 – POST HARVEST PROCESSING AND STORAGE

MATURITY STANDARDS

Maturity

Maturity is the basis for determining exact moment/stage to pick a crop. The stage at which the crops should be harvested has an important bearing on quality.

Good quality is obtained when harvesting is done at the proper stage of maturity. Fruits harvested before optimum maturity may not ripen adequately and may not develop adequate flavour, while crops harvested late (over mature) will have a shorter postharvest life and will deteriorate easily.

DETERMINATION OF MATURITY

Determination of maturity Maturity can be determined either by subjective or objective observation

- Physical methods: Size, shape, colour, texture etc.
- Chemical methods: Total Soluble Solids (TSS), acidity etc.
- Physiological methods: Respiration and ethylene production.
- Apart from the above measures, abscission, accumulated heat unit, specific gravity, duration after flowering, firmness, dry matter, juice content, Oil content, waxiness, tenderness etc can also be used to determine the optimum stage of harvest maturity.

Differentiate between physiological maturity and horticultural maturity

Physiological maturity

1) It refers to the stage in the development of the fruits and vegetables when maximum growth and maturation has occurred.
2) Indicate the end of stage.
3) Maximum growth and maturation occured.
4) Closely associated with fruits.
5) Allow normal ripening after harvest.
6) Seed collection easy

Horticultural maturity

1) Horticultural maturity refers to any stage of development when the commodity has reached a level of development sufficient for its intended use
2) Indicate desirable change to make marketable.
3) Maximum growth and maturation not occurred.
4) Closely associated with vegetables.
5) May not ripen.
6) Seed collection not easy.

Factors affecting maturity

1. Temperature: Higher temperature gives early maturity.e.g. Gulabi (Pink) grapes mature in 100 days in Western India but only 82 days are enough in the warmer Northern India. Lemon and guava takes less time to mature in summer than in winter.

2. Soil: Soil on which the fruit tree is grown affects the time of maturity. e.g. Grapes are harvested earlier on light sandy soils than on heavy clays.

3. Size of planting material: This factor in propagated fruits affects fruit maturity. e.g. In pineapple, the number of days taken from flowering to fruit maturity was more by planting large suckers and slips than by smaller ones.

4. Closer spacing: Close spacing of hill bananas hastened maturity.

Maturity index for fruits and vegetables

- The principles dictating at which stage of maturity a fruit or vegetable should be harvested are crucial to its subsequent storage and marketable life and quality.

- Post-harvest physiologists distinguish three stages in the life span of fruits and vegetables: maturation, ripening, and senescence.

- Maturation is indicative of the fruit being ready for harvest. At this point, the edible part of the fruit or vegetable is fully developed in size, although it may not be ready for immediate consumption.

- Ripening follows or overlaps maturation, rendering the produce edible, as indicated by taste.

- Senescence is the last stage, characterized by natural degradation of the fruit or vegetable, as in loss of texture, flavour, etc. (senescence ends at the death of the tissue of the fruit).

Some typical maturity indexes are described in following sections

Skin colour:

This factor is commonly applied to fruits, since skin colour changes as fruit ripens or matures. Some fruits exhibit no perceptible colour change during maturation, depending on the type of fruit or vegetable. Assessment of harvest maturity by skin colour depends on the judgment of the harvester, but colour charts are available for cultivars, such as apples, tomatoes, peaches, etc

Optical methods:

Light transmission properties can be used to measure the degree of maturity of fruits. These methods are based on the chlorophyll content of the fruit, which is reduced during maturation. The fruit is exposed to a bright light, which is then switched off so that the fruit is in total darkness. Next, a sensor measures the amount of light emitted from the fruit, which is proportional to its chlorophyll content and thus its maturity.

Shape:

The shape of fruit can change during maturation and can be used as a characteristic to determine harvest maturity. For instance, a banana becomes more rounded in cross-sections and less angular as it develops on the plant. Mangoes also change shape during maturation

Size:

Changes in the size of a crop while growing are frequently used to determine the time of harvest. For example, partially mature cobs of *Zea mays saccharata* are marketed as sweet corn, while even less mature and thus smaller cobs are marketed as baby corn. For bananas, the width of individual fingers can be used to determine harvest maturity.

Aroma:

Most fruits synthesize volatile chemicals as they ripen. Such chemicals give fruit its characteristic odour and can be used to determine whether it is ripe or not. These doors may only be detectable by humans when a fruit is completely ripe, and therefore has limited use in commercial situations.

Fruit opening:

Some fruits may develop toxic compounds during ripening, such as ackee tree fruit, which contains toxic levels of hypoglycine. The fruit splits when it is fully mature, revealing black seeds on yellow arils. At this stage, it has been shown to contain minimal amounts of hypoglycine or none at all

Leaf changes:

Leaf quality often determines when fruits and vegetables should be harvested. In root crops, the condition of the leaves can likewise indicate the condition of the crop below ground. For example, if potatoes are to be stored, then the optimum harvest time is soon after the leaves and stems have died. If harvested earlier, the skins will be less resistant to harvesting and handling damage and more prone to storage diseases.

Abscission:

As part of the natural development of a fruit an abscission layer is formed in the pedicel. For example, in cantaloupe melons, harvesting before the abscission layer is fully developed results in inferior flavoured fruit, compared to those left on the vine for the full period.

Firmness:

A fruit may change in texture during maturation, especially during ripening when it may become rapidly softer. Excessive loss of moisture may also affect the texture of crops. These textural changes are detected by touch, and the harvester may simply be able to gently squeeze the fruit and judge whether the crop can be harvested. Today sophisticated devices have been developed to measure texture in fruits and vegetables, for example, texture analyzers and pressure testers; they are currently available for fruits and vegetables in various forms.