TRAINING AND DEMONSTRATION-1

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i. ASSESSMENT OF PHYSIOLOGICAL CHANGES AND LOSS OF QUALITY

PHYSIOLOGICAL LOSS IN WEIGHT:

- Physiological loss in weight of fruit is mainly due to evaporation, respiration and degradation process occurring during post-harvest handling of fruits.
- Moisture content of the most of fruits is high and weight loss during transport and storage is an economic factor to be considered especially when sold by weight in market.

- The physiological loss in weight can be calculated by noting down the difference between the initial and subsequent weight every day.

- The physiological loss in weight can calculated using the following formula:

$$\text{PLW (\%)} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100$$

QUALITY EVALUATION (POST HARVEST TOOL KIT)

Digital temperature probe is used for measuring pulp temperatures.

- The FlashCheck Pocket Probe Digital Thermometer is a fast, accurate HACCP and quality assurance tool that allows to quickly determine temperatures of foods throughout handling, preparation, and storage.
- The pulp temperature of produce can be checked within 10 seconds by inserting the tip of the probe into the item. If you do not want to damage the produce, you can get an accurate reading of the internal temperature by holding the tip of the probe BETWEEN two items for 15 seconds.

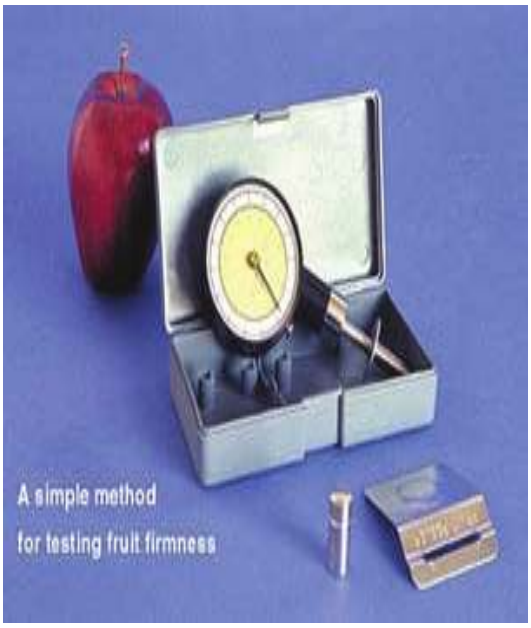
Digital Temperature Proble

- The digital probe has a stainless steel reduced tip probe that provides a fast response time, a thermistor sensor at the tip of the probe with an accuracy of ± 1.8°F (1°C), and an operating range of -40°F to 302°F (-40°C to 150°C).

- A rugged ABS unibody structure with a molded steel collar probe construction braces against severe pull and push flex actions. It can be field calibrated, and is waterproof so it can be washed with soap and water for thorough cleaning and sanitization.

Firmness or pressure tester is used for measuring firmness

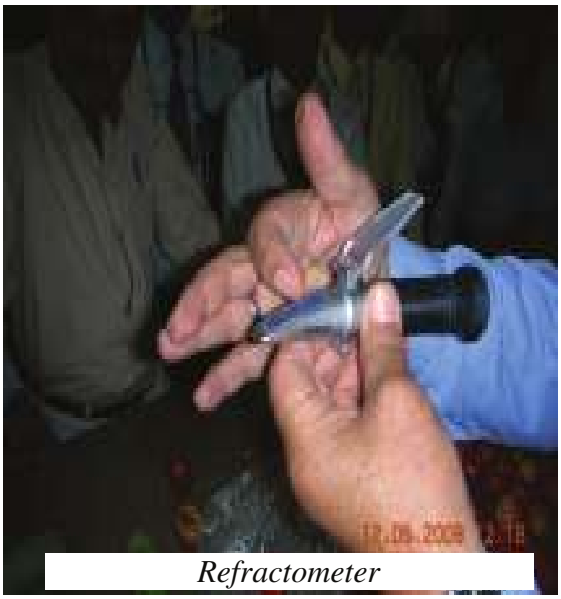
- The degree of softness or crispiness can be estimated by squeezing produce, or by taking a bite.
- Objective measurements can be made with inexpensive penetrometers.
- The most common way to measure firmness is resistance to compression or pounds-force (lbf).
- To measure firmness, use fruits that are uniform in temperature, since warm fruits are usually softer than cold fruits. Use fruits that are uniform in size, since large fruits are usually softer than smaller fruits.
- Make two puncture tests per fruit on larger fruits, once on opposite cheeks, midway between stem and blossom ends. Remove a disc of skin (larger than the tip to be used) and choose the appropriate plunger tip (see below).
- Hold the fruit against a stationary, hard surface, and force the tip into to fruit at a slow, uniform speed (take 2 seconds) to the scribed line on the tip.
- Take the reading to the nearest 0.5 lb-force.



Pressure Tester

Refractometer; measuring soluble solids or sugars

- Sugars are the major soluble solids in fruit juices and therefore soluble solids can be used as an estimate of sweetness.
- A hand-held refractometer can be used outdoors to measure % SSC (equivalent degrees Brix for sugar solutions) in a small sample of fruit juice.
- Temperature will affect the reading (increasing about 0.5% SSC for every 5 ºC or 10 ºF), so you should adjust the measurement for the ambient temperature.
- Refractometers require periodic calibration. This is done by taking a brix reading on distilled water.
- The contrast line should cross the scale at the zero mark. If it does not, the scale needs to be adjusted. Refer to the specific refractometer manual for calibration instructions (in most cases, there is a screw located on the refractometer body which will adjust the scale).
- Clean the refractometer after each measurement using distilled water. Dry it carefully using delicate cloth.



Refractometer

Sling Psychrometer is used for measuring relative humidity

Psychrometer

- Relative humidity has a direct impact on produce quality because as RH% in the packinghouse, storage environment or during transport decreases, the rate of water loss increases.
- Knowing the RH of the environment in which produce is being handled can assist the postharvest handler to reduce water loss, which is weight loss of the produced and decreases its quality (with symptoms of shriveling or wilting) and its quantity (the amount or weight available to sell).
- Relative humidity can be measured by an instrument called a hygrometer. The simplest hygrometer - a sling psychrometer - consists of two thermometers mounted together with a handle attached on a chain. One thermometer is ordinary. The other has a cloth wick over its bulb and is called a wet-bulb thermometer.
- When a reading is to be taken, the wick is first dipped in distilled water and then the instrument is whirled around. During the whirling, the water evaporates from the wick, cooling the wet-bulb thermometer. Then the temperatures of both thermometers are read.
- The wet-bulb thermometer cools to the lowest value possible in a few minutes. This value is known as the wet-bulb temperature. The drier the air the more the thermometer cools and hence, the lower the wet-bulb temperature.
- You can make a sling psychrometer by using two commercial thermometers. Wrap the bulb of one tightly with a piece of cloth. Attach the thermometers to a narrow, thin board with wire or strong tape. Drill a hole in the top of the board and attach a wooden handle to the board with a short piece of chain.

pH - test strips is used for measuring acidity or alkalinity


pH test strips

- pH test strips provide a simple uncomplicated way of determining the degree of acidity/alkalinity of aqueous solutions.
- pH test strips can be used for measuring the acidity/alkalinity of wash water samples. If the wash water is found to be too alkaline, muratic acid should be added until the pH level reads 6.5

Simple to use:

- Immerse strip and read results in 2 or 3 seconds
- Fast, easy, cost-effective measurements
- No costly instrumentation
- Accurate to 0.5 pH units

Other useful tools and supplies

Scales

- Measurements of produce weight at various points in the handling chain can help postharvest trainers demonstrate how different handling methods, packages, treatments, etc can affect weight loss.
- Digital scales (battery operated) can be carried to the field or market and used easily during demonstrations.

Scales

Calipers

Example: banana calipers used in the tropics to measure diameter of banana fingers to determine fruit grade.

- Quick and easy readings simply by pressing caliper button which squeezes against banana finger and gives diameter in inches. Scale: 7/8" to 2" by 1/32"

Calipers

Sizing rings

Orange Sizing Rings

- Used by growers and the USDA to determine sizing of packing house oranges.
- Each orange size has its own ring constructed of heavy duty poly plastic.
- Box and inch sizes are clearly marked on the rings. Each individual ring can be removed easily from it's holder to use independently.
- Six boxes sizes include: 48, 64, 80, 100, 125, & 163.

Size Rings

ORGANOLEPTIC QUALITY

- The organoleptic quality for assesing sensory atributes of the samples was conducted by a panel of seven judges. The samples were rated on the Hedonic Rating Scale as given below (Amerine*et al.* 1965).

Organoleptic score	Rating
9	Like extremely (LE)
8	Like very much (LVM)
7	Like moderately (LM)
6	Like slightly (LS)
5	Neither like nor dislike (NLNDL)
4	Dislike slightly (DS)
3	Dislike moderately (DM)
2	Dislike very much (DVM)
1	Dislike extremely (DE)

ii) **PACKAGING AND STORAGE :**

Comparative study : Effect of three different storage conditions

Commodities	Ice Box (Temp 0°C)	Refrigerated (Temp 5°C)	Ambient Room (Tem. 37° C - 40°C)
Tomatoes	Vented pack was most acceptable, softening in control	Vented pack was the best, others were also acceptable	Lost firmness, control was slightly leathery, packed tomatoes were better
Banana	Severe browning observed, packed ones were in a better condition	Chilling injury in control, severe browning, browning was observed in packed ones also	browning and shrinkage in control, packed Non-Vented was in a much better condition
Mango	Browning and softening in control and non vented, while Vented pack retained better quality	control as well as vented bag retained freshness	Vented pack was the best, freshness retained. Control was also acceptable,mangoes in Non-Vented bags showed softening
Brinjal	All retained good quality	shrinkage in control, Vented pack retaied firm brinjals, Non-Vented showed slight brown spots with softening	Severe shrinkage in control, Vented pack retained best quality, Non-Vented pack was also in acceptable condition
Okra	Shrinkage in control, Vented packs retailed green, fresh okra followed by Non-Vented	shrinkage in control, Vented packs retained good quality green okra followed by Non-Vented	Severe shrinkage in control, some shrinkage in Vented packs also
Cucumber	Vented pack was most acceptable, softening in control	Vented pack was the best, slight softening and shrinkage in control	overall- Lost firmness, control was slightly leathery.
Spinach	Leaves wilted in all, lost turgidity in control, slight browning in Vented pack, Non-Vented pack was acceptable	Leaves wilted in control and slightly in Vented and Non-Vented packs, browning in control	Severe wilting and eventually drying of leaves, Vented pack was most acceptable, In Non-Vented, leaves started rotting
Amranth	Most acceptable in Non-Vented pack, maximum wilting observed in control.	Non-Vented pack retained maximum freshness, wilting in control	Severe wilting in control, Non-Vented retained good quality, slight wilting in Vented pack