Fruit & Vegetables
Post Harvest Care
THE BASICS

by Pawanexh Kohli
Contents

- Introduction
- Quality & Shelf Life
- Need for Cooling
- Why Air Circulation
- Problems Associated
  - Moisture Loss
  - Compatibility
  - Hygiene
- Hazard Analysis
- Action Needed!
All living tissues respire:

- Oxidizing various components to provide energy to continue life.

Fruit & Vegetables are living tissues:

- Continue to live even in absence of nutrient transfer.

F&V have a delicate balance:

- Flavors, colors, nutritional components, etc. A slight change makes a difference.

Not all are created equal:

- Yet most Fruits & Vegetables are 90-95% water.

Ultimately all F&V die:

- And become unusable or unmarketable.
The Quality of any Fresh produce is at its PEAK when it is harvested.

- Deterioration sets due to natural processes, water loss, temperature or physical injury, or microbial invasions.
- All of these factors interact and all are influenced by temperature.
- Cooling is required to slow down metabolic processes, both within and without the produce.
The longer Fruits & Vegetables stay in uncontrolled ambient, the quality and useful SHELF LIFE is lost.

- **Shelf life** begins at **harvest**.
- Rapid post harvest cooling is required to minimise respiratory rates and also to inhibit growth of decaying micro-organisms on the produce.
Cooling

- Cooling is necessary to remove post harvest field heat & also to continually remove the respiratory heat of the produce. Also inhibits external micro-biological processes.

- Cooling is carried out by employing methods such as Hydro-Cooling, Vacuum Cooling, Icing, Room Cooling or Forced Air Cooling. Room air cooling is also employed for long term storage.
Physiological respiratory processes of fresh produce continue after harvesting. This requires oxygen (O₂) and in turn generates heat and releases carbon dioxide (CO₂) and ethylene.

- High concentrations of CO₂ & Ethylene degrades or kills the produce.
- These gases must be replenished with Fresh Air employing a ventilation system.
- Efficient air circulation enhances cooling & removes trapped pockets of gaseous by-products.
**Associated Problems**

- **Tainting:** Cooling requires energy and tends to invite compartment sharing and other shortcuts.
- **Moisture Loss:** Cooling effects external environment and changes ambient conditions.
- **Disease:** Cooling creates condensate which encourages disease and rots.
- **Stowage:** Cooling is ineffective if the medium spread is in-correct.
- **Control:** Cooling causes chill injuries and even death.
Products stored in common spaces must be compatible for shared storing temperatures, moisture levels (RH), volatility (ethylene), odour (tainting), etc.

Cross contamination through incompatible product mix can lead to an un-saleable produce.

Cross-transfer of odours and/or stimulated maturing leading to subsequent decay is to be avoided.
Fresh horticultural commodities are unique packages of water! In fact Freshness Sells and freshness is water!

Water loss is one main cause of loss of quality & marketability of fresh fruits and vegetables.

Low Humidity levels are inherent to poorly designed refrigerated spaces.
With inefficient packaging and storing, the cooling medium (air or water) does not spread contact with the produce leading to cooling inefficiencies & product damage.

Packaging must Protect, easy on FIFO, tolerate & allow preferred Cooling method, enhance Space Utilisation and have Sales Appeal.

Some packaging can simulate CA conditions.
Hygiene & Sanitation

- Safe sanitation, hygienic conditions and abidance with laws of food regulatory authorities is a must.
- Prudent care is applied to keep the fresh produce clean, dirt, insect & microorganism infestation.
- All water used to be pre-treated.
- Anti fungal treatments are regularly applied.
- Between subsequent uses, the cold room space sanitisation is required.
- To identify and apply controls, HACCP (Hazard Analysis and Critical Control Points) procedures are useful.
- Regular internal quality audits, checks and training is a must.
Hazard Analysis Critical Control Points - example Harvest of eggplant

Hand harvest eliminating defective fruit, place into clean carrier trays, baskets, crates.

Clean, Spray wash or wipe with clean moist cloth

Sort, Grade & classify by size, maturity and defects
Hazard Analysis Critical Control Points - example Harvest of eggplant

1. Pack by weight or count into crates.
2. Palletize and transport to Cooler.
3. Rapid Cool to 7 to 13 °C. Monitor cooling.
4. Move and Store at distribution centre.
Hazard Analysis Critical Control Points

- Field Worker Hygiene
- Farm Equipment Sanitation
- Water Sanitation
- Crate Sanitation
- Temperature Control and Cold Store Sanitation
- Transport Sanitation
Understand that fresh fruits and vegetables live and breath! They need to be:

- treated with care.
- provided fresh air to breathe.
- kept clear from exposure to disease.
- protected from dehydration to stay fresh.

Shelf life of F&V can be extended by reducing the ambient temperatures they are exposed to.

- Avoid unnecessary handling & prevent body injuries.
- Keep F&V storage areas neat and clean.
- Identify likely critical hazard areas & apply controls.