Fruit & Vegetables
Post Harvest Care
THE BASICS

by Pawanexh Kohli

Crosstree
techno-visors

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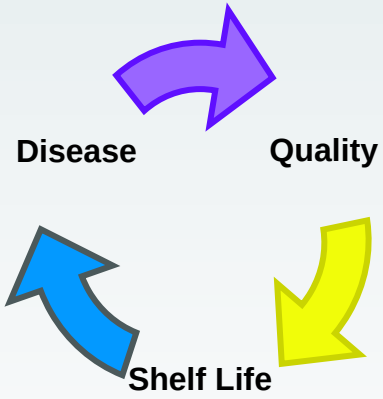
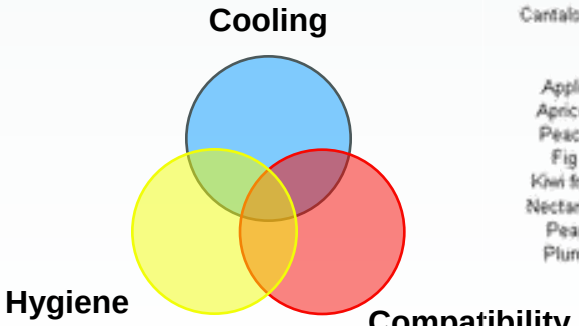
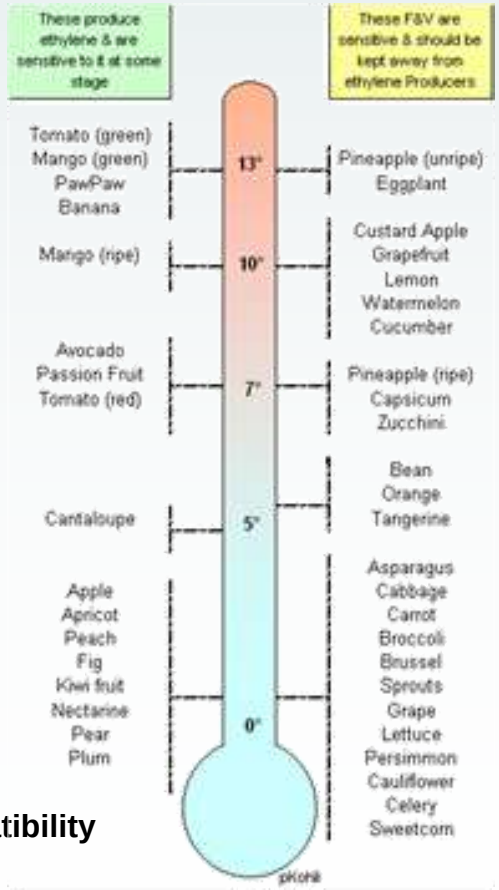






Introduction

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.

Quality

- 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.

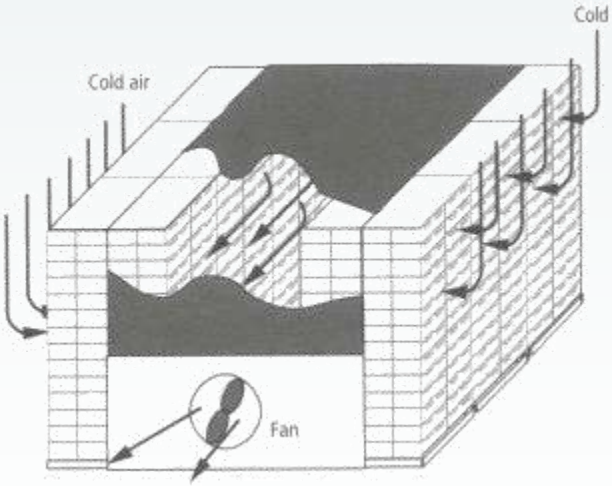
Shelf Life

- 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

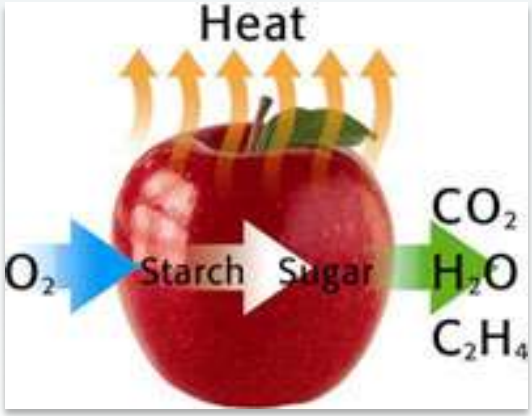
- Cooling is necessary to remove post harvest field heat & also to continually remove the respiratory heat of the produce. Also inhibits external micro-biological processes.

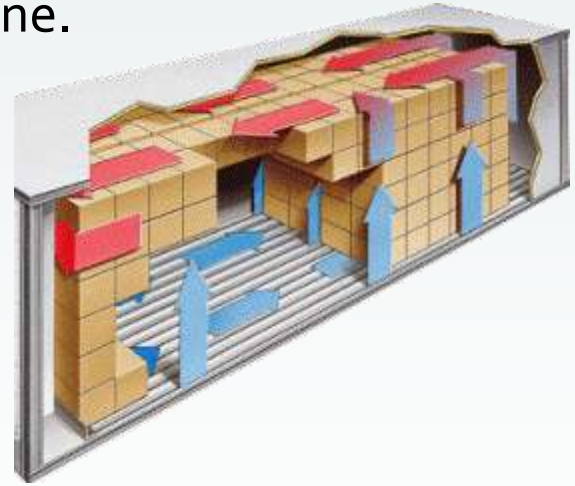


- Cooling is carried out by employing methods such as Hydro-Cooling, Vacuum Cooling, Icing, Room Cooling or Forced Air Cooling. Room air cooling is also employed for long term storage.

Air Circulation

- Physiological respiratory processes of fresh produce continues after harvesting. This requires oxygen (O2) and in turn generates heat and releases carbon dioxide (CO2) and ethylene.





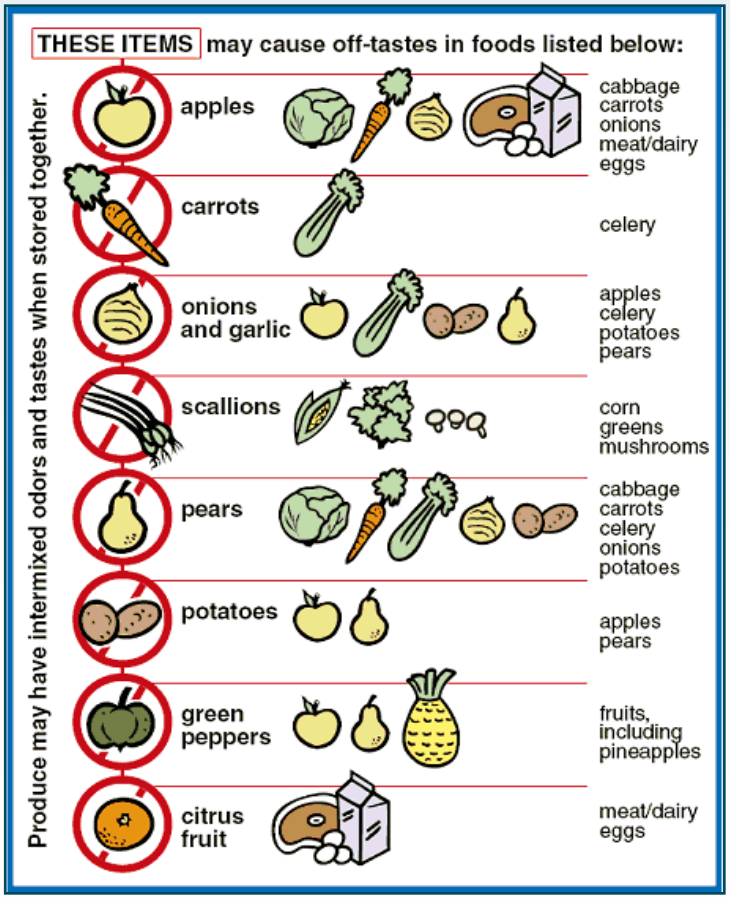
- High concentrations of CO^2 & Ethylene degrades or kills the produce.
- These gases must be replenished with Fresh Air employing a ventilation system.
- Efficient air circulation enhances cooling & removes trapped pockets of gaseous by-products.

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.

Produce Compatibility

- 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.

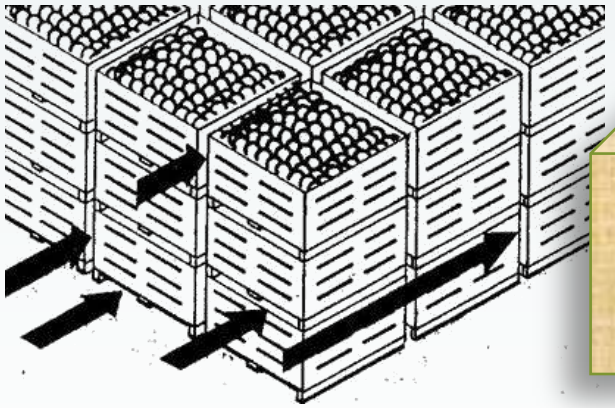


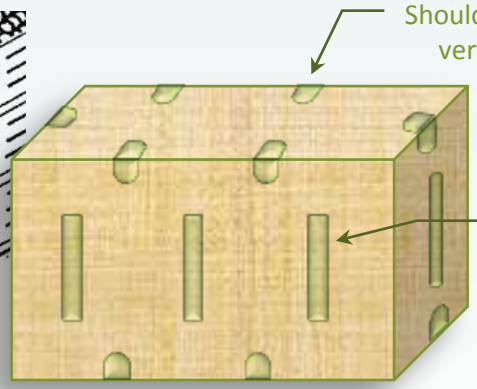
Moisture Losses

- 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.

Product Packaging

- 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 sanitisaton 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.

HACCP

- 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

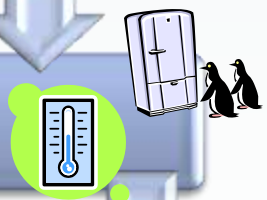
HACCP

- Hazard Analysis Critical Control Points- **example Harvest of eggplant**

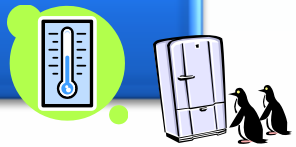
Pack by weight or count into crates.

Palletize and transport to Cooler.

Rapid Cool to 7 to 13 °C. Monitor cooling.

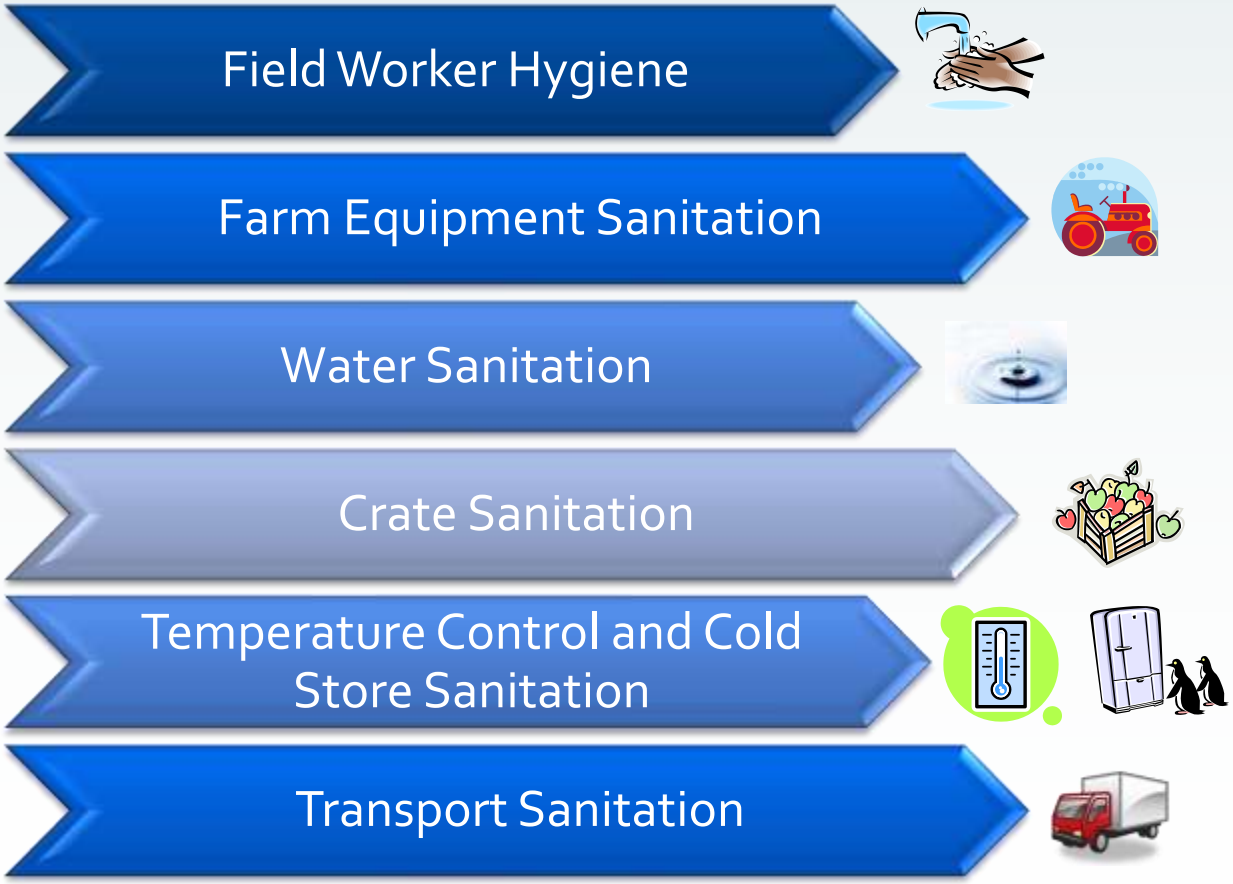


Move and Store at distribution centre



HACCP

- Hazard Analysis Critical Control Points



SOPs Required!

- 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.

End of Deck

Thank You