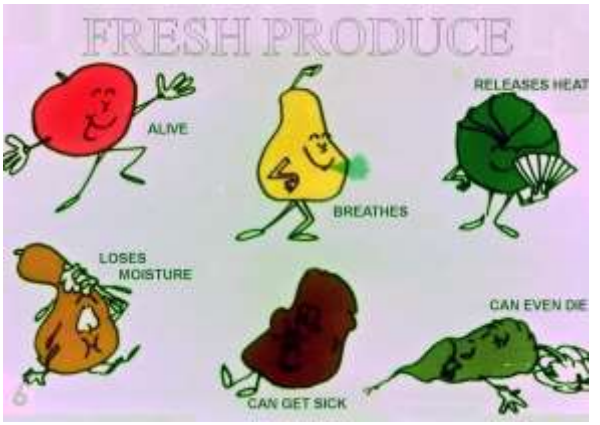
Postharvest of vegetables

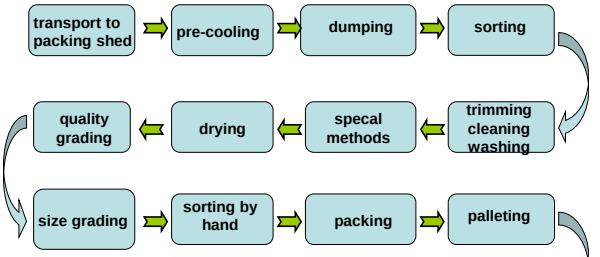


Principle factors that determine product quality at the consumer level

- Raw product quality at harvest time.
- Physical handling of the product during and after harvest.
- The length of time since the product was harvested.
- Controlling the tissue water content after harvest.
- The storage environment after the product is removed from the plant.

- High market quality and maximum shelf life result from proper attention to these factors.
- Proper temperature management is the single most important tool in maintaining product quality and shelf-life.

A usual protocol for post-harvest activities



Objective: to get fresh produce from the field to the consumer in good condition, preserving as much quality as possible.

What does cooling do?

- Removes field heat.
- Reduces respiration heat and slows ethylene production.
- Decreases the rate of deterioration.
- Reduces water loss.
- Limits the growth of decay organisms.

Cooling methods

- **Room cooling** - Transfers heat slowly from the mass of a product, by convection, to the cold air circulating around stacked containers of products.
- **Forced-air cooling** - Cooling air is pulled or pushed through product containers. Faster.
- **Hydrocooling** - Uses cold water as the cooling medium, showering it down over the product. Can only be used for products that can tolerate wetting.
- **Package icing** - Direct contact of the product with ice results in fast, initial conduction cooling. Only for commodities that can tolerate water-ice contact.
- **Vacuum cooling** - Product is placed in a vacuum tube and air pumped out to reduce atmospheric pressure, causing the water in the product to vaporize.
- **Transit cooling** – e.g. mechanical refrigeration, top-icing, evaporation of liquid nitrogen

packing methods

- bunch
- mesh bag
- (semi-permeable) plastic (PE) bag
- film-wrapping
- plastic or cartonboard tray
- plastic or cardboard box
- bulk container, bin

Objectives of storage

- accomodate surplus production
- extend marketing period
- await favourable marketing opportunities

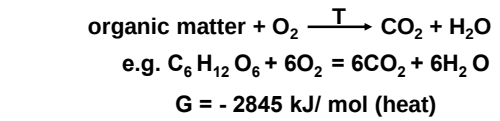
Factors affecting storage durability

- species and cultivar
- environmental factors in the field (soil, precipitation)
- production technology (mineral nutrition, irrigation, harvest time and method, plant protection)
- dry matter content of the crop
- health condition of the crop
- storage environment, storage method

Storage durability of vegetable crops

- 1-2 weeks – mushroom, sweet corn, asparagus, leafy vegetables, green pea, snap bean, pepper
- 3-4 weeks - cauliflower, tomato
- even 6-9 months – cabbage, carrot, horse radish, onion, garlic

The process of respiration



Possibilities for slowing down this process:

– decreasing temperature
– decreasing O_2 level
– increasing CO_2 level
– increasing relative humidity

Optimal storage conditions

- Temperature:
  - 0°C – leafy vegetables, root vegetables, asparagus, sweet corn, cole crops, mushrooms
  - (5)-8-12°C – snap bean, pepper, tomato, cucumber, melon, watermelon
- Relative humidity:
  - 90-95% - almost every vegetable crops
  - 70-75% - onion, garlic
- O_2 level:
  - 2-3%
- CO_2 level:
  - 2-3%

Storage methods

- Field/outdoor storage
  - in-situ „storage" (overwintwering)
  - storage in covered (straw, soil, PE) heaps
  - storage in insulated field CLAMPS ? DAMPS
  - ground storage pit
- Indoor storage – storage facilities
  - common indoor storage – cold ambient air + ventillation
  - controlled temperature (refrigerated) storage – T and rh% are controlled
  - controlled athmospehere (CA) storage – O_2 and/or CO_2 levels are controlled