

Principles of Fruit and Vegetable Storage

Why Store?

- To preserve crops to consume out of season
- To keep food in good condition
 - Slow down ageing
 - Protect from frost
- To provide even supply
 - Avoid gluts (surplus)
 - Prevent shortages
- To obtain higher prices

Produce to Store

- Fruits
- Vegetables
- Nuts
- Herbs

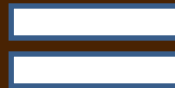
Ageing - Senescence

- Produce does not improve in storage
- Aim is to slow down the ageing process:
 - Respiration
 - Moisture loss
 - Decay, disease

Respiration

- All fruit and vegetables continue to breathe after harvest
- Respiration

carbohydrates (sugars) + oxygen



carbon dioxide + water + heat

Respiration

Respiration rate depends on

- Temperature
- Atmosphere
 - Oxygen – O_2
 - Carbon Dioxide – CO_2
- Humidity
- Mechanical Injury
 - Cuts
 - Bruises
- Infection, pest and disease

Moisture Loss

- Produce loses moisture in store
 - Shriveling - skin
 - Pressure
- Turgidity on entering store
 - Irrigation / rain before harvest
- Humidity in store
 - Water from respiration
 - Ventilation

Humidity

- High humidity prevents water loss
- Ventilation reduces humidity
- Earth floor – damp
- Stone walls – dry
- Use wet cloths or flood floor
- **DO NOT WET PRODUCE!**
 - Control condensation – drips from roof
 - Wet causes produce to rot

Ripening

- Climacteric and non-climacteric fruit
- Climacteric – ripen after harvest:
 - Apples and Pears
 - Apricots, Peaches, Plums, Persimmons
 - Bananas
- Non-climacteric – stop ripening after harvest
 - Pomegranates
 - Strawberries
 - Citrus

Ethylene

- Plant hormone gas that promotes ripening
- Produced by ripe or damaged fruit
- Removing ethylene prolongs storage life
 - Modern stores have ethylene ‘scrubbers’
 - 1-MCP used to prevent ethylene (‘Smartfresh’)
 - Modified atmosphere packaging
- (Use of Calcium Carbide to produce acetylene is illegal)

Atmosphere

- Controlled atmosphere (CA) storage
 - Low oxygen
 - High carbon dioxide
 - Remove ethylene
- Not possible in ventilated stores
- But modified atmosphere packaging could be used

Control

Xtend[®] bag



Air Circulation

- Important that air is moving in store
 - Avoid local accumulation of CO₂
 - Avoid local accumulation of ethylene
 - Even temperature through store
- Ventilation
 - Regulate temperature and humidity
 - remove ethylene and odours (smells)
- Warm air rises; cool air falls
- Leads to design features of underground stores