


■ ■ ■ Pome & Stone Fruits

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■ ■ ■ Pome & Stone Fruits

- Pome Fruits:
 - Apples & Pears (European & Asian) & Quince
- Stone Fruits:
 - Peaches:
 - Freestone (melting flesh; fresh market only)
 - Clingstone (mostly non-melting flesh; and mostly processed)
 - Apricot, Nectarine, Plum, Prune, Sour Cherry, Sweet Cherry

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■ ■ ■ Ripening Pattern

- **Climacteric:**
 - Apples, European and some Asian Pears
 - Apricot, Nectarine, Peach, Plum, Prune
- **Non-climacteric:**
 - Cherry
 - Some Asian Pears

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■ ■ ■ Maturity & Quality Standards

- **Internal quality** attributes
 - Sugars, acids, ratio, etc.
- **Exterior attributes**
 - Color, shape, size, freedom from defects, etc.

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■ ■ ■ Harvest

- No mechanical harvesting of fresh produce
 - Cherries for processing or prunes for drying are commonly harvested mechanically

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■ ■ ■ Optimum Temp & RH



- Almost all pome and stone fruit should be stored near 32F (0C)
- Chilling sensitive apple cultivars (incl. Yellow Newtown, McIntosh, some Jonathan, and some Grimes Golden) should be stored 34-40F (3-4C)
- Optimum RH for all is 90 to 95%

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Shelf Life



- Apples: 1 to 12 (in CA) months
- Pears: 2 to 7 months
- Apricot: 1 to 3 weeks
- Nectarine & Peach: 2 to 4 weeks
- Plum & fresh Prune: 2 to 5 weeks
- Sweet Cherry: 2 to 4 weeks

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MA or CA



- CA extends storage of apples and pears
 - Optimum conditions vary by variety but are often between 1-2% O₂ & 1-4% CO₂
- CA or MA of 10-15% CO₂ & 3 to 10% O₂ are used for cherries
- Responses to CA or MA of apricots, nectarines, peaches, and plums in not consistent

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Ripening Control Using 1-MCP (SmartFresh™)



- Application to preclimacteric fruit delays onset of ripening significantly
 - Used alone or with CA storage for about half of the U.S. apple crop
- Its use is complicated for other fruits because results depend on:
 - Maturity/ripeness at application
 - Concentration and exposure time
 - Temperature during and following treatment

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Ripening



- Ripening related changes:
 - Increased respiration and ethylene production
 - Softening
 - Increased sweetness
 - Loss of astringency
 - Development of aroma volatiles
 - Color change
- Preclimacteric fruit store better than postclimacteric fruit

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Ripening



- Optimum temperature for ripening are ~ 68 to 72F (20 to 22C) with RH of 90-95%
 - Temperature above 30C inhibits ethylene biosynthesis
- Ethylene treatments of 10 to 100 ppm can be used to accelerate ripening

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Ripening


- Pears tend to become mealy if ripened on the tree
 - Use cold storage (32F or 0C for 2 to 8 weeks) or ethylene treatments
- Pear preconditioning treatments:
 - Bartlett – expose to 100 ppm ethylene at 68-77F (20-25C) for 24 hrs.
 - d'Anjou – expose to 100 ppm ethylene at 68F (20C) for 2 to 3 days

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Physiological Disorders


- Apples:
 - Scald – Diphenylamine commonly used to control. Low O₂ concentrations (1%) can also control scald
 - Freezing injury
 - Chilling injury (some cultivars) – at 32-40F (0-4C)
 - Water core – faulty sugar (sorbitol) metabolism
 - Bitter pit – calcium deficiency
 - Different types of breakdown in different cultivars



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Physiological Disorders


- Pear:
 - Scald – same as apples
 - Senescent scald
 - Cork Spot – similar to bitter pit in apples
 - Core breakdown (internal breakdown or brown core)
 - Freezing injury – core may freeze first because of lower sugar content
 - High CO₂ or low O₂ (<1%) injury



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Physiological Disorders

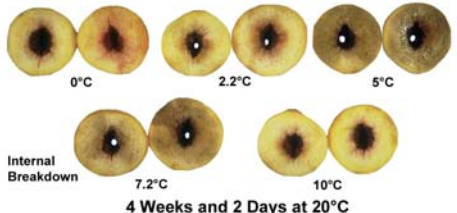
- Stone fruit (except cherries):
 - Internal breakdown (CI) – symptoms include browning of the flesh, dry-mealy texture (wooliness, lack of juiciness), development of off flavors
 - Symptoms develop when stored at temperatures between ~36 and 45F (2 to 7C)
 - Freezing injury
 - Heat injury (above 95F or 35C) – pit burn; gas pockets in prunes



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Internal Breakdown and Temperature

Carnival



Internal Breakdown


4 Weeks and 2 Days at 20°C



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Decay Control


- Stone Fruits:
 - Brown rot (*Monilinia*) – Does not develop during cold storage below 39 to 41F (4 to 5C)
 - Rhizopus stolonifer* – It is chilling sensitive. Proper cooling and maintenance of the cold chain will reduce its growth significantly



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Decay Control

- Apples & Pears:
 - Gray mold (*Botrytis cinerea*) & Blue mold (*Penicillium expansum*)
 - Best controlled through careful handling and sanitation in the field & packinghouse
 - Fungicides may also help, but resistance is occurring to TBZ-type fungicides



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Decay Control

- Apples & Pears:
 - **Mucor rot** (*Mucor piriformis*) problem on Granny Smith & Fuji
 - Lives in the soil
 - Grows slowly even at 32F (OC)
 - Fungicides & even chlorine not particularly effective
 - Best control: sanitation (keep soil out of drench & water solutions)



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Special Note on Pears

- Pears are very easily bruised when ripe so **handle ripe fruit very carefully**



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Postharvest Handling Selected Points

- **Reducing mechanical damage**
 - Use air suspension systems on trucks and bubble plastic liners and top pads in filled bins
 - Grade farm roads and restrict speeds on these roads to reduce vibrations
 - Reduce handling steps
 - Maintain clean packing equipment to reduce abrasive particles (e.g. sand)
 - Immobilize fruit within shipping containers



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Harvest Accumulation



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"Ranch-Pack" System for Tree-ripe Peaches



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Cooling Field Bins Prior to Packing



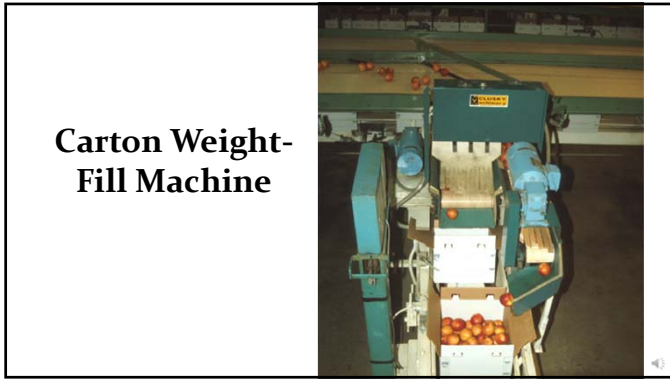
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