Subtropical Fruits

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Subtropical Fruits

- Some of these fruits are grown in tropical areas
- These fruit are diverse in:
  - Morphology
  - Composition
  - Postharvest physiology
  - And in their optimum postharvest handling requirements

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Subtropical Fruits Include

- Atemoya

http://www.2ndlight.com/forum42ndlight/attachments/Atemoya901ASIT.jpg

- Avocado

- Carob (Chinese date)

http://www.cookbookwiki.com/images/e/ef/Carob.jpg

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Subtropical Fruits Include

- Cherimoya

http://bigy.com/content/prod/i/var/cherimoya.jpg

- Citrus

- Date

http://www.wegmans.com/kitchen/ingredients/produce/fruit/images/date.jpg

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Subtropical Fruits Include

- Fig

- Jujube

http://bulletin.coa.gov.tw/htmlarea_graph/web_articles/5761/jujube01.jpg

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Subtropical Fruits Include

- Kiwifruit

http://media.apn.co.nz/webcontent/image/jpg/kiwifruit.JPG

- Longan

http://www.khmerkromrecipes.com/photo_recipes/longan.jpg

- Loquat

http://darkwing.uoregon.edu/~inaasim/Hist%20410/Loquat.jpg

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Subtropical Fruits Include

- Lychee
- Olive
- Persimmon
- Pomegranate

http://www.pakissan.com/english/advisory/images/dat.lychee05.jpg

http://springstonphoto.com/adm/photo/47_Olive.jpg

http://elise.o3.net/mt/persimmon.jpg

http://www.coral-cure.com/images/pomegranate-fruit.jpg

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Groupings

- Highly Perishable:
  - –Fresh figs, loquat, lychee
- Moderately Perishable:
  - –Avocado, cherimoya, olive, persimmon
- Less Perishable:
  - –Citrus, carob (dry), dried figs, date, jujube, kiwifruit, pomegranate

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Class	(mg CO_2/kg-hr) at 5 °C (41 °F)	Commodities
Very Low	< 5	**Dates**, dried fruits and vegetables, nuts
Low	5 - 10	Apple, beet, celery, **citrus fruits**, cranberry, garlic, grape, honeydew melon, **kiwifruit**, onion, papaya, **persimmon**, pineapple, potato (mature), sweet potato, watermelon
Moderate	10 - 20	Apricot, banana, blueberry, cabbage, cantaloupe, carrot (topped), celeriac, cherry, cucumber, **fig**, gooseberry, lettuce (head), mango, nectarine, **olive**, peach, pear, plum, potato (immature), radish (topped), summer squash, tomato
High	20 - 40	**Avocado**, blackberry, carrot (with tops), cauliflower, leeks, lettuce (leaf), lima bean, radish (with tops), raspberry
Very High	40 - 60	Artichoke, bean sprouts, broccoli, Brussels sprouts, cut flowers, endive, green onions, kale, okra, snap bean, watercress
Extremely High	> 60	Asparagus, mushroom, parsley, peas, spinach, sweet corn

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Ripening Patterns

- Climacteric:
  - Avocado, Cherimoya, Fig, Kiwifruit, Persimmon
  - Avocados do not ripen on the tree.
- Non-climacteric:
  - Citrus, Date, Jujube, Longan, Loquat, Lychee, Olive, Pomegranate

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Compositional Characteristics

- Citrus:
  - Good source of vitamin C (#1 contributor of vitamin C to human diet in U.S.)
- Avocados:
  - High energy value (higher than meat of equal weight)
  - (along with olives) have the highest protein and fat content of any tree fruit (excluding nuts)
  - Good source of niacin and thiamin

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Maturity & Quality Standards

- Includes:
  - –Internal quality attributes (sugars, acids, ratio, etc.)
    - Avocado (CA): minimum dry weight (19 to 25% depending on cultivar)
    - Citrus: juice content, sugars, acids, sugar/acid ratio
  - –Exterior attributes (color, shape, size, freedom from defects, etc.)
  - –Avocado (FL): days after full bloom

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Optimum Storage Conditions

	(°F)	(°C)	RH (%)	Max. Shelf Life
Citrus (FL)				
Orange	32-34	0-1	85-90	3-6 wk
Grapefruit	50-60	10-16	85-90	6-8 wk
Tangerine (mandarins)	40	4	90-95	2-4 wk
Lemon	50	10	85-90	1-4 mo
Lime	50	10	85-90	6-8 wk
Kumquat	39	4	90-95	2-4 wk
Pummelo	45-48	7-9	85-90	12 wk
Avocado	40-55	4-13	85-90	4-6 wk
Cherimoya	55	13	90-95	2-4 wk
Dates	32	0	75	6-12 mo
Figs (fresh)	31-32	-1-0	85-90	7-10 days
Kiwifruits	32-36	0-2	90-98	3-5 mo
Loquat	32	0	90	3 wk
Lychee	35	2	90-95	3-5 wk
Olive	41-50	5-10	85-90	4-6 wk
Persimmon	30	-1	90	3-4 mo
Pomegranate	41	5	90-95	2-3 mo

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MA or CA

- Avocado:
  - Potential use of 2-5% O_2 and 3-10% CO_2
- Citrus:
  - Potential use of 5-10% O_2 and 0-10% CO_2

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Physiological Disorders

- Most are sensitive to chilling injury
  - Wide differences in susceptibility
    - E.g. Florida oranges vs. grapefruit
  - Those not sensitive to chilling injury include those that are harvested fully ripe (date and figs), and 'Hachiya' persimmons
  - 'Fuyu' persimmons are chilling sensitive

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Physiological Disorders

- Freezing injury
  - Freezing injured fruit can be separated at the packinghouse based on density, or using x-ray or light transmission methods

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Physiological Disorders

- Citrus fruit have a variety of physiological disorders (besides CI)
  - Postharvest Pitting
  - Stem-end Rind Breakdown (SERB)
  - Aging
  - Stylar-end Russetting
  - Blossom-end clearing
  - Creasing
  - Blue Albedo
  - Zebra Skin

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Decay Control

- Avocado:
  - Anthracnose – esp. in humid Florida. Not serious in California
  - *Dothiorella gregaria* – important in California
  - Stem-end rots (*Diplodia natalesis, Phomopsis citri*) – serious in Florida and other humid places

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Decay Control

- Citrus:
  - Stem-end rots (*Diplodia natalesis, Phomopsis citri*) – serious in Florida and other humid places
  - Anthracnose – esp. in humid Florida. Not serious in California
  - Sour rot (*Geotrichum candidum*).
  - Green & Blue mold (*Penicillium digitatum* & *italicum*)

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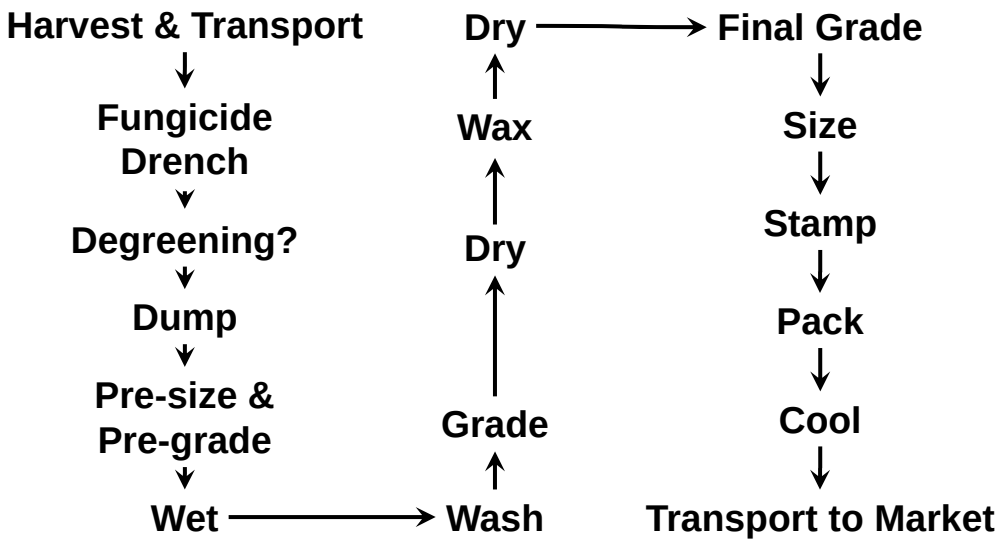
Fresh Citrus Handling



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Postharvest Handling of Citrus

Before & After

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Harvest

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Transport From The Field

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Fungicide Drench (truck)

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Fungicide Drench (bin)

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Degreening

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Degreening

	Florida
Temperature	28 to 29°C (82 to 85°F)
Ethylene	5 ppm
Humidity	90 to 96%
Ventilation (keep below 0.1% CO_2)	1 air change per hour
Air Circulation (CFM = cubic feet per minute)	100 CFM per 900 lb. bin

	California
Temperature	20 to 25°C (68 to 77°F)
Ethylene	5 to 10 ppm
Humidity	90%
Ventilation (keep below 0.1% CO_2)	1 to 2 air changes per hour
Air Circulation	1 room volume per minute

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Worker Hygiene

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Dumping

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Equipment Sanitation

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Presizing

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Wetting (± SOPP)

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Washing (High Pressure)

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Pre-Grading

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Eliminations (for Juice)

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Drying

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Waxing

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Drying

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Final Grade

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Labeling

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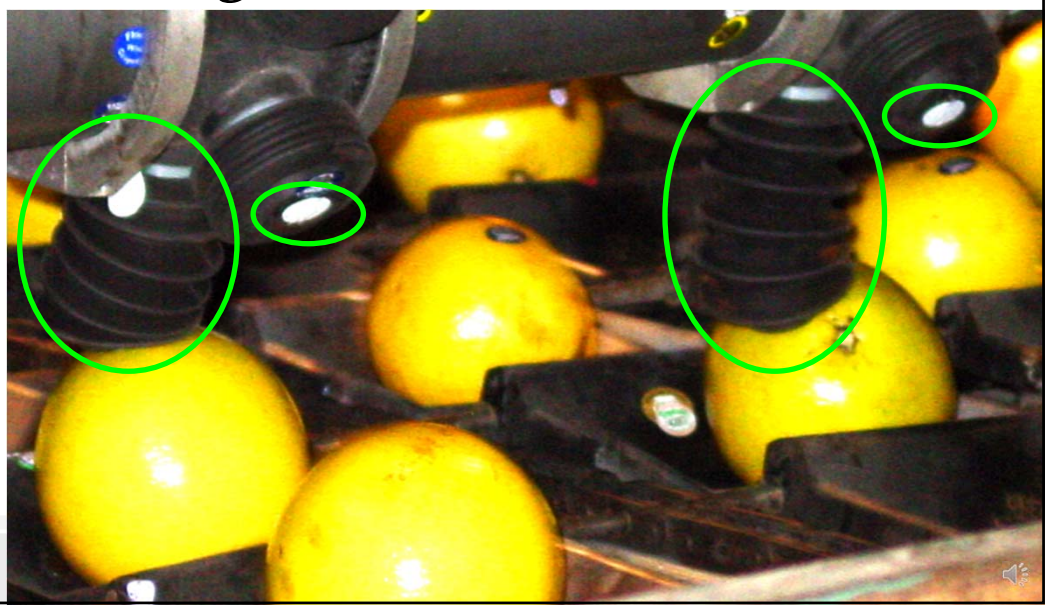
Labeling



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Sizing & Packing

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Packing

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Palletizing

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Accumulating / Staging

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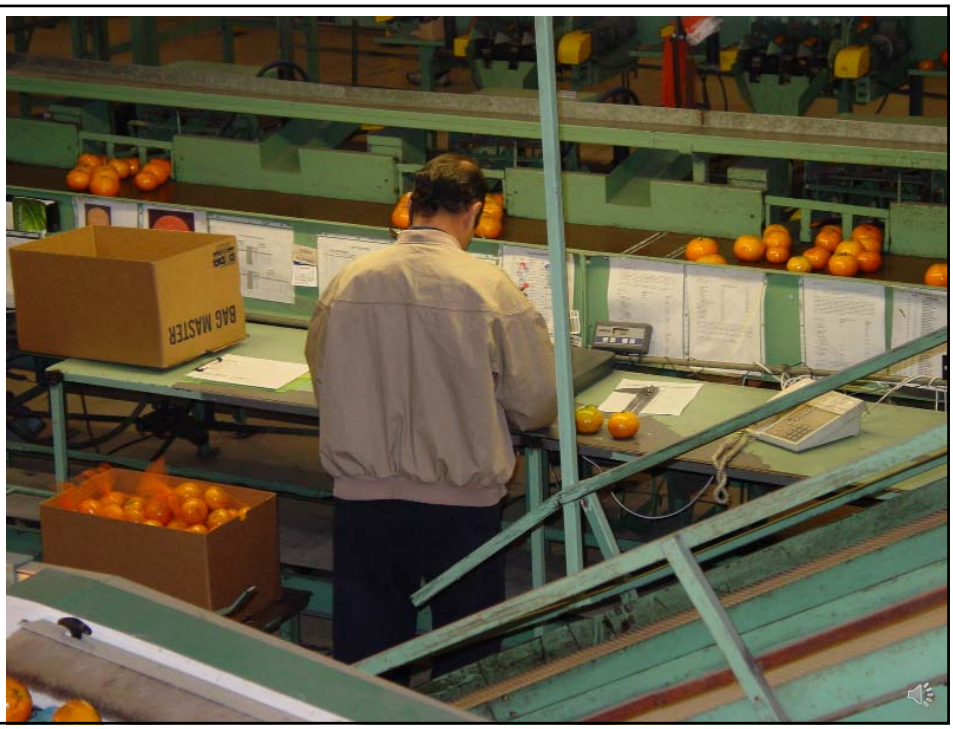
Quality Control



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Cooling & Storage

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