



Fruit and vegetable juices

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Fruit and vegetable juice production

- Fruits

- Temperate

- Citrus
 - Apple
 - Pear
 - Others

- Tropical

- Pineapple
 - Mango
 - Papaya puree

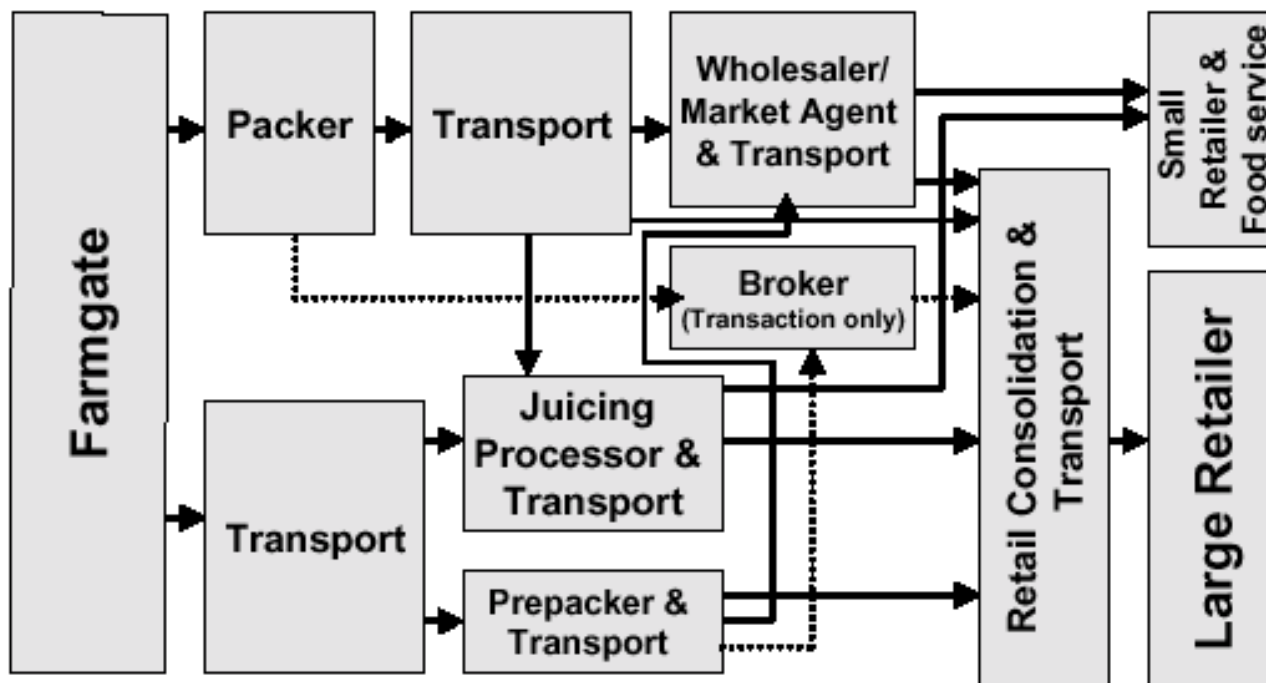
- Vegetables

- Carrot
 - Tomato



Supply chain analysis

Domestic Supply Chain for Fresh & Juiced Valencia & Navel Oranges



<http://www.pc.gov.au/inquiry/citrus/retailworks.pdf>



Common treatments

- Clarification

- Removal of excess pulp by centrifugation or by finishers (screens)
- Removal of pectins, starch, gums, proteins, polyphenolics, metal cations and lipids, which otherwise cause haze before or after preservation; enzymes use



Common treatments

- Clarification

- Fining: heating to required temp, addition of enzymes, allowing time for reaction, addition of flocculating agents (gelatin, bentonite, silica-sol)
- Ultrafiltration: very effective with yield in the range of 95-97% than the above methods



Common treatments



- Preservation methods
 - Deaeration to avoid loss of vitamin C
 - Thermal treatment (Pasteurisation)
 - Increase shelf life to 3-4 weeks under refrigeration
 - Stabilisation of cloud by inactivating pectolytic enzymes, higher temperature (90-95 C) for 30 s is required



Common treatments (Preservation)

- Thermal treatment (Pasteurisation)
 - Destroying yeasts (*Saccharomyces roxii*) and lactobacillus
- Canning
 - Low heating temp in unlaq cans
- Aseptic processing

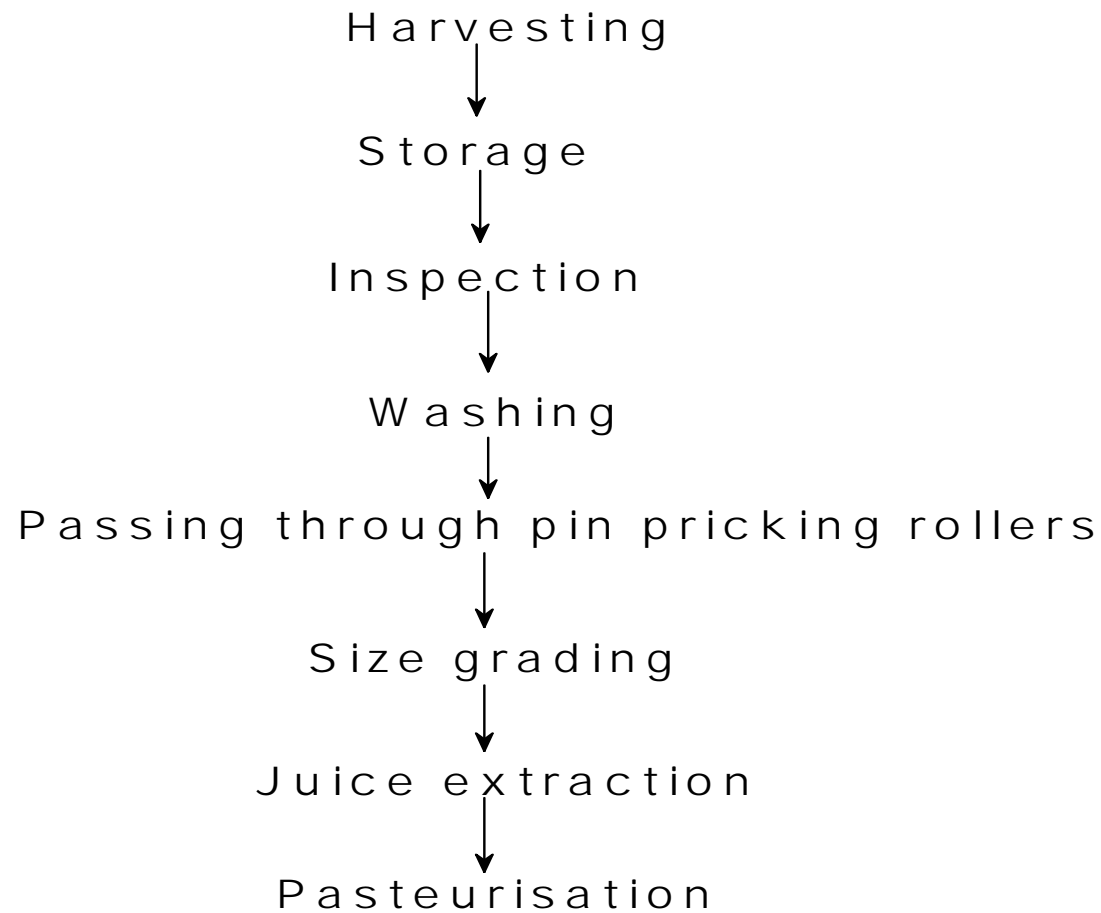


Common treatments (Preservation)

- Chemical preservatives
 - SO₂ (100 ppm)
 - Sorbate and benzoate mixture (400 ppm)



Fruit processing for juice



Citrus juice extraction

- Harvesting: do not ripen after picking, therefore should be picked at correct sugar concentration (12 B for orange)
- Storage: large bins (35 tonees) with zig-zag arrangements of baffles to avoid bruising of bottom fruits
- Inspection: removal of damaged & spoiled



Citrus juice extraction



- Washing under water sprays & brush rollers
- Pin rolling to prick and puncture oil glands to release essential oils and pigments; oil components otherwise contribute bitter notes
- Grading: size



Citrus juice extraction



- Juice extraction
 - Slicing the fruits to halves, reaming heads rotate into flesh releasing juice
 - Depth of ream controls quality: deeper the ream lower is the quality Systems



Citrus juice extraction



- Juice drains to trough below the reamers & screened to remove pulp and seeds
- Pasteurisation: at 80 C for 15 sec to
 - Increase shelf life to 3-4 weeks under refrigeration
 - Stabilisation of cloud by inactivating pectolytic enzymes, higher temperature (90-95 C) for 30 s is required



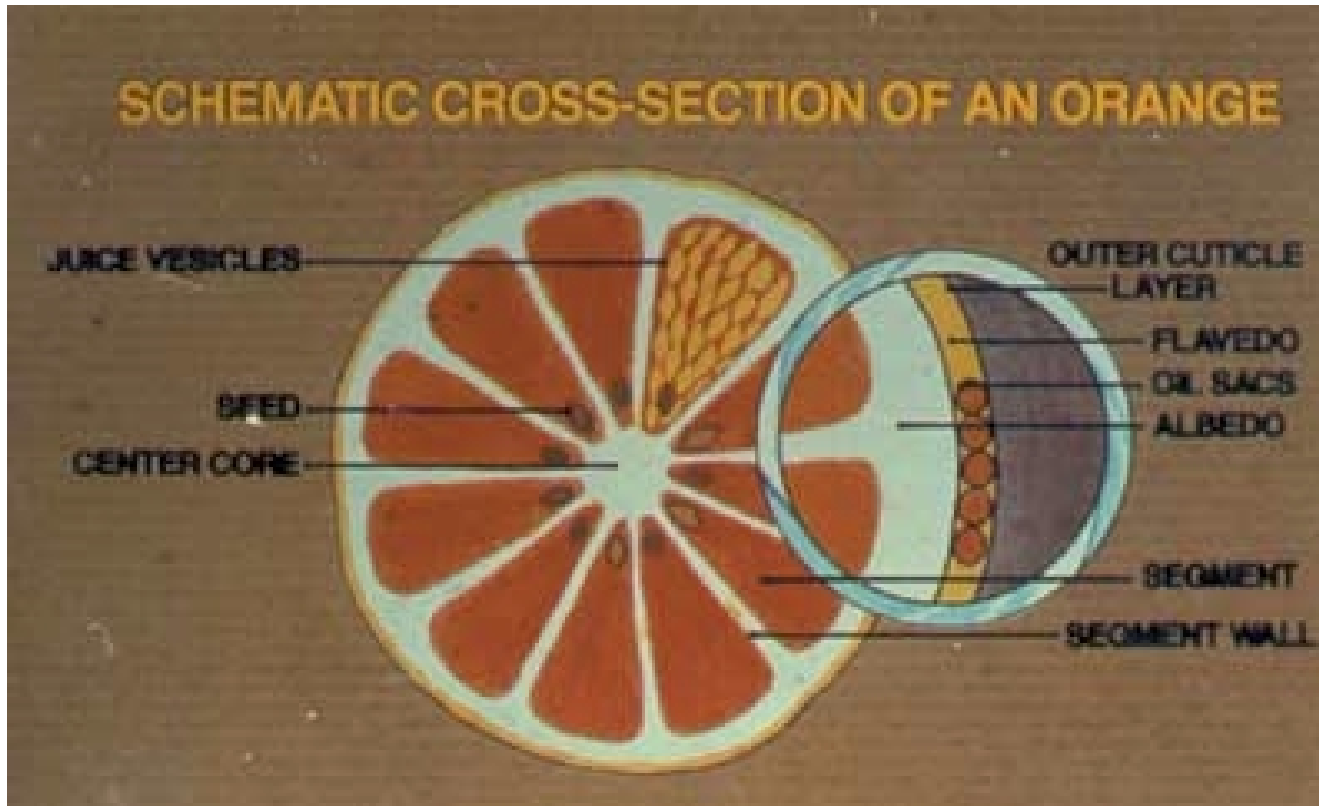
Citrus juice extraction



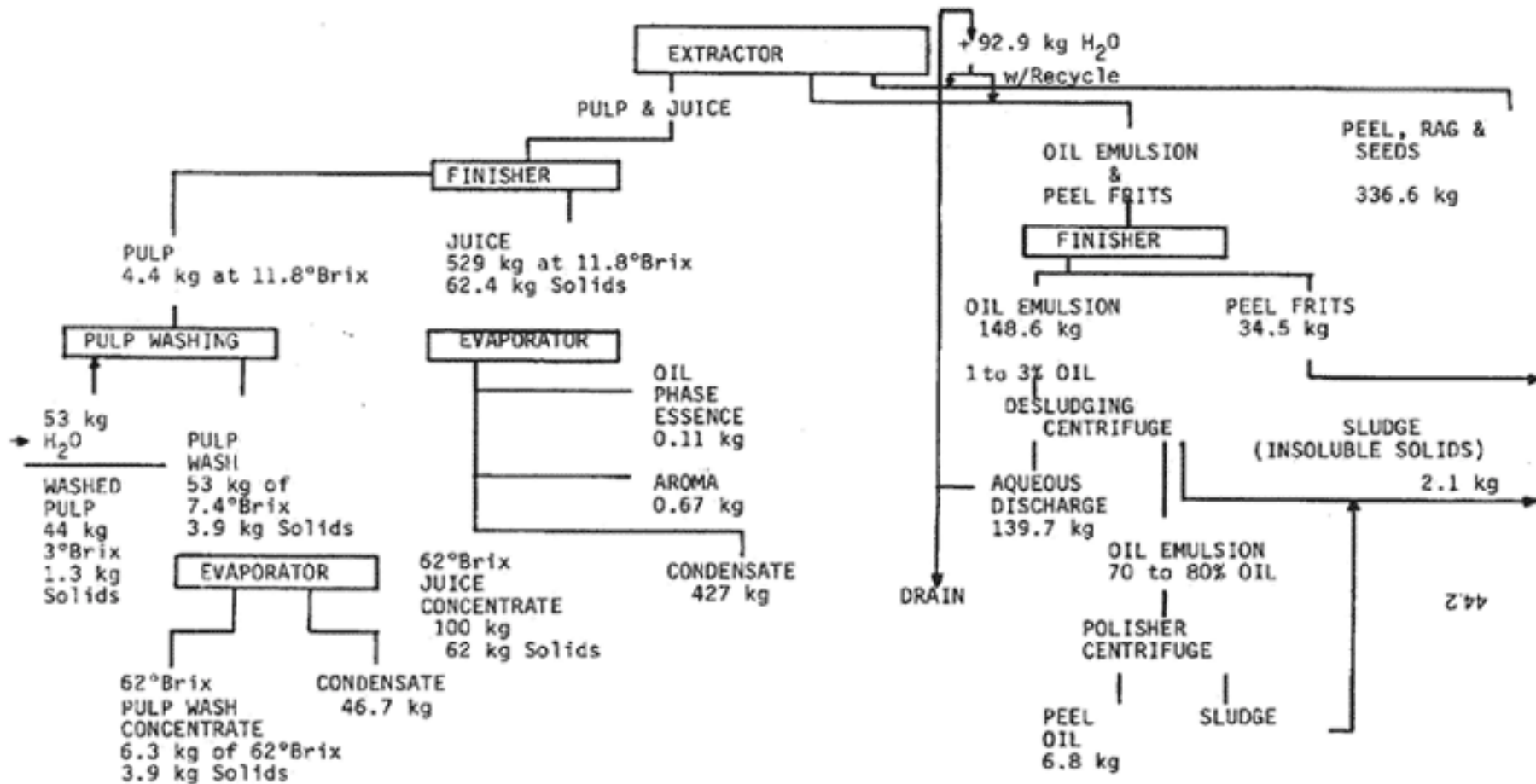
- Single strength
- Concentrates
- By products
 - Halves-shaved and used to produce crystallised peel
 - Essential oils



Cross-section of an orange



Material balance on citrus processing



<http://www.fao.org/DOCREP/005/Y2515E/y2515e13.htm>

Household juicers



Small-scale juicer



Juice extractor



www.storefast.co.uk/fvp.htm



www.OzScientific.com

Juice extractor



www.actrader.com.au/.../extractingline1.html



Industrial juice extractor

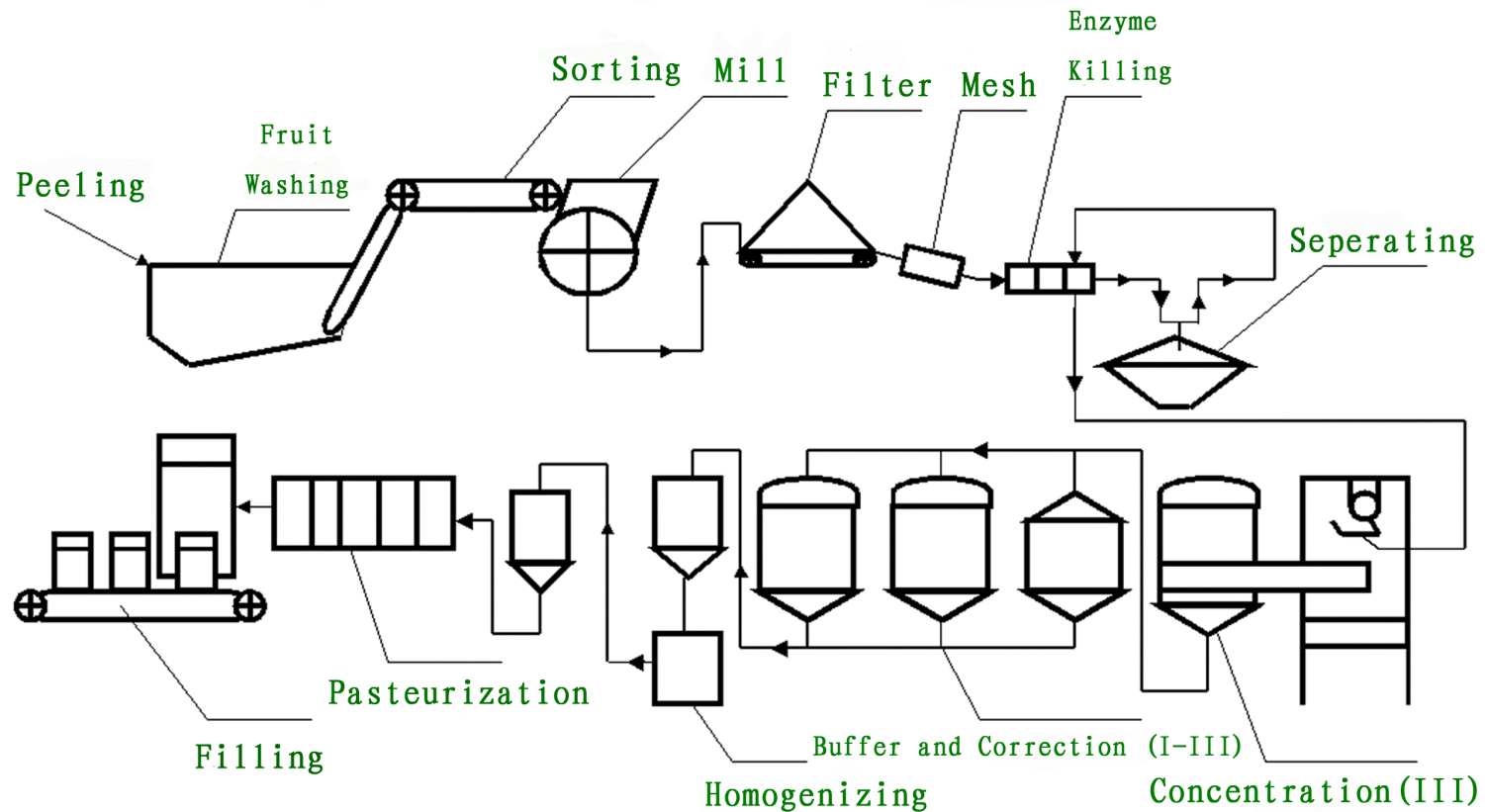


www.westernsource.com/verrazzano/harvest3.htm



Flowchart for pineapple juice concentrate

Flow Chart of Pineapple Juice Concentrate Processing



www.bpgjuice.com/english/management.htm



Pineapple juice concentrate



Washed raw fruits



Juice extractor



Juice evaporator



Frozen storage



Steriliser



Vacuum packing

Chemical changes



- Production of furfurals during storage
- Oxidation of vitamin c when packed in containers permeable to air



Fruit juice products

- Juice: 100% fruit content
- Juice drinks: juice diluted with sugar-acid syrup with acidity up to 1% & ss 10-12%, pH same as juice (3-4)
- Nectars: mixtures of juice, water and sugar with ss content of 25-50%



Fruit juice products

- Carbonated beverages
 - May or may not contain fruit juice
 - Soft drinks contain mixture of flavoured, coloured and acidified syrup with benzoic acid as a preservative
 - Carbonated fruit juice is marked in some countries

