Practical 1

VISIT TO A PROCESSING PLANT

EXERCISE

1.1 : Learn about different operations required for processing of fruits

OBJECTIVES

- To learn the different unit operations required for processing of fruits in different value added products
- To learn pulp extraction, juice making and bottling of juices
- To learn about thermal processing and storage of processed products

Delivery schedule: 03 periods

Student expectations/learning objectives

- Identification of different equipments and machinery required in a processing plant
- Understanding different unit operations required for making of different value added products from fruits
- To set up a processing unit in his/her village or in a town or a city
- To start an agri-business in the processing of fruits

Pre-learning required: Acquaintance with different kinds of fruits, pulp extraction etc.

Handouts/material/equipment's & tools required: Paper sheet and pen to note down the instructions, different machines and machinery and tools for pulp extraction, and processing of fruits such as pulper, refracrometer, bottles, corking machines, etc.

INTRODUCTION

You might have seen different processed products in the market and might have enjoyed the taste of them. These are prepared in processing factories. In a processing unit, following machinery or equipments are available:

Instruments for preparation of raw material (before processing)

Washing machines, peeling machines, cutting machines, preparation tables, pitting knives, coring knives etc.

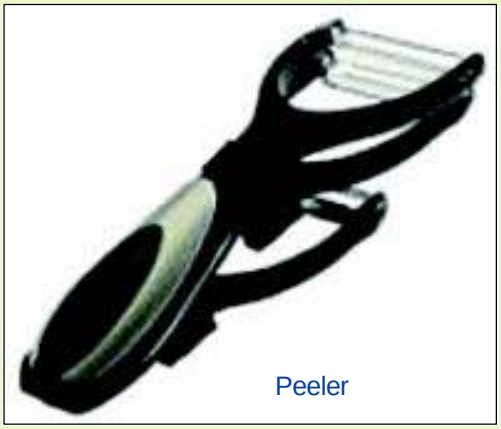
Important points to remember

All the equipments mentioned in this chapter may not be required for the developing processed products from all types of fruits. However, some may be common. For example, for the preparation of dried products, we may not need bottling plant and for juices, we may not need dryers. Bakery products require different equipments than juice processing.

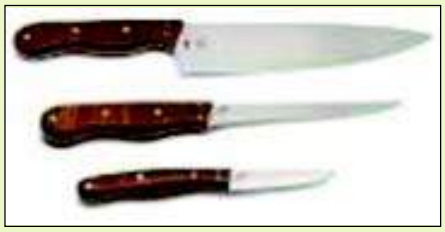
Equipments for pulp / juice extraction

A view of bottling plant in a processing factory

Continuous simple crusher, horizontal pulper, turbo refiner, continuous extractor, hydraulic press etc. Hydraulic juice press is widely used to squeeze out the juice from fruits such as *jamun*, orange, grapes and several other fruits. It can be of different sizes, depending upon the capacity of processing unit.



Peeler



Different types of knives

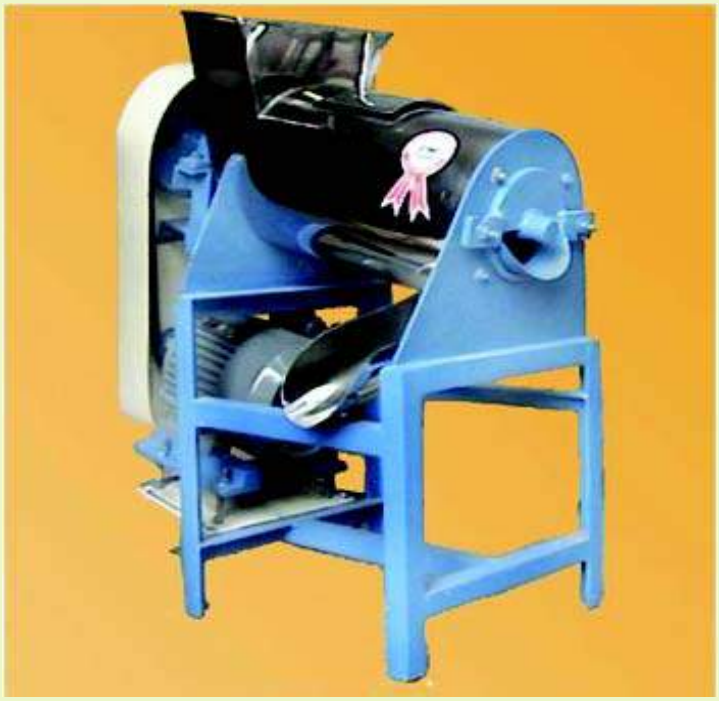
A kettle

Equipments required for blanching / cooking / concentration / evaporation

Cooking kettle, steam jacketed pans, continuous water blancher, large stainless steel tank, steam generator, double bottom tank for scalding / blanching. These instruments may be of different sizes, depending on the capacity of a processing unit.

Instruments for pasteurization and deaeration

De-aerator, pasteurizer, horizontal sterilizer, steam heated processing retort, plate heat exchanger. Deareators are not usually used in India. However, now several mulinational companies have started using it in India as well.

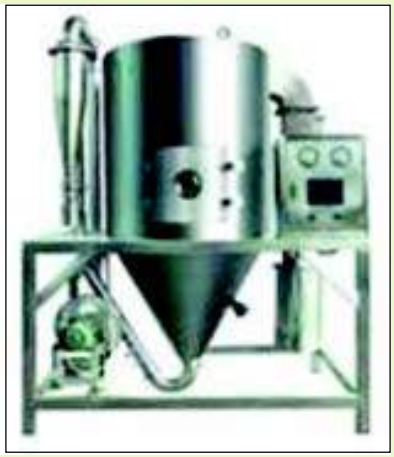


A pulper

Instruments for drying / dehydration

Cabinet dryers, SO_2 generator / chamber, sulphuring box, solar dryer, tunnel dryer, drum dryer, spray dryer, freeze dryer etc.

Packing instruments

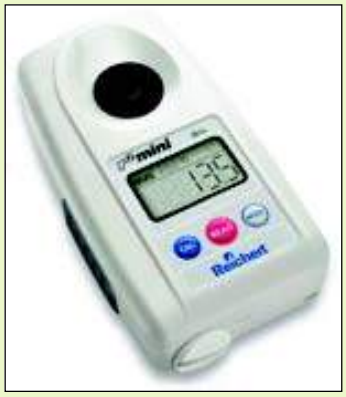


A spray dryer

Pouch filler, bottle filling machines, seaming machine, pouch sealing machine, crown corking machine, semi-automatic capping machine etc.

Teachers: Attention please

- Teachers are advised to take the students to different processing units in the area so that students could understand the processing of different products practically and effectively.
- Demonstrate the students for pulp extraction, preparation of some value added products such as juice making, RTS preparation, jam making etc.
- If possible, guide the students to take up processing of fruits and vegetable as their job in future life.



Digital refractometer

Instruments for canned products

Can reformer, flanger, double seamer, exhausting tunnel, water sprays, brining/syruping tanks, vacuum gauge, retorts, seam testing machines, salometer, hydrometer etc.

Quality control equipments

Refractometer, retorts (autoclaves), hot oven, pH meter, penetrometer, texture analyzer, microscope, incubation oven, analytical balance, working

tables, BOD incubator, refrigerator, spectrophotometer/ colorimeter, electronic balance, jars vacuum detector, various thermometers, hand refractometer, vortex shaker, colony counter, gas stoves etc.

An oven

Miscellaneous equipments

A crown corking machine

Mobile product wagons, storage tank, mixing tank, rotating tank, hot plate, magnetic stirrer, weighing machine, water bath, boilers, exhausts, fans, blowers, illumination and control equipments, waste water treatment equipments, weighing scale, jelmeter, rubber gloves, filter cloth, dusters, aprons, bottles, jars, cans etc.

An electronic balance

ACTIVITIES/ EXCERCISES FOR THE STUDENTS

- Visit some juice processing units. Make a list of equipments and juices being prepared in the processing unit. Make a flow diagram of the products being prepared.

A cabinet dryer

- Plan a visit to a tomato processing unit. Make a list of equipments and tomato products being prepared in the processing unit. Make a flow diagram of the all the products being prepared.
- Plan a visit to pickle factory. Make a list of equipments and pickles being prepared in the factory. Make a flow diagram of the all the pickles being prepared.
- Plan a visit to a processing unit making jams and jellies. Make a list of equipments and

different types of products being prepared in the processing unit. Make a flow diagram of all the products being prepared.

- Visit a bakery unit. Make a list of equipments and baked products being prepared in the unit. Make a flow diagram of the all the baked products.
- Visit some flower drying lab or unit. Make a list of flowers being dried and products being made. Try to make some such products at your home.

RESOURCE MATERIAL

- Hui, Y.H. (2008). Handbook of fruit and vegetable processing. Wiley India Pvt. Ltd., New Delhi.
- John, R.B.C. (2008). A hand book om post harvest management of fruits and vegetables. Dapa Publishing House, New Delhi.
- Sethi, V., Sethi, S., Deka, B.C. and Meena, Y.R. (2006). Processing of fruits and vegetables for value addition. Indus Publishing House, New Delhi.
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- Wills, R.B.H, McGlasson, W.S, Graham, D. and Joyce, D.C. (2009). Postharvest: An introduction to the physiology and handling of fruits, vegetables and ornamentals. CABI International, Cambridge, USA.