



Processing and value addition in pome and stone fruits

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India is one of the largest producers and a net importer of many fruits and vegetables and according to the FAO of the United Nations, the year 2021 has been declared as International year of fruits and vegetables.

Fruits and vegetables are rich source of vitamin and mineral, includes foliate, Vitamin C, and potassium. They are excellent source of dietary fiber, which help in maintain health, gut and prevent

constipation and other digestion problem. Other vital nutrients supplied by fruits and vegetables include riboflavin, zinc, calcium, potassium and phosphorous. Consumption of fruits and vegetables is abysmally low among middle and high income groups in urban India. It is likely that with liberalization, globalization and easing of trade restrictions, different types of fresh and processed food will be more readily available in the country. Today, fruits and vegetables are available in different forms (such as fresh, frozen, juices and chopped), through multiple retail channels and in different formats (such as branded, non-branded, organic and inorganic).

Generally on the basis of climate, fruits are classified into three groups viz. tropical, sub-tropical and temperate fruits. The total area and production of fruit crops in India is 6.66 million hectares and 99.07 million MT. However, total area occupied by temperate fruits is 474603 ha in the country which accounts for a total production of 3126576 tons. The per cent share of area in the world is 1.56 and that of production is 1.49. The average productivity of temperate fruits in world is 6.91 MT/ha in comparison to 6.58 MT/ha in India. Among the temperate fruits apple accounts for the highest production. Maximum productivity of apple was in New Zealand (56.72

MT/ha) in comparison to 7.51 MT/ha in India. Even in other fruit crops the productivity in other developed countries is much higher than India. In North-Western Himalayan states where temperate fruits are predominately grown, there are wide variations in average productivity. In apples, the highest productivity of 11.42 MT/ha was found in Jammu and Kashmir followed by 3.25 MT/ha in Himachal Pradesh and 2.2 MT/ha in Uttarakhand. In walnuts, the highest productivity of 3.29 MT/ha was recorded in Jammu and Kashmir in comparison to 0.35 MT/ha in Himachal Pradesh.

Among different temperate fruits pome and stone fruits are considered as the major one. Pome fruit is a fleshy fruit, consisting of outer thickened fleshy layer and a central core with usually five seeds enclosed in the capsules eg. apple, pear, quince and loquat whereas stone fruits get their name from the pit or stone in their center that is encased in a fleshy outer area eg. apricot, plum, peach, cherries. Post-harvest losses of fruits are very high (20-40 %). About 10-15 per cent fresh fruits shrivel and decay, lowering their market value and consumer acceptability. The processing or value addition of fruits in one way is to increase the income of farmers and to generate the employment.

NEED OF PROCSSING AND VALUE ADDITION

- i. To improve the profitability of farmer.
- ii. To empower the farmers and other weaker section of society especially women through gainful employment opportunities and revitalize rural communities.
- iii. To provide better quality, safe and branded foods to the consumers.
- iv. To reduce post-harvest losses.
- v. Reduction of import and meeting export demands.
- vi. Way of increased foreign exchange.

vii. Reduced the economic risk of marketing.

viii. Overall, increase farmer's financial stability.

Fruits are a high-moisture, generally acidic food that is relatively easy to process and that offers a variety of flavour, aroma, colour, and texture to the diet. Vegetables consist of a large group of plants consumed as food. Fresh fruits are highly perishable in

1. Canning

Canning is the process of applying heat to food that is sealed in a jar in order to destroy any microorganisms that can cause food spoilage. Proper canning techniques stop this spoilage by heating the food for a specific period of time and killing the microorganisms. Fruits that are canned i.e. apple juice, apricot, cherries, peach, pear, plum. In canning, firstly washing the fruits, than peeling, coring and slicing the fruits. Peeled fruit never rests for long outside the water, to prevent discoloration. Bring water to boil, then start timing and let it boil for 5 min. Pack hot fruit slice into half liter jars. Top up with blanched water. Leave two cm headspace after filling liquid. Wipe jar rims and then process in steam canner for 20 min.

2. Freezing

Freezing in food processing, is a method of preserving food by lowering the temperature to inhibit microorganism growth. Most commercial freezing is done either in cold air kept in motion by fans (blast freezing) or by placing the foodstuffs in packages or metal trays on refrigerated surfaces (contact freezing). Fruits that can be freeze mostly temperate fruit i.e. Peaches, nectarines and plum etc. Steps involve in freezing, firstly remove the pits

nature but able to be preserved by a number of processing methods, they are excellent sources of certain minerals and vitamins and are often the main source of dietary fibre. Processing of fruit is very important as well as in vegetable to produce products for direct consumption and as food ingredients. There are three major processes:- 1) canning 2) Drying 3) Freezing

and cut into slice. Freeze until the fruits slice become solid, about 4 hrs (-13°C to -14°C). Leave the fruit overnight, but be sure to package them within a day or two or they will start to develop freezer burn.

3. Drying

Drying or “dehydrating” food is a method of food preservation that removes enough moisture from the food so bacteria, yeast and molds cannot grow. Himachal Pradesh, Kashmir, Cold arid areas of Ladakh, Lahual-Spiti and Kinnaur mostly fruits can dry i.e. apple, pear, apricot etc. Steps involve in drying firstly dry fruit forms an important item of confection. The fully ripe fruit are harvested and placed in a wooden sulfuring chamber wherein yellow sulphur is burnt at the rate 4g/kg fruit. Sulfured fruit are dried in a solar drier for 5-7 days till moisture content is about 17 per cent. The dry fruits are packed in polythene bags for storage and marketing.

Value Addition

Addition value to raw product by taking it into at least, the next stage of production or value addition is a process in which for the same volume of a primary product, a high price is realized by means of processing, packing, upgrading the quality or other such methods. Different value added products from pome and stone fruits are jam, jelly,

candy, marmalade, pickle, chutney, sauces, tutty fruity, RTS, squash and vinegar.

Table 1: Various value added products prepared from pome and stone fruits

Fruits	Value added products
Pome fruits	
Apple	Jam, Jelly, Candy, Dry apple, Apple cider, Sauce, Cookies, Vinegar, Pickle, Juice, Tutti-fruitti, Chutney
Pear	Jam, Jelly, Juice concentrates, RTS, Drying, Tutti- fruitti, Candy, Pickle, Sauce,
Quince	Jam, Murabba, Leather, Drying
Loquat	Jam, Jelly, Pickle, Chutney
Stone fruits	
Peach	Jam, Jelly, Drying, Juice concentrates, RTS, sauce,
Plum	Jam, Jelly, Juice, Squash, Chutney, Sauce, Juice concentrates,
Apricot	Jam, Jelly, Drying, Chutney,
Cherry	Jam, Jelly (sour), Candy, Juice, Freezing.

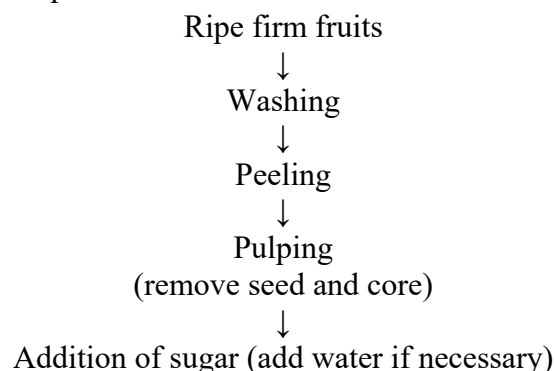
Classification

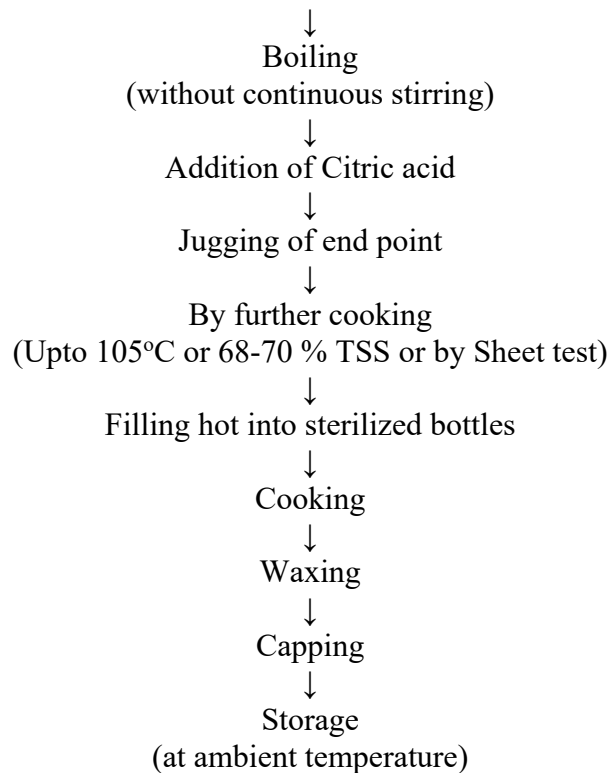
- ❖ Preservation with sugar : Jam, jelly, marmalade, candy, tutty fruity.
- ❖ Preservation by salt : Pickle
- ❖ Preservation by food additive : Chutney, sauces, RTS, squash.
- ❖ Preservation by fermentation : Vinegar

JAM

The most commonly fruits used to make jam are apple, pear, quince, peach, plum, apricot. Jam is a product made by boiling fruit pulp with sufficient quantity of sugar to a reasonably thick consistency, firm enough to hold the fruit tissues in position. It can be prepared from one kind of fruit or from two or more kinds. For jam ripe firm fruits are taken and during sorting spoiled fruit are removed. After that the fruits are washed under running tap water and

peeling is done. Pulping is done to remove the seed and core parts. Required amount of sugar and pectin is added to fruit pulp. Boiling is done till sugar dissolves and specified amount of citric acid is added during boiling. Heating is done up to 105°C or up to 68-70 per cent TSS. Prepared jam is then poured into sterilized bottles after cooling, finally metal caps are vacuum capped on the jars.

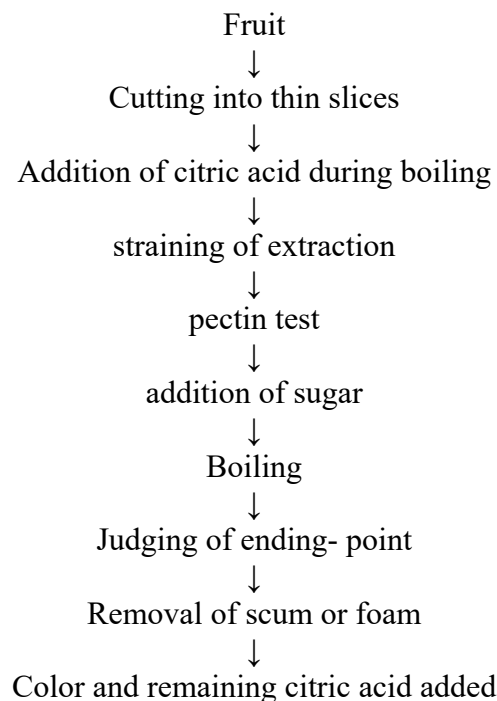




JELLY

Jelly formed by those fruits which contain pectin like apples, crabapples, plums and high bush cranberries etc. Boiling a clear, strained solution of pectin- containing fruit extract, free from pulp. Bring the fruit and pectin to a rolling boil and then add in the

sugar. Stir and hard boil the jelly and heating up to 105°C or 65 per cent TSS. Take the jelly off of heat and skim the foam from the top. Transfer the jelly into pre-warmed jars to prevent breakage.



↓
Filling hot clean sterilized bottles
↓
Waxing
↓
Capping and storage at ambient temperature

CANDY

Apples peels have been used to prepare candies. Steps involve in candy formation, firstly remove core and stem if whole fruit to be used otherwise peel and cut into halves. Steep into salt solution for 2 per cent for 24 hours to prevent browning. Wash and

dip in 2 per cent alum solution for 24 hours and wash again. Blanch in water containing small quantity of potassium metabisulphite to bleach or in water containing edible deep green or red colour.

PICKLE

Many types of fruit are used for pickle some includes peaches, mango, apples, crab apple, pears, plums, grapes, currant, tomato and olives. Chop the apples or other fruit into small pieces and mixed it with salt Heat oil in a pan and splutter mustard seeds. Add chopped ginger, garlic and curry leave sand

sauté till the raw smell disappears. Reduce flame low and add fenugreek powder and turmeric and sauté for 1-2 min. Now add the chopped apples or other fruit and 2tbsp water, mix it well and cook for 2 min. Add vinegar and then switch off. Allow to cool done then store into jar.

Fruit
↓
Peeling
↓
Removal of core
↓
Cutting lengthwise into pieces
↓
Placing immediately in salt water
↓
Cooking sugar, vinegar and spices for 5-10 min
↓
Mixing with pieces
↓
Heating till pieces tender but still firm
↓
Cooling
↓
Filling in jar and storage at ambient temperature

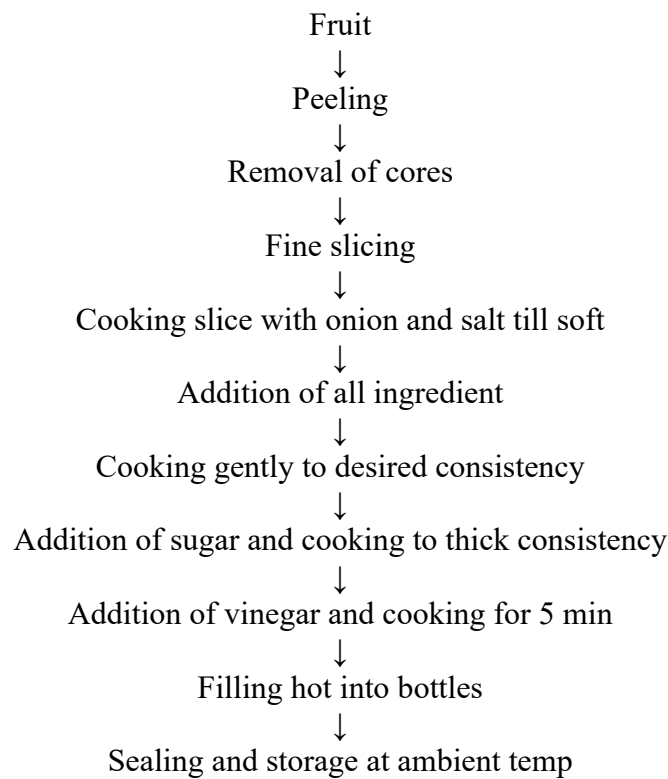
CHUTNEY

Apple, plum, apricot etc. are the raw materials for chutney. Steps involve in chutney formation firstly wash, peel and removal the cores of fruit. Fine slice should

be done and then cooking the slices with onion and salt till soft. Addition of all ingredients and cooking gently to desired consistency. Add the sugar and cook till

thick consistency. After that addition of vinegar and cooking for 5 min and filling

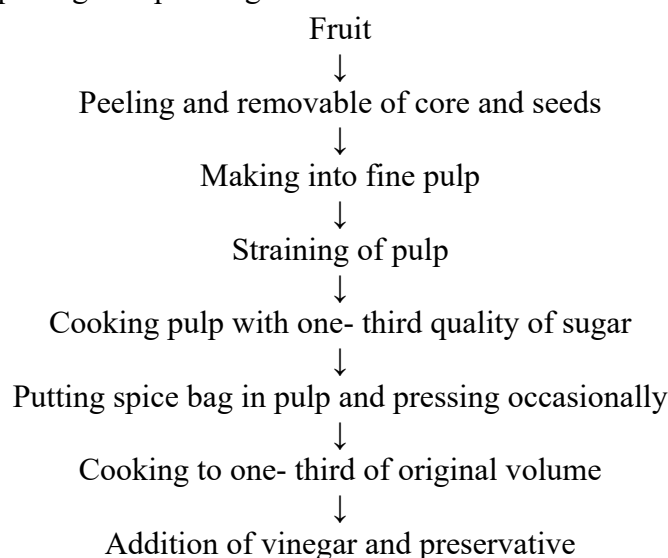
hot into bottles.



SAUCE

Apple, plum, apricot etc. are the raw materials for chutney. Steps involve in sauce formation firstly wash, peel and removal the cores and seed of fruit. Make the fruit into fine pulp then straining of pulp done. Cooking the pulp with one – third quality of sugar and putting the spice bag in

pulp and pressing occasionally. Cook the one- third of original volume of pulp. Remove the bag of spice from it. Add the remaining sugar and salt into it. Cooking to one- third its original volume. Addition of vinegar and preservation. Fill into hot bottle.



↓
 Filling hot into bottles and pasteurization (85- 90°C)

↓
 Cooling and storage at ambient temperature

TUTTY FRUITY

Fruits used for tutti frutti ice cream include cherries, watermelon, raisins, and pineapple, often augmented with nuts. Steps involve in tutti frutti firstly, raw and cleaned fruit. Washing and then peeling and pricking done. Cut the fruit in to regular cubes. Add common salt in water and soak

for 1 hour. Wash thoroughly with water. Blanched the fruit for 15 min. Cooling them with water. Steeping of cubes in sugar syrup with citric acid (6-8 hrs). Flavored and colored. Draining and then drying of cube (shade drying). After dry packed into polythene.

Raw and cleaned fruit

↓
 Washing and then peeling and pricking done.

↓
 Cutting in to regular cubes.

↓
 Add common salt in water and soak for 1 hour.

↓
 Wash thoroughly with water.

↓
 Blanching for 15 min.

↓
 Cooling them with water.

↓
 Steeping of cubes in sugar syrup with citric acid (6-8 hrs).

↓
 Flavoring and coloring.

↓
 Draining and then drying of cube (shade drying).

↓
 After dry packed into polythene.

APPLE CIDER AND VINEGAR

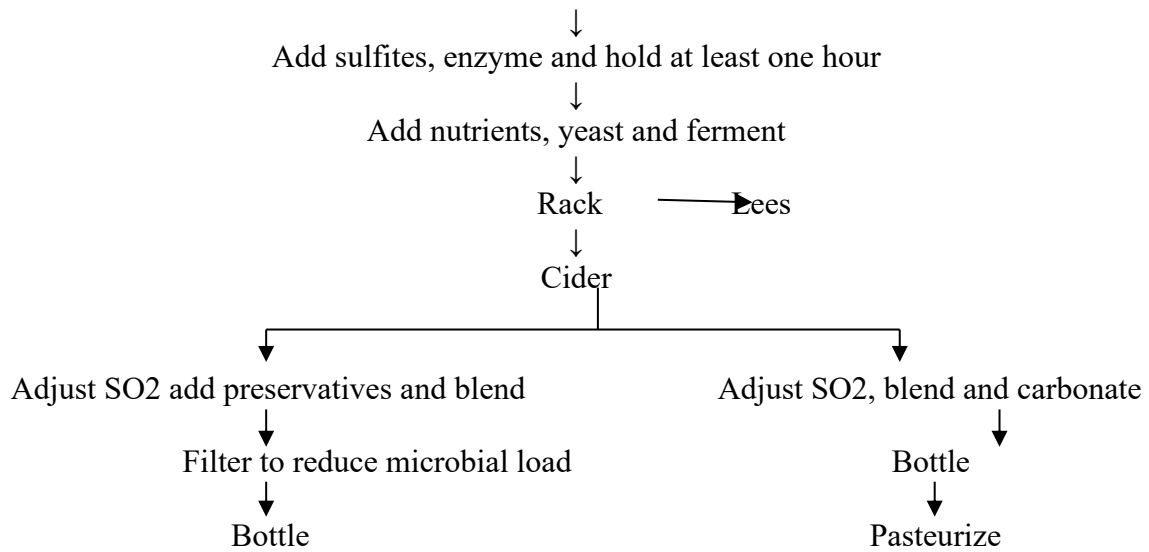
Wash apples with cold water and cut into pieces. Cover apples with water. Add raw sugar and cover the jar with a cheese cloth. Keep the jar in a warm, dark place. Stir the mixture once or twice a day. Wait for the apples to sink to bottom of the jar. Strain the

apples from the cider and pour the cider back into the jar. Leave the cider to ferment for 3-6 weeks, stirring every few days. Transfer the fermented vinegar to lidded glass jar and store.

Wash and mill apples

↓
 Press → Pomace

↓
 Juice



RTS (Ready to Serve)

Pure juice can be preserved and processed in various types of beverage. Fruit beverages are prepared as per the specification.

Plum juice: washing, addition of water, crushing, heating up to 80°C with continuous crushing, straining done, ready-to-serve.

SQUASH

It is non-alcoholic concentrated syrup. It is used in beverage making. It is usually fruit flavored, made from fruit juice, water, sugar or a sugar substitute. Cutting is done, juice extraction with the help of juicer,

straining is done, preparation of syrup with the mixture of sugar + water + acid, straining done, the syrup mixed with juice, boiling it, capping is done after cooling and store it. Example: plum.

