

FRUIT JUICE





Fruit processing toolkit



FRUIT JUICE

1.- Fruit juices and squash - general information

Classification

- JUICE -

Fruit juices are made from pure filtered fruit juice with nothing added. Sodium benzoate can be added as a preservative to extend the shelf life, but this is not essential. Properly pasteurised juice has a shelf life of several months. Most fruits can be used to make juice. The most popular ones are pineapple, orange, mango, grapefruit and passion fruit.

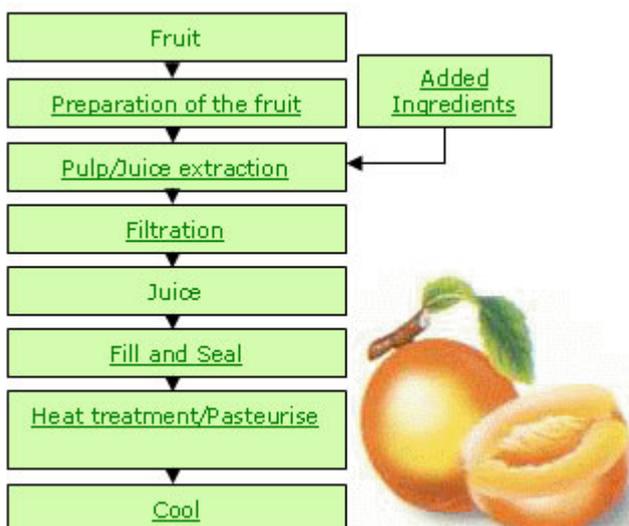
- SQUASH AND CORDIAL-

Squashes and cordials are concentrated, sweetened drinks made from a 30% mix of fruit pulp and sugar syrup. They are diluted before drinking. The sugar concentration must be high enough (12-14%) to preserve the squash after the bottle has been opened.

-NECTAR-

Some juices, such as guava juice are not filtered after pulping. They are bottled and sold as fruit nectars.

2.- Processing details for fruit-juice production



2.1.-Preparation of the fruit

Fruit should be washed in clean water, peeled and the stones removed. All fruit should be ripe and free from bruising. Any rotten or bruised fruit should be thrown away as this will spoil the flavour of the juice. Pineapple contains an enzyme that damages the skin.

Therefore, gloves should be worn when handling pineapple. The juice must be heated to a higher temperature for a longer time to destroy the enzyme (it must be boiled for 20 minutes). Soft fruit, such as berries and apricots, are delicate and should be handled carefully to avoid bruising.

2.2.-Pulp/Juice Extraction

Juice is extracted in a number of different ways - steaming, reaming, pressing and pulping. Fruit can be pulped in a liquidiser. A range of fruit presses are available to extract the juice. Some machines combine pressing with filtration to remove the fine particles. To make fruit squash or cordial, the extracted fruit juice is mixed with sugar syrup to give a final sugar concentration of 12-14%. See added ingredients.

2.3.-Added Ingredients

Pure fruit juices have no added ingredients, but sometimes preservatives such as sodium benzoate or citric acid are added. Fruit squashes have sugar added to preserve the squash after opening.

Sugar

Sugar is added to fruit juice to make a fruit squash or cordial. It is added to give a final concentration of 12-14% sugar. The amount of sugar present in the fruit has to be taken into account when calculating the amount of sugar to add. The amount of sugar added to a fruit squash is also determined by consumer taste and demand for sweetness. The amount of sugar syrup to be added to the juice to give a final concentration of 12-14% can be calculated by using the Pearson Square. Sugar syrups should be filtered through a muslin cloth to remove particles of dirt that are present in the sugar.

2.4.-Filtration

To make clear bright juice, the juice should be filtered to remove the fine suspended particles. The juice can be strained in a muslin cloth bag, or filtered using a steel filter. Pectic enzymes are sometimes added to the juice to break down the pectin which is naturally present and which gives the juice a cloudy appearance.



2.5.-Fill and seal

At the small-scale, containers can be filled simply using a funnel and a jug. For larger scale operations a range of filling machines are available. The juice containers should be thoroughly washed and sterilised before filling. Bottles that are recycled should be checked for cracks and chips. Only new caps should be used for sealing the bottles.



2.6.-Heat Treatment/Pasteurise

At the small-scale, the filled bottles of juice can be pasteurised in a stainless steel, enamelled or aluminium pan over a gas flame.

Care should be taken to avoid localised overheating.

A range of small-scale pasteurising units are available. To make fruit squash, the sugar syrup is heated to boiling in a large pan.

A measured amount of syrup is mixed with the fruit juice in a stainless steel pan, which increases the temperature of the juice to 60-70deg C.

The juice/syrup mixture is quickly heated to pasteurising temperature and hot filled into sterilised bottles and sealed. Fruit juice is pasteurised after it has been bottled.

The filled bottles are heated in boiling water for 5-10 minutes depending on the size of the bottle.

Both the time and temperature of pasteurisation are critical to achieve the correct shelf life and to retain the colour and flavour of the juice.



2.7.-Cooling

After heating, the bottles are cooled to room temperature by immersing them in clean cold water. If the bottles are cooled too quickly they will crack and break.

General

All equipment must be thoroughly cleaned each day to prevent contamination by insects and micro-organisms.



3.- Basic fruit recipes

The following basic recipes are only guidelines since they depend on the composition of fruit (which varies between different types) and the different consumer tastes for sweetness.

A.-Mango juice

Mango pulp Boiling water: 1 litre per kg pulp Sugar: 200g per kg pulp Lemon juice: 2 spoons per kg pulp

Reference. FAO, 1995. (Ref 37)

Preparation of pulp

Use fully ripe fruit. Wash and peel the mangoes and cut into slices with a stainless steel knife.

Extract the pulp using a hand-driven or electrical juice extractor.

Add boiling water, sugar and lemon juice to the pulp so that the mixture contains 12% total soluble solids (as measured by a refractometer) and has a pH of 3.5-3.8. Fill the juice into clean sterilised bottles and seal with caps. Pasteurise the juice by immersing batches of the bottles in a hot water bath at 75°C. Leave in the water until the temperature of the juice reaches 68°C. The time depends on the size of bottles:

Size of bottles (litres)	Pre-heating	Pasteurisation time (minutes)
0,33	yes	20
0,5	yes	25
0,75	yes	30

Leave the bottles to cool overnight then rinse, label and store them. When properly stored, mango juice will store for up to 12 months.

B.-Mango squash

Mango pulp 900g

Sugar 900g

Citric acid 18g

Water 900g

Reference. FAO, 1995. (Ref 37)

Wash the mangoes and peel with a stainless steel knife. Cut into slices. Prepare a pulp using a pulper with a fine sieve size (0.6mm). Prepare a syrup by dissolving the sugar and citric acid in the water. The water will need to be heated to fully dissolve the sugar. Add the pulp to the syrup and mix well. Strain through a clean muslin cloth or filter bag into clean, sterilised bottles. Place the sealed bottles in a water bath at 85°C and heat for 30 minutes. Leave to cool in the water and store at room temperature.

Quality assurance

It is important to exclude all air bubbles from the sealed bottles as the presence of air will cause the squash to deteriorate.

C.-Tomato Pulp

Ripe tomatoes

Lemon juice

Reference. FAO, 1995. (Ref 37)

1. Tomatoes should be ripe but not over-ripe or spoilt.
2. Wash the tomatoes and drain to remove surface water. Sort and remove any over-ripe, under-ripe or bruised fruits.
3. Cut the tomatoes into half using a stainless steel knife.
4. Extract the juice and pulp using either a manual or electrical pulper/juicer. Separate the pulp from the seeds and the skin.
5. Transfer the pulp to a large stainless steel pot and heat until a total solids content of 8-9°Brix as measured by a refractometer.
6. Check the acidity using a pH meter. It should be between 3.5-3.8. If it is too high, adjust it by adding a small amount of lemon juice.
7. While the pulp is still hot, fill it into clean, sterile bottles. Close with a screw top.
8. Pasteurise the pulp. Place the jars into a hot water bath. Bring the water to the boil and keep the jars in the water for the following time:

Size of jars (kg)	Pasteurisation time (minutes)
0,5	30
0,75	40
1	50

9. Cool the bottles overnight. Label and store. Bottled puree will store for up to 12 months.

D.-Mango and guava nectar

Mature mangoes and guavas

Sugar - 200g per kg pulp

Lemon juice or citric acid - 2 spoons per kg pulp

Water - 1 litre per kg pulp

Reference. FAO (1997). Ref 26.

1. Wash the mangoes and guavas in clean water. Drain. Sort and remove any unripe or over-ripe fruit.
2. Peel the mangoes with a stainless steel knife and separate the pulp from the stone. Cut the guavas into 4 sections and blanch them in boiling water for 3-10 minutes depending on their maturity.
3. Extract the pulp from guava and mango using a pulper.
4. Weigh the pulp and then weigh the water, lemon juice and sugar in the ratios above.
5. Boil the water with the lemon and sugar, then add the pulp so that the mixture has a total solids content of 19% as measured by a refractometer. The pH of the mixture should be between 3.5 and 3.8.
6. Remove the foam from the top of the nectar. While it is still hot, fill into clean, sterile bottles. Cap the bottles.
7. Pasteurise the juice by placing the capped bottles in a boiling water bath for the following length of time:

Size of jars (kg)	Pasteurisation time (minutes)
0,33	10
0,5	15
0,75	20

8. Leave the bottles to cool. Label them and store in a cool place.

E.-Peach or apricot nectar

Mature peaches or apricots

Sugar - 200g per kg pulp

Lemon juice or citric acid - 2 spoons per kg pulp

Water - 1 litre per kg pulp

Reference. FAO (1997). Ref 26.

1. Wash the fruit in clean water. Drain. Sort and remove any unripe or over-ripe fruit.
2. Peel the fruit with a stainless steel knife and separate the pulp from the stone.
3. Extract the pulp from the fruit using a pulper.
4. Weigh the pulp and then weigh the water, lemon juice and sugar in the ratios above.

5. Boil the water with the lemon and sugar, then add the pulp so that the mixture has a total solids content of 12-13% as measured by a refractometer. The pH of the mixture should be between 3.5 and 3.8.

6. Remove the foam from the top of the nectar. While it is still hot, fill into clean, sterile bottles. Cap the bottles.

7. Pasteurise the juice by placing the capped bottles in a boiling water bath for the following length of time:

Size of jars (kg)	Pasteurisation time (minutes)
0,33	10
0,5	15
0,75	20

8. Leave the bottles to cool. Label them and store in a cool place.

F.-Pear nectar

Mature pears

Sugar - 200g per kg pulp

Lemon juice or citric acid - 2 spoons per kg pulp

Water - 1 litre per kg pulp

Reference. FAO (1997). Ref 26.

1. Wash the fruit in clean water. Drain. Sort and remove any unripe or over-ripe fruit.

2. Peel the fruit with a stainless steel knife. Cut the pears into quarters and blanch for 2-10 minutes depending on their degree of maturity.

3. Extract the pulp from the fruit using a pulper.

4. Weigh the pulp and then weigh the water, lemon juice and sugar in the ratios above. Another commonly used formula for pear nectar is as follows:

37% pear pulp

55% water

8% sugar

lemon juice or citric acid to a pH of 3.6

The exact formulation depends on the pear variety and consumer taste .

5. Boil the water with the lemon and sugar, then add the pulp so that the mixture has a total solids content of 12-13% as measured by a refractometer. The pH of the mixture should be between 3.5 and 3.8.

6. Remove the foam from the top of the nectar. While it is still hot, fill into clean, sterile bottles. Cap the bottles.

7. Pasteurise the juice by placing the capped bottles in a boiling water bath for the following length of time:

Size of jars (kg)	Pasteurisation time (minutes)
0,33	10
0,5	15
0,75	20

8. Leave the bottles to cool. Label them and store in a cool place.

