



Types and Methods of Fruit Preservation for the Nutritious Ripe Fruits of *Flacourtia jangomas* (Lour.) Raeus.

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Received: 17 July 2020; Revised accepted: 12 September 2020

Key words: *Flacourtia jangomas*, Fruit preservation, Fruit juice, Fruits in syrup, Salty nuggets

Flacourtia jangomas (Lour.) Raeus. a medium sized tree of nutraceutical importance, is an endemic tree of eastern Uttar Pradesh having significant medicinal properties (Srivastava *et al.* 2012, Sinha *et al.* 2018,2019). The ripe fruits have high fibre content together with good protein content, low fat and higher amount of monosaturated fatty acids as compared to polysaturated fatty acids. It contains significant amount of β -carotene followed by lutein and zeaxanthene, retinol and phyloquinone (Vitamin K) which are important in the regulation of haemoglobin and fibrinogen in human body (Srivastava *et al.* 2009). The flowering period of this tree falls around June – July and the brown-red ripe fruits may be obtained from the market from late August to November every year. However, it would be almost impossible to get these highly nutritious ripe fruits during the rest of the period (December to July). Therefore, it would be imperative to develop certain specific canning and preservative methods for ripe fruits of “Paniala” with all its nutritional qualities intact so that consumers may get these fruits throughout the year.

Most of our food consists of agricultural products, which are usually seasonal and spoil quickly. To make food available throughout the year, certain methods have been developed to prolong the storage life of products and to preserve them for a longer duration. The biodegradation process can be postponed by adding preservatives and optimizing storage conditions, applying modern techniques. The ripe fruits of “Paniala” may get preserved for longer period of time in the form of sweet juice, fruits in syrup as

well as dried salty nuggets.

Preparation of sweet fruit juice

a) Cleaning and washing

First, the “Paniala” fruits have to be thoroughly cleaned to remove any dirt or insecticide residues. This cleaning process usually involves washing the products under a faucet with running drinking-water or in a bucket with clean water that is regularly refreshed. When cleaning it is best to first remove the stems.

b) Lye dip treatment

Some products, such as plums and grapes, are immersed for 5-15 seconds in a pan of hot, almost boiling, lye (NaOH; 10-20g lye/litre water) to make the peel rough and to thereby speed up the general drying process. The peel then also separates more readily from the fruit, which makes it easier to remove. After such a treatment, the fruit has to be rinsed vigorously with cold water to remove the lye residues. Lemon juice can also be used to neutralize any remaining lye residues.

c) Juice extraction and packing

The ripe fruits, following cleaning, washing and the lye-dip treatment; will be crushed. Equal amount of water (W/V) will be added and heated 80–82°C until softening and then, filtered through 4-fold cheese cloth or bag to obtain clear juice. Juice steamer may also be used for the purpose. Before packing, one-part sugar will be thoroughly mixed with 4 parts of fruit juice (Table 1). For better taste acceptability it would be advisable to mix one part of orange juice to 5 parts of *Flacourtia jangomas* (Lour.) Raeus. “Paniala” fruit juice prior to bottling.

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Table 1 Method for preparation of fruit juice
(Modified after James and Kuipers 2003)

Fruit	Preparation method	Sugar and other additive
Ripe fruits of "Paniala"	Use ripe fruits, wash and crush, add 1 litre water to 1 kg of fruit, heat to 82°C until soft. Press through cloth or cloth bag, or use a juice steamer	1-part sugar + 4 parts juice <i>For better taste acceptability:</i> One part of orange juice may be added to 5 parts of this juice.

Fruit preservation in sugar syrup

The healthy and ripe fruits will be carefully selected and the over-ripe fruits will be discarded. The stalks and stem parts will be removed, and following cleaning, washing and the lye-dip treatment; will be put in near boiling water for 30

seconds and removed. Later, 30% sugar syrup will be prepared and these fruits will be put in the boiling sugar syrup for one minute and will be allowed to cool. Prior to complete cooling, the fruits will be packed in air-tight bottles, jars and tins (Table 2).

Table 2 Method for preservation of fruit in syrup
(after James and Kuipers 2003)

Product	Preparation	Add to product when packing into jar, bottle or tin
Ripe fruits of "Paniala"	Remove any over-ripe fruit, wash, remove stalks, remove pits	Boiling water, 30% sugar

Dried and salty "Paniala" nuggets

The healthy and ripe fruits will be carefully selected and the over-ripe fruits will be discarded. The stalks and stem parts will be removed, and following cleaning, washing and the lye-dip treatment; will be put in near boiling water for 30 seconds and removed. Later, 30% Rock salt solution will be prepared and these fruits will be put in the boiling salt solution for one minute and will be allowed to cool. Cooled and spread on thick cloth to dry. When almost dry

thoroughly mixed with powdered rock salt and dried completely under sun or kept at 40-50°C in an oven for 24 h and packed in air-tight jars and tins (Table 3).

Blanching or pre-cooking is done by immersing fruits in water at a temperature of 90-95°C. Exposing them to steam is also possible. The result is that fruits become somewhat soft and the enzymes are inactivated. Blanching is done before a product is dried in order to prevent unwanted colour and odour changes and an excessive loss of vitamins.

Table 3 Method for preparation of dried and salty fruit nuggets (after James and Kuipers 2003)

Product	Preparation	Add to product when packing into jar or tin
Ripe fruits of "Paniala"	Remove over-ripe fruits, wash, remove stalks, remove pits	Boiling water with 30% Rock salt. Cooled and spread on thick cloth to dry. When almost dry thoroughly mixed with powdered rock salt and dried completely under sun / kept at 40-50°C in an oven for 24 h and packed in air-tight jars.

The different types of prepared preserved ripe fruits of *Flacourtia jangomas* may be utilized in the following ways in regular diet:

Sweet fruit juice

The fruit juice may be used in the following manner for consumption:

a) Jellies

The fruit juice may be transformed into jelly by addition of gelatine crystals to hot juice in an appropriate concentration to prepare delicious dessert of choice.

b) Decoration on puddings and ice-creams

The fruit juice directly or in the form of jelly may be used as decoration toppings on puddings and ice-creams. Addition of juice to puddings may provide better taste to it.

c) Healthy cool drink

By addition of desired sugar to taste and cold water or soda (of desired dilution) will be served as chilled refreshing cold drink.

*Fruit in sugar syrup**a) As cherries*

Fruits may be consumed directly like cherries or mixed with puddings, ice-creams or other similar delicacies.

b) Decoration on puddings and ice-creams

The fruits may directly be used as decoration toppings on puddings and ice-creams.

*Dried and salty nuggets**a) As salty candy*

These nuggets may be used as salty candies. In case of nausea it relieves to have a better mineral balance in the body.

b) In preparation of chutney

Put some seed-removed salty nuggets in a grinder together with spices like green chillies and green leaves of coriander / parsley / mint and grind the mixture into chutney. Add lime juice and adjust salt to taste.

SUMMARY

The ripe fruits of “Paniala” or “Coffee Plum” or *Flacourtia jangomas* (Lour.) Raeus., which are highly rich with vitamins and minerals, are usually available only for a

limited four months period in a year, i.e. from August to November. Therefore, it would be necessary to develop certain specific canning and preservative methods for ripe fruits of “Paniala” with all its nutritional qualities intact so that consumers may get these fruits throughout the year. The methods for the preparation of sweet fruit juice, fruits in sugar syrup and dried and salty nuggets; have been given in this communication. Earlier preparations and studies have indicated that the best use period will be 24 months from the date of its package.

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