

Review Article

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A Review on the Preparation Method of Fruit Leathers

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ABSTRACT

Fruit leathers are made by drying a very thin layer of fruit puree to produce a product with a texture similar to soft leather. Fruit leather is the product prepared by blending fruit purees or pulp extracted from ripe pulpy fruit, sugar or other nutritive sweeteners and other ingredients and additives desired for product and dehydrated to form sheet which can be cut to desired shape and size. The preservation of fruit leathers depends on their low moisture content, the natural acidity of the fruit used and high sugar contents. Various drying systems including combined convective and far-infrared drying, hot air drying, microwave drying, solar drying, and sun drying have been used to make fruit leathers. Most fruit leathers are dried at 30 to 80°C for up to 24 hours until the target final moisture content (12 – 20%) has been reached. Research about fruit leathers began in the 1970s. This paper reviews the literature on fruit leathers; most notably it covers various facets of process and development of fruit leathers.

Keywords

Fruit leather,
Drying, Blending,
Moisture content

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Introduction

Fruit leathers are dried sheets of fruit pulp which have a soft, rubbery texture and a sweet taste (Diamante *et al.*, 2014). Leathers can also be made from a mixture of fruits and also eaten as snack foods instead of boiled sweets. It is chewy and flavourful, naturally low in fat and high in fiber and carbohydrates; it is also lightweight and easily stored and packed

(Ayotte, 1980; Diamante *et al.*, 2014). Consuming fruit leather is an economic and convenient value-added substitute for natural fruits as a source of various nutritional elements. They are produced by dehydrating of fruit puree into a leathery sheet (Raab and Oehler, 1999). The edible portion of fruit (one or more types) is pureed, mixed with other ingredients to improve its physicochemical and sensory characteristics, heated, formed

(flattened and shaped) and then dried on a flat trays until a cohesive fruit leather is obtained. Fruit pulp-based fruit leathers are nutritious and organoleptically acceptable to customers. They contain substantial quantities of dietary fibers, carbohydrates, minerals, vitamins, and antioxidants (which remain constituents of the finished product) (Ayotte, 1980; Gujral and Brar, 2003; Diamante *et al.*, 2014). Most fresh fruits have a short harvest season and are sensitive to deterioration and even when stored under refrigerated conditions; therefore, making fruit leather from fresh fruits is an effective way to preserve fruits (Maskan *et al.*, 2002; Diamante *et al.*, 2014). Fruit leathers are easy to prepare and a good way to use left-over canned fruit and slightly over-ripe fresh fruit. Most fruit or combinations of fruits can be used. Apricots, apples, grapes, berries, bananas, pineapples, oranges, pears, peaches, plums, melons, and most tropical fruits can be blended and dried to make fruit leathers.

In addition, mixed fruit leathers like guava and papaya fruit leather are also available. Basically, fruit pulps are mixed with appropriate quantities of sugar, pectin, acid, and colour and then dried into sheet-shaped products (Diamante *et al.*, 2014). Gujral and Brar, (2003) added sugars and pectin to mango leathers. The sugar gave the product a sweeter taste and increased the solids content; then pectin was used to thicken the pulp, modify the flexible texture, and ensure the retention of the shapes of the dried product. Furthermore, they also prepared mango leather with the addition of potassium meta bisulphite to get better sensory qualities and the results were satisfactory for customers/consumers. Chan and Cavaletto (1978) made papaya leathers with sucrose and sodium bisulphite (SO₂). They found that SO₂ reduced the change in color of the papaya leathers during processing and storage (Diamante *et al.*, 2014).

Various additives can be used, such as glucose syrup, sodium meta bisulphite, and sorbic acid, depending on the types of fruit leather (Demarchi *et al.*, 2013; Quintero Ruiz *et al.*, 2012; Sharma *et al.*, 2013).

Fruit leathers can be dried using various drying method including sun, oven, cabinet or dehydrator drying method (Raab & Oehler, 1999). The composition of the final fruit product may vary depending on the processing conditions. Sun-dried products can become discoloured and the process can be unhygienic and lengthy. Hot air drying is an alternative method that needs less drying time and improves the quality of the dried fruit (Maskan *et al.*, 2002). Modern dryers, such as tunnel dryers and forced air circulation cabinet dryers have been used for making fruit leathers with a better colour and flavour. Over 85% of industrial dryers are of the convective type with hot air or direct combustion gases used as the drying medium. Drying occurs from vaporization of the liquid by supplying heat to the wet material.

Conduction, like contact or indirect dryers, convection such as direct dryers, and radiation or volumetrically by placing the wet material in a microwave or radio frequency electromagnetic fields are various methods that are used in making fruit leathers. The methods chosen are dependent on what kind of fruit and the commercial conditions.

The product changes during drying include shrinkage, puffing, and crystallization. Sometimes there are also desirable or undesirable chemical or biochemical reactions occurring that will cause changes in color, texture, odour, and other properties in the final product. In many processes, incorrect drying methods result in irreversible damage to the quality of the final product which makes the product no saleable (Huang and Hsieh, 2005; Gujral and Brar, 2003).

With modern dehydrators and well-designed drying methods, fruit leathers can be dried at any time of the year to reach the requirements of customers. In the current growing market of fruit leathers, commercial packaging is necessary. Packaging materials for fruit leather are required to prolong the shelf-life of the product and, normally, relate to the stability of water activity, microbiological stability, sensory properties, and physicochemical characteristics (Irwandi *et al.*, 1998).

Production of fruit leathers

As the pulping process can be mechanised, it makes this process less labour-intensive. Further it offers a scope for full utilisation of pulp and added ingredients resulting in negligible waste generation and processing losses in comparison to other methods of processing (Tiwari, 2019). The following basic steps are involved at all levels of production of fruit leathers at three scales; from a very small simple home based system, through cottage industry to small industrial production.

- Preparation of the puree
- Batch preparation
- Drying
- Packing and storage

Development of fruit leather

Ripe fruits are used in its preparation. Wash ripe fruits and collect fruit pulp by removing its peel or shell. Addition of water to fruit pulp (if required), mix well and heat it up to 80°C. Collect fruit pulp free of seeds and fibers by straining heated mass through stainless steel sieve. Add sugar, citric acid and preservatives etc to treated pulp. Boil treated pulp and spread on aluminium trays smeared with butter. Dry at 55-60°C for 15-16 hrs to a moisture content of 14.5%. Cut slices of dried

pulp in aluminium trays, wrap in butter paper and pack in polyethylene bags. Addition of up to 10 per cent sugar to the extracted pulp was found to be ideal before drying the pulp to a moisture content of 14.5 per cent (Roy and Singh, 1979; Singh and Chaurasiya, 2014).

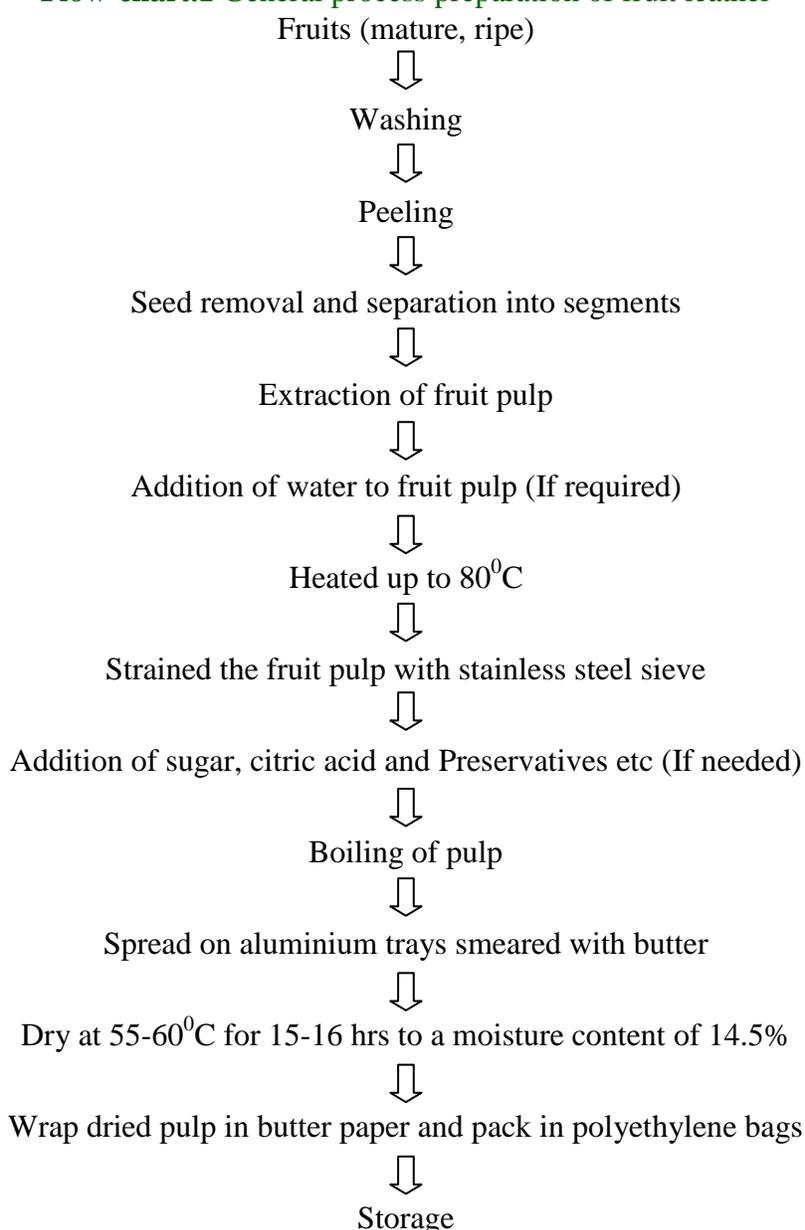
Mango pulp is commonly used for making fruit leather as mango fruits are usually available in market. It is also known as *Ampapar* (Hindi) or *Tandra* (Telugu) (Tiwari, 2019). However, other fruit pulp leather can also be made from guava, papaya, apricot, banana, etc. Different fruits like apple, berries, kiwifruit, and a range of tropical fruit pulp have already been used for making fruit leathers and these are consumed as popular snack (Huang and Hsieh, 2005; Tiwari, 2019). Fruit leathers are usually promoted as natural snacks in health food market. Even dehydrated fruit pulp can be alternatively rehydrated in water after cutting into small pieces to prepare RTS juice by blending (Nanjundaswamy *et al.*, 1976). Dehydrated fruit-based snacks such as fruit leathers have the advantage of being perceived by consumers as healthier food. Therefore, they can be a potential carrier for prebiotics and probiotics. An ideal fruit leather can be prepared from fruits such as apples, pears, pineapples, and strawberries, apricots, cherries, nectarines, berries and peaches etc (Tiwari, 2019). Product similar to fruit leather is also known as pestil in some part of world. Yılmaz *et al.*, (2017) stated that pestil is a traditional fruit product commonly produced in Anatolia, Arabia, Armenia, Lebanon, Persia and Syria. Pestil is a sweet product with high nutrient content such as mineral, vitamins and considered as a rich energy source because of its high carbohydrate content. It is also known with different names such as 'Bastegh', 'Qamar eldeen', 'Bestil', and 'Fruit Leather'. Pestil is made from different fruits such as apricot, kiwi-fruit, grape, mulberry and pear (Tiwari, 2019).

Development of fruit leathers by blending technique

Generally reports on fruit leathers are based on use of single type of fruit or pulp. Beside usual process of fruit leather preparation, blending of different fruit pulp for preparation of fruit leathers has also been reported. The main purpose of choosing two or more fruits for blending is improvement in nutritional qualities, sensory qualities (colour, texture

and flavour) and storage stability as per the contribution from different fruits during product formulation (Tiwari, 2000; Tiwari, 2019). Further, it also gives an opportunity to utilize fruit which are available throughout the year. Good blended fruit leather from mango-guava pulp has been reported by Hemakar *et al.*, (2000). Cherian and Cheriyan, (2003) carried out works on acceptability study on blended papaya leather.

Flow-chart.1 General process preparation of fruit leather



Other works relating to acceptable blended fruit bar have been reported by Sreemathi (2008) in sapota-papaya leather; Kaushal and Bhat (1999) in blended fruit leather using sprouted soya slurry with peach, plum and apricot and Chauhan, *et al.*, (1993) in apricot-soy fruit leather. Narayana *et al.*, (2007) reported improvement in the moisture content in banana fruit leather after addition of pectin. Blended fruit leather made from 60% papaya pulp with 40% guava pulp was best with improved nutritional and sensory attributes besides being very cost effective (Kumar *et al.*, 2010). Similarly, purees of apple, banana and pineapple have also been used for making mixed fruit leathers (Tiwari, 2019).

In conclusion, fruit leathers, sometimes referred to as fruit rolls or Fruit Roll-ups, are popular dried food snacks. The popularity of the fruit leather has increased significantly in the last 10 years because many view these snacks are more healthful than other confections. Fruit leather is mass-manufactured by different companies but can also be made rather easily at home. Making fruit leathers from commercial fruits for example grapes, raspberries, apples, and strawberries, mango, papaya etc on the kitchen stove and using the oven or a food dehydrator to assist in the drying process. In India mainly mango leather is commercially available in the market. Underutilized fruits like bael, ber, jamun etc. can also be used for preparation of fruit leathers and these fruit leathers can be popularised commercially, so that postharvest losses of fruits can be reduced. Fruit leathers can be a good, convenient and natural alternative to junk foods or foods which are with high salt, sugar and fat

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