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Processing for Value Addition of Papaya

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The Papaya (*Carica papaya* L.) is the most economically important fruit in the Caricaceae family. The post harvest losses of papaya in India are estimated at 5-30 percent of total production. Most of the market discarded fruits due to mechanical injury during harvesting, transportation, washing, grading, packaging are practically not using for any processed product preparation, even though they are as good as other fresh fruits except mechanical damage. Market discarded papaya processing is necessary, where it ensures fair returns to the growers to improve their economic condition. Total quantity of production of the papaya is depends on processing methods, the products like papaya jam, papaya squash, papaya Sauce, papaya toffee and papaya nectar can prepared. These products have good consumer demand because of its nutritional and medicinal value. It has more demand for development of diversified value added products from discarded fruits. It provides the employment opportunity for rural mass, increases export demand of value added products and helps in increase the economy of the country.

Keyword: Market, Nutritional, Papaya, Processing

Introduction: India is the second largest producer of fruits and vegetables in the world after China. It accounts for about 69.82 lakh ha and production of fruits is about 812.85 lakh MT (NHB 2012). As per the latest estimates, by Central Institute of Post Harvest Engineering and Technology (CIPHET), Ludhiana, the wastage of fresh horticultural produce is up to 18 percent due to poor post harvest management practices. Hardly 2 per cent of fresh horticultural produce is processed to value added products. Hence, there is huge scope for processing of fruits and vegetables. This wastage can be easily prevented by adopting various stages of collection to processing and preservation of perishables. At the same time, there is market glut during harvesting season and farmers are forced to sell their produce at throw away prices, some time which

will not meet even harvesting cost of the produce. Therefore, food processing industries can help farmers to get sure income for their produce and also avoid market glut.

The Papaya (*carica papaya* L.) is the most economically important fruit in the Caricaceae family. Brazil stand out as the world's biggest producer, supplying 25 per cent of the world demand, followed by Mexico at 14 per cent, Nigeria at 11 per cent, India and Indonesia at 10 per cent, other papaya growing nation include Venezuela, China, Peru, Congo, and Ethiopia, all of which contribute less than 3 per cent of the papaya supply (Benassi, 2010) ^[1] and the principal markets for consumption are the USA and Europe.

The post harvest losses of papaya in India are estimated at 5-30 percent of total production. The

processing of papaya fruit not only minimizes these losses to some extent but also gives better return to farmer during the glut season. Freshly harvested, ripe papaya fruit typically exhibit a storage potential of less than one week under ambient tropical conditions (Paull et al., 1997) [4]. The high perish-ability of papaya and other tropical fruit is further exacerbated when they are utilized as fresh-cut products.

Papaya is cultivated throughout the tropics for its fruit. Fruit are eaten green or ripe, in salads or fresh. Fruit are pyriform (pear-shaped), spherical, or cylindrical. The pyriform, hermaphroditic fruit is the most common. (Nakasone 1986) [3], the sizes of this papaya ranges from 200 g to 10 kg, with flesh thickness from 1.5 to 4 mm (0.06 to 0.16 in). Flesh is greenish white in immature fruit to pale orange-yellow, salmon pink, or red, depending on cultivar, when ripe (Paull and Duarte 2011) [5].

Size, shape, smooth skin, and absence of blemishes are major quality characteristics. Consumers in Western countries also prefer fruit without the heavy musky, sweaty odor found in some South Asian cultivars.

Nutritional values of papaya

Sl. No.	Nutrient Composition	Unit/Per cent
1.	Moisture	85-90 Per cent
2.	Pulp	75-80 Per cent
3.	Carbohydrates	9-11 Per cent
4.	Fiber	0.6-1 Per cent
5.	Total soluble solids	7-10 Per cent
6.	Acidity	0.4-0.8 Per cent
7.	Vitamin A	1800-2000 IU
8.	Vitamin C	30-40 mg/100g
9.	Vitamin B1	0.03-0.05 mg
10.	Vitamin B2	0.2-0.4 mg
11.	Niacin	0.2-0.3 mg
12.	Minerals	0.4-0.6 per cent
13.	Calcium	15-20g
14.	Iron	0.5-0.7 mg
15.	Calorific value	35-40/100g

Processing

There are many reasons for processing papaya besides the development of a business with a

good return on investment for the owners such as to prevent post harvest losses, to eliminate waste, to preserve quality, to preserve the nutritive value of the raw papaya, to make seasonal horticultural produce available throughout the year, to put them in convenient form for the user, to develop new products, to increase the value of the product and also better return to the farmers. So ultimately it will be beneficial to producer, processors and consumers.

Most of the market discarded fruits due to mechanical injury during harvesting transportation, washing, grading, packaging are practically not using for any processed product preparation, even though they are as good as other fruits except mechanical damage. These kind of fruits required immediate processing operation because they are not able to keep for long duration in the same condition. This kind of fruits shelf life can be increased by changing their form by preparation of value added products. However, some of these fruits are not acceptable in the market in fresh form due to their mechanical damage and other type of injury. Hence, there is a urgent need to concentrate on research efforts in diversification and popularization of such fruit crops. To achieve this, there is a need to create demand for such fruit crop processed products in the domestic and international markets. Processing also make availability of papaya product throughout the year irrespective of season. However in India, the total processed fruit account for per cent of total production.

Softening is the key to ripeness, Papayas that are one-quarter to one-half ripe should keep 1-2 weeks. The development of a yellow blush is associated with ripening when the fruit ripens at 65 degree F, or over. At lower temperatures the colour process may stop and the fruit soften without changing colour. For this reason papaya should be stored at room temperature until ripe (soft). Ripening can be slowed by chilling at 60 degree F. or stopped at 50 Degree F. Chilling below 50 Degree F will damage fruit. Chill a papaya once it is completely or almost ripe, not before. Serve within a day or two, or it loses flavor (Jo-Feng et al 1990) [2].

Market discarded papaya and glut season processing is necessary, where it ensures fair returns to the growers to improve their economic condition.

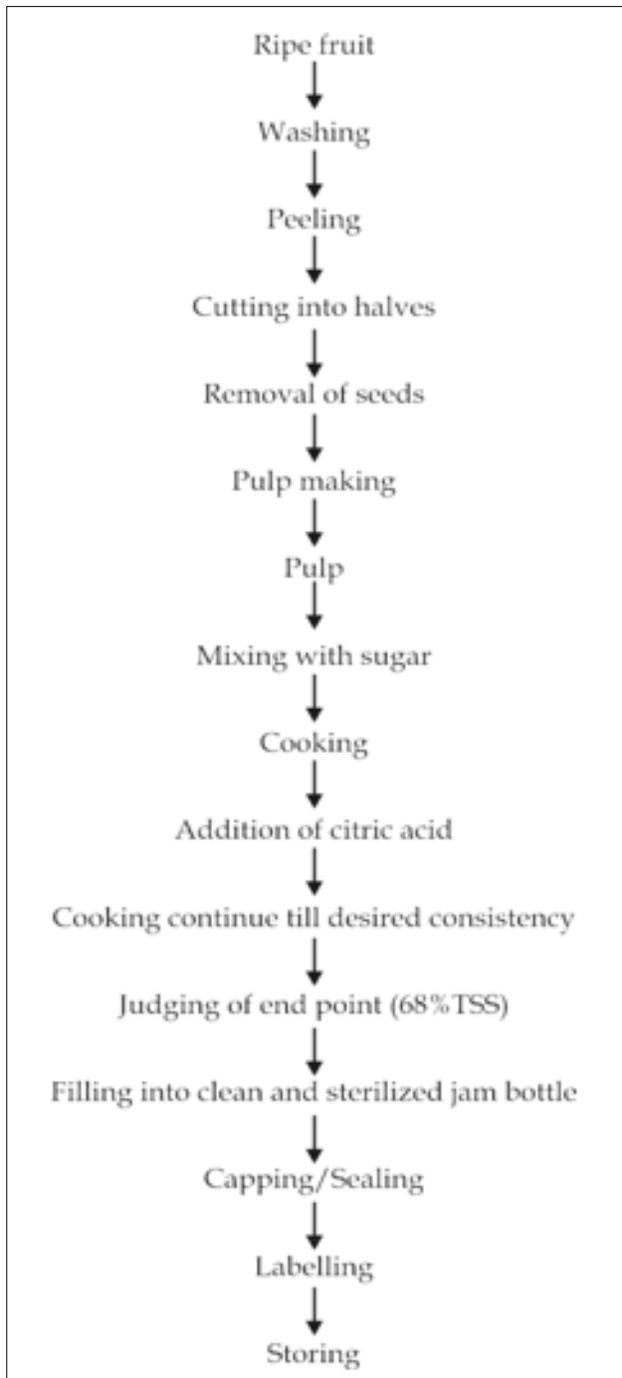


Fig 1: Process Flow Chart for the Preparation of Papaya Jam

Recipe : Pulp 1 Kg, Sugar 0.75 Kg, Water 60 ml and Citric acid 2g

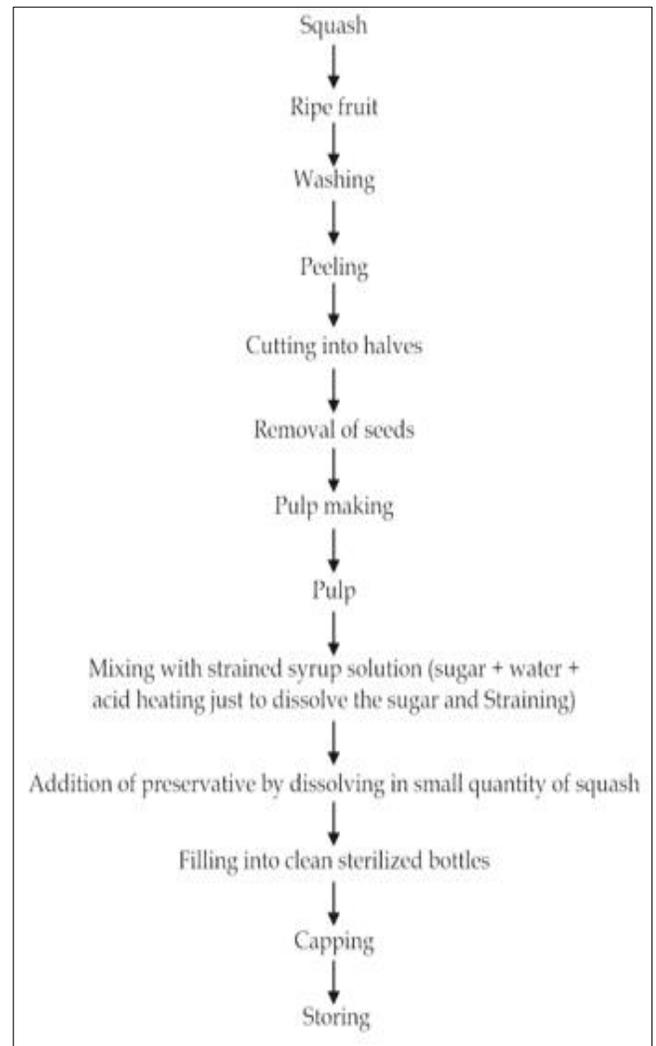


Fig 2: Process Flow Chart for the Preparation of Papaya

Recipe: Pulp 1 Kg, Sugar 1.2 Kg, Water 1 liter and Sodium metabisulphite 2g

It also helps to mitigate the problem of under-employment during off season in the agricultural sectors. The over ripen and mechanical injured papaya fruits are wasted in large quantities due to absence of facilities and know-how for proper handling, distribution, marketing and lack of storage facilities. Fruit preservation has an important role in the conservation and better utilization of fruits in order to avoid wastage of fruits.

Therefore, there is great scope for processing of papaya fruits to curtail the post harvest losses.

The various products such as jam, jelly, candy, nectar, puree, concentrate slab, toffee, tutti-fruity freeze dried chunk, dried rolls, dried slices and pickles can be prepared from papaya processing. The knowledge of cost and its profitability will be useful for the farmers, who want to substitute this crop for the traditional crop grown in the area. Keeping in view above aspects, the present study has been undertaken to work out value addition in papaya. This, to some extent, can be achieved through developing and popularizing suitable processing and marketing strategies for these market discarded papaya fruits.

Mechanical injured papaya fruits were collected at every point i.e. from harvesting, transportation, grading, washing/wiping, packaging and marketing. The papaya fruits collected from all the selected places based on the availability within the Chitradurga and nearby districts. The collected mechanical injured papaya fruits were immediately brought to the Post Harvest Engineering laboratory, College of Horticulture, Hiriya of Chitradurga district for preparation of value products and the below mentioned products have been prepared. The sensory evaluation has been made on nine point hedonic scale.

The same products prepared from the without mechanical damaged fresh papaya fruits also and same sensory evaluation was done. It was found that products prepared from both type of fruits was no much difference except the total quantity of pulp. This indicates that mechanical injured papaya fruits can be used for the preparation of all type of value added products.

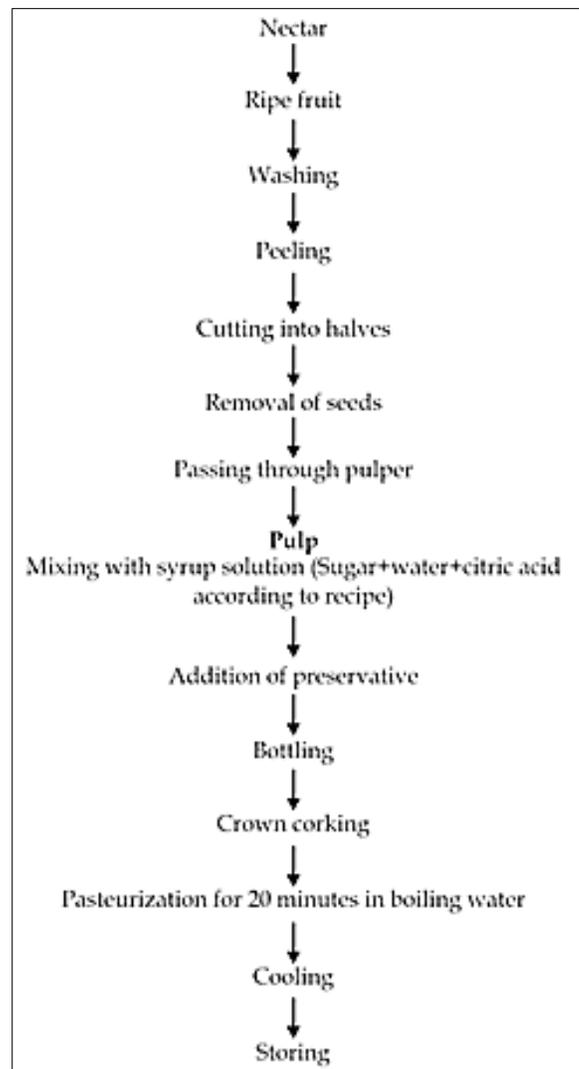


Fig 3: Process Flow Chart for the preparation of Papaya

Recipe: Pulp 20%, Total Soluble Solids 12%, Acidity 0.3% and Sodium metabisulphite 0.1%

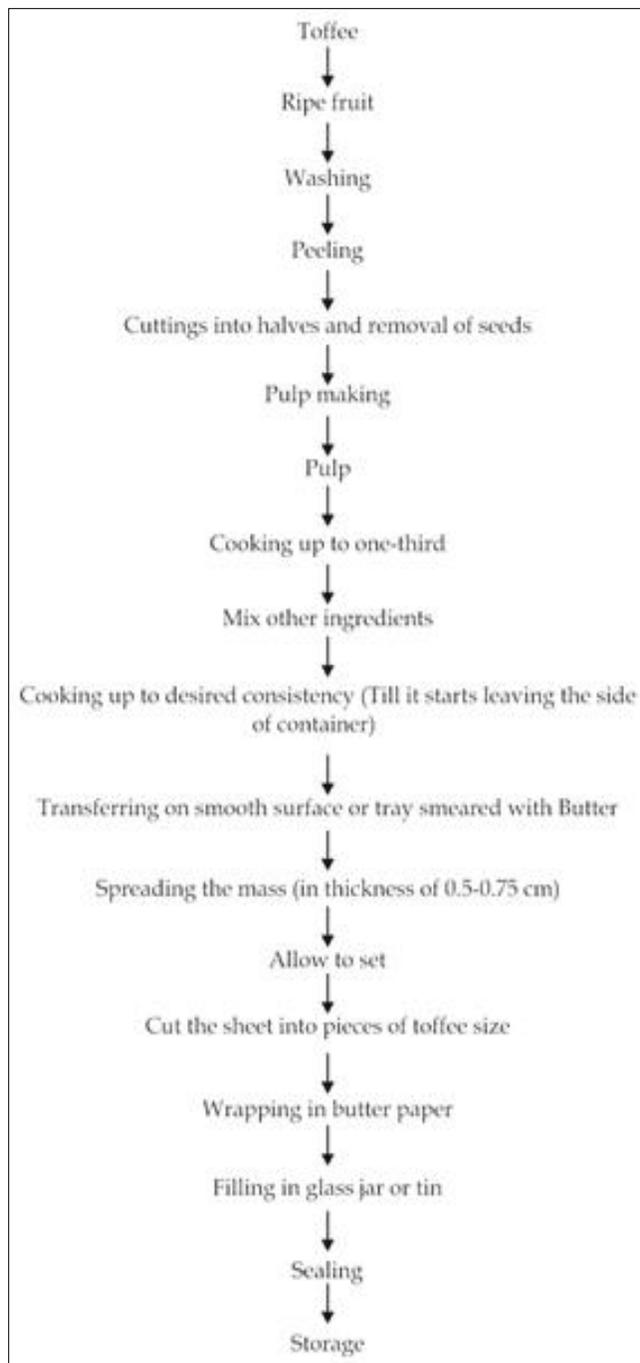


Fig 4: Process Flow Chart for the Preparation of Papaya

Recipe: Pulp 1 Kg, Sugar 600g, Glucose 100g, Skim milk powder 160 g and Butter 100g

Conclusion

Most of the market discarded papaya fruits are enriched with nutritional and medicinal value. The attempts have been made to proper

utilization of discarded papaya fruits in the Post Harvest Engineering laboratory, Horticultural College, Hiriyur, Chitradurga district of Karnataka. Mechanical injury was the most important parameter that determines the total quantity of papaya. Even the proper and timely utilization of these papaya fruits can also give higher returns for the farmers in general and farm women in particular.

Total quantity of production of the papaya is depends on processing methods, the products like papaya jam, papaya squash, papaya Sauce, papaya toffee and papaya nectar can prepared. These products have good consumer demand because of its nutritional and medicinal value. It has more demand for development of diversified value added products from discarded fruits. It provides the employment opportunity for rural mass, increases export demand of value added products and helps in increase the economy of the country.

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