AgriCos e-Newsletter
ISSN: 2582-7049
Volume : 01 Issue : 07 November 2020 Article No: 07

Processed Products from Papaya

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SUMMARY

Papaya is a very popular fruit grown in tropical countries and belongs to the family of Carcicaceae. Nutritionally papaya is a rich source of carotenoids and also provides fair amounts of B complex vitamins, ascorbic acid and minerals. Papaya can be processed to obtain many preserved products such as candy, jams and jellies. Papaya is also prized for its medicinal properties, which have been documented by many researches. The present review focuses on the salient features of processed products of papaya.

INTRODUCTION

Papaya (*Carica papaya* L.) is a rapid growing hollow stemmed and short-lived perennial tree, belonging to the family Carcicaceae which is usually propagated from seeds. Because of open pollination, papaya is a notoriously difficult crop to maintain as a pure or tree cultivar. This family includes 4 genera and about 20 species of carica native to tropical and subtropical areas of the world (Sidhu, 2006). It may be male, female, or hermaphrodite, the fruits from female trees are round whereas fruits from hermaphrodite trees are elongated. (Bruce and Peter, 2008). The fruit is melon-like, oval to nearly round, somewhat pyriform, or elongated club-shaped, 15-50 cm long and 10-20 cm thick and weighing up to 9 to 10kg. Semi wild (naturalized) plants bear small fruits 2.515 cm in length. The skin of the fruit is waxy and thin but fairly tough. When the fruit ripens it develops a light- or deep- yellow-orange coloured skin, while the thick wall of succulent flesh becomes aromatic, yellow orange or various shades of salmon or red. The ripened fruit is juicy, sweetish and develops a characteristic papaya flavor which resembles the flavor like a cantaloupe. Mature fruits contain numerous grey-black ovoid seeds attached lightly to the flesh by soft, white, fibrous tissue (Morton, 1987).

Products of Papaya

Papaya Pickle

Raw papaya can be used for making salted pickles by brine curing and adding spiced vinegar in the traditional way. Su and Liu (2006) studied the processing technique of papaya pickle preparation with the addition of spices (including garlic, hot pepper and ginger). Nurul and Asmah (2012) developed a papaya pickle and compared the pickle with the fresh papaya for its total phenol (TPC), total flavonoid (TFC), â- carotene, lycopene,

ascorbic acid contents and antioxidant activity. With the process of pickling the researchers found that there was a significant decrease in the above-mentioned parameters in comparison with the fresh papaya.

Papaya Preserves

Papaya preserves are developed by washing, peeling, deseeding papaya and then cutting into pieces; the pieces are soaked for 1-2 days in solution containing sulfite and calcium chloride. The treated pieces are blanched in water (90ÚC), cooled, and then submerged in 30Ú Brix sucrose syrup. More sucrose is added to the syrup gradually until its concentration reaches 45Ú Brix. The syrup-infiltrated fruit are dipped into boiling water to wash off the sugar on their surface, taken out, and then dried in hot air oven, until the water activity drops to 0.75 or lower (Chen *et al*., 2005).

Fermented Papaya Products

Wen-Jun and Hong (2008) studied the brewing technology of papaya and jujube to make healthy wine. A method was described for preparation of wine by fermentation of papaya, jujubes, powdered Eucommia extract and honey for 48 hours at 30-34° C. Lee et al., (2011) studied the impact of amino acid addition on aroma compounds in papaya wine fermented with Williopsis mrakii. The study suggested that papaya juice fermentation with W.Saturnus mrakii in conjunction with the addition of selected amino acid (L-leucine, L-isoleucine, L-valine and Lphenylalanine) can be an effective way to modulate the aroma of papaya wine.

Freeze Drying

Most of the dried products prepared from papaya fruit suffer from undesirable darkening effects. To overcome these defects, less severe treatments have been tried. Freeze-drying is one such method that produced good results to reach a moisture content of as low as 3% in the finished papaya powder. Storage of freeze-dried powder in glass jars did not show significant adverse effects on the quality or composition of finished products after 3 months (Salazar, 1968). Carotenoids were found to be most stable in freeze-dried powder at water activity of 0.33 (6–7% moisture content) and the researchers recommended freeze drying for the storage of papaya (Arya *et al*., 1983). A combination of osmotic dehydration and freezing was investigated for the preservation of papaya slices (Moyano *et al*., 2002). Two models have been developed by Mendoza and Schmalko (2002) to predict the contents of moisture and sugar during osmotic drying of papaya slices. The osmotic (60 o brix, 60°C) and air-drying (60°C) methods were used for drying papaya slices.

By-Products from Papaya

Papain

Papain is the major by-product from dried latex derived from papaya fruit, which contains a protein hydrolyzing enzyme. This enzyme has a number of specific technological applications such as in food, meat tenderization, beverages, and animal feeds; pharmaceutical industry; textile industry and detergents; paper and adhesives; medical applications; sewage and effluent treatment; and research and analytical chemistry (Flynn, 1975; Sanchez- Brambila *et al*., 2002; Kaul *et al*., 2002). Among the food applications, the use of papain in chill haze removal during beer clarification as well as in the tenderization of meat has shown a steady increase over the past years. There is also a belief in some countries of Asia that eating papaya by pregnant ladies results in abortion (Adebiyia *et al*., 2002).

Pectin

To make papaya cultivation and papain industry viable, the profitable use of promising fruit is essential. The green fruits, whether scarred or not, are rich source of pectin (10% pectin on dry basis), which can be extracted for use in food industry (Das *et al*., 1954; Varinesingh and Mohammed-Maraj, 1989). Peel is shown to be higher in pectin content than the papaya pulp, and pectin content increases at a higher rate with fruit maturity up to a stage (Paul *et al*., 1998). The integrated processing of papaya fruits for the production of papain and pectin has been found to be economical (Nanjundaswamy and Mahadeviah, 1993). The process as described by the above authors reported that, it gave a papain yield of 0.25% and a pectin (jelly grade 200) yield of 1% on fresh fruit

basis. The variety of the fruit, the growing conditions, and the stage of maturity of fruit are all known to influence the chemical composition of pectin (Lassoudiere, 1969)

CONCLUSION

Carica papaya is considered as one of the important fruits because of its nutritional, medicinal and neutraceutical properties. Papaya is an excellent source of nutrients such as; carotenes, vitamin C, and flavonoids, the B vitamins including folate and panthothenic acid, minerals such as potassium and magnesium and dietary fiber and phytochemicals.

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